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British Standard

Storage, transportation and maintenance of magnetic media for use in data processing and information storage

Part 1. Recommendations for disk packs, storage modules and disk cartridges

Stockage, transport et maintenance des supports magnétiques utilisés pour le traitement
et le stockage des informations

Partie 1. Recommandations pour piles de disques, modules de mémoire et cartouches de disque

Speicherung, Transport und Wartung von magnetischen Datenträgern in der Datenverarbeitung
und Informationsspeicherung

Teil 1. Empfehlungen für plattenstapel, Speichermodule und Plattenkassetten

Foreword

This Part of BS 4783 has been prepared under the direction of the Information Systems Technology Standards Committee. It has been developed from advice and information provided by Government computing departments, magnetic media suppliers and manufacturers, users and specialist disk maintenance organizations.

The use of high-grade materials and modern production techniques, that include rigorous testing and inspection, ensures that disk packs are manufactured to exacting standards. To continue to benefit from the care taken during manufacture, and to ensure optimum performance from a product during its life, the user should also exercise care, and this British Standard gives appropriate advice.

Manufacturers' publications often cover some of the advice given and, where available, should be read in conjunction with this standard.

BS 4783 is being published in four Parts as follows.

- Part 1 Recommendations for disk packs, storage modules and disk cartridges
- Part 2 Recommendations for magnetic tape on open spools
- Part 3 Recommendations for flexible disk cartridges
- Part 4 Recommendations for magnetic tape cartridges and cassettes

Part 2 will form a revision of BS 4783 : 1972. When Part 2 is published, BS 4783 : 1972 will be withdrawn.

The following British and international standards are relevant to disk packs and disk cartridges.

- BS 4850 Specification for magnetic six-disk packs for data processing
 - Part 1. Mechanical and magnetic properties
 - Part 2. Track format(Technically equivalent to ISO 3561)

- BS 5356 Specification for magnetic single disk cartridges (top loading) for data processing
 - Part 1. Mechanical and magnetic properties (Identical with ISO 3562-1976)
 - Part 2. Track format (Identical with ISO 3563-1976)

- BS 5359 Specification for magnetic eleven-disk packs for data processing. Mechanical and magnetic properties (Identical with ISO 3564-1976)

- BS 5595 Interchangeable magnetic twelve-disk pack for information processing
 - Part 1. Specification for 100 Mbytes magnetic twelve-disk pack (Identical with ISO 4337-1977)
 - Part 2. Specification for 200 Mbytes magnetic twelve-disk pack (Identical with ISO 5653-1980)

- BS 6266 Code of practice for fire protection for electronic data processing installations

- ISO 2382 Data processing — Vocabulary
 - Section 12 Data media, storage and related equipment

A British Standard giving recommendations for the accommodation and environment of computer installations is in preparation.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Recommendations

1 Scope

This Part of BS 4783 provides recommendations on the care and maintenance of exchangeable disks.

It includes recommendations for storage, handling, transportation, inspection, cleaning, maintenance and fault identification.

2 Definitions

For the purposes of this Part of BS 4783, the following definitions apply.

2.1 alternative tracks. Spare tracks specifically reserved for the relocation of data originally destined for data tracks which are subsequently found to be defective (flagged).

2.2 axial runout (vertical runout). A measure of the flatness of each disk platter surface defining the variation of the surface from its nominal position.

2.3 correctable error. An error that can be corrected by the error correcting code (ECC).

NOTE. See 2.13.

2.4 cosmetic blemishes. A blemish usually resulting from the manufacturing process, e.g. machining marks (from grinding or lapping), or slight variations in the oxide coating.

NOTE. Cosmetic blemishes do not necessarily affect operational performance.

2.5 coverset. An outer protective cover of a disk pack.

2.6 cylinder. On the data surfaces, the set of data tracks having the same data track identification.

2.7 disk. A disk pack, storage module or disk cartridge.

2.8 disk cartridge. An exchangeable platter assembly enclosed in a plastic protective container.

NOTE. There are two basic types, referred to as front-loading or top-loading according to the method of inserting the cartridge into the drive.

2.9 disk drive. A complete disk mounting device comprising spindle, motor, read/write head(s) with associated controls.

2.10 disk pack. A removeable assembly of platters within a protective coverset.

2.11 disk surface. One side of a coated platter.

2.12 drive spindle lockshaft. An assembly in the disk drive providing the mechanical interface with the disk pack spindle lock.

2.13 error correcting code (ECC). A data checking method capable of detecting and correcting single bursts of errors.

2.14 error free. Containing no uncorrectable or correctable errors.

2.15 extreme environment. Environmental conditions outside the limits referred to in this standard.

NOTE. See 5.1.

2.16 flag free. Containing no uncorrectable errors but possibly containing a certain number of correctable errors.

2.17 flawed or flagged track. A track in which an uncorrectable error exists.

2.18 formatting. The prerecording of the control areas on the disk.

2.19 head crash. A fault condition occurring when a head comes into contact with the magnetic recording surface(s) of a disk platter, causing damage.

2.20 head to disk interference (HDI). Contact between the disk drive magnetic head assembly and the surface of the disk.

NOTE. HDI does not necessarily produce data errors or a head crash.

2.21 high technology disks. Disks incorporating a head tracking servo system.

2.22 horizontal runout (HRO). A measure of the concentricity of each disk platter.

2.23 initialization. The preparation of a disk for use.

NOTE. Initialization may involve labelling (identifying) tracks, volumes or sectors.

2.24 library. A storage area for media and associated equipment.

