

KOREAN INDUSTRIAL STANDARD

Interchangeable Magnetic Twelve-Disk Pack (100 bytes)

1. Scope

This Korean Industrial Standard specifies the general characteristic mechanic and magnetic characteristics and the pre-initializations to secure a physical compatibility of interchangeable magnetic twelve-disk pack (memory capacity 100 M bytes) which is used in the information processing system.

Remark In this standard, the unit numerical values in ; are in accordance with gravitational unit system and are added as references.

2. General Description

2.1 Structure Figures

A typical structure of interchangeable magnetic twelve-disk pack (refer as to disk pack) is shown in Appended Figure 1 to 6.

Corresponding International Standard

ISO 4337