2.25 lockscrew assembly (LSA) (spindle lock). A metallic assembly in a disk that is screwed into the lockshaft on the disk drive.

2.26 low technology disks. Disks without a head tracking servo system.

2.27 permanent (uncorrectable) error. An error that cannot be corrected by the error correcting code.

2.28 platter (plate). A flat, circular plate made from aluminium coated with a magnetizable surface layer on which data can be stored by magnetic recording.

2.29 rebuilt disk, as new. A disk constructed from parts which, although not necessarily new, have been individually inspected and tested to verify the compliance with the specification for new parts.

2.30 recording surface. A disk substrate coated with magnetic recording medium.

2.31 refurbished disk (repaired disk). A disk in which any damaged parts of the assembly have been replaced and then tested to verify compliance with the specification for a new disk.

2.32 sector. That part of a track on a platter of a predetermined angular displacement.

2.33 sector disk. A notched disk used by the drive electronics to monitor speed and position.

2.34 servo surface. A prerecorded surface with positioning data that is used as an electrical and physical reference for all other surfaces.

NOTE. A servo surface is an integral part of high technology disk packs, storage modules and certain disk cartridges.

2.35 storage module (SMD). A high technology disk with bit and track densities in excess of 6000 bits per inch and 400 tracks per inch respectively.

2.36 substrate. The uncoated platter.

2.37 track. On the platter surfaces an area for data storage that is accessible to a given read head position.

3 Disk library

3.1 General

Disks should be stored and their use monitored by means of a central facility typically referred to as a disk library.

3.2 Personnel

Personnel should be trained in their responsibility for the condition, care and handling of disks in order to improve and maintain the proper functioning of any library. Ideally, an individual should be designated as a librarian with overall responsibility for day-to-day maintenance and control.

3.3 Equipment

The maintenance equipment available at a computer installation will inevitably be governed by the library size and comparative cost effectiveness. Site policy should clearly indicate who is responsible for the provision of resources and equipment, such as disk inspection and cleaning devices, consumables (replacement filters, cleaning fluids and materials); e.g. the equipment engineers or operational staff.

3.4 Location

The library should be sited away from electrical equipment and dust-producing peripherals such as line printers, paper tape or punched card machines.

The library should be adjacent to the computer room with the same or very similar environmental conditions. Monitoring devices for temperature and humidity should be installed.

Stationery and cardboard containers should not be stored within the area.

Chemicals and other materials stored in the library should be restricted to those required for on-going maintenance.

3.5 Security, safety and cleaning

Access to the library and computer areas should be controlled and restricted to essential personnel, both to keep down the amount of dust and dirt and to maintain security.

Items that are hazardous (e.g. disk-cleaning fluids) should be identified with a suitable warning label and should be kept in a locked cabinet when not in use.

The library should be kept clean and there should be no eating, drinking or smoking in this area because of the risk of disk contamination.

All personnel should wear clothing that is antistatic and does not shed fibres. Some personal cosmetics, including hand creams, nail varnish and face powders, may lead to contamination and their use should be avoided.

The materials, equipment and methods used by cleaners in computer rooms and magnetic media libraries should be approved by the equipment suppliers or manufacturers.

Library and computer areas should not be allowed to become contaminated and preventative cleaning, using a disciplined schedule, should be implemented. A smart, clean working environment is often an outward sign of an effective unit and may positively assist employee morale.

4 Incoming disks (control procedures)

4.1 Incoming inspection

On receipt of disks, whether new, interchange, rebuilt or refurbished, the recommended inspection procedures outlined in appendix A should be followed. Any disk delivered in a damaged carton should be set aside for immediate reference to the consignor in case the consignor needs to make a claim against the carrier.

The high standards of dust filtration and cleanliness used during manufacture should ensure that newly delivered disks do not require cleaning prior to use. However, a preliminary inspection by the user is considered essential and, if contamination is suspected, a site engineer or the media supplier or both should be asked for advice.

4.2 Records

When any disk is brought into the library area, a record sheet or card should be created or updated similar to the example shown in figure 1. Disk usage, cleaning, inspection and any subsequent refurbishment should be entered on the record together with details of any flawed or flagged tracks that exist or develop. Cosmetic blemishes should also be noted although these may not necessarily affect performance. If disk inspection equipment is available its use allows more detailed surface checking. A record sheet similar to the example shown in figures 2 and 3 should be kept. Figure 4 illustrates surface number identification for the types of disk packs and storage modules most widely used.

In some cases, high technology disks are provided with a track flag log (TFL) or surface error map (SEM) (see also 4.5) and this should be kept with the record.

DISK RECORD											
Manufacturer				Date received							
Disk type				Refurbished/ (1)							
Manufacturer's serial no.				Rebuilt date (2)							
User allocated serial no.				(3)							
Date initialized				On drive no.							
Re-initialized (1)				On drive no.							
Re-initialized (2)				On drive no.							
Record of use		Fail type and date		Date inspected/ cleaned (and by whom)		Comments (including reference numbers of inspection reports)		Date inspected/ cleaned (and by whom)		Comments (including reference numbers of inspection reports)	
Date	User	Date	User	Date	User	Date	User	Date	User	Date	User

Figure 1. Example of a disk record sheet

DISK PACK INSPECTION—SUMMARY REPORT

SITE

QUANTITY INSPECTED

Type	Manufacturer	Serial No.	Pass	Fail	Suspect	Comments

Specialist Recommendation:

Recommended date for next inspection:

Specialist contractor name Signature

User comments: Signature

Figure 3. Example of a disk pack inspection summary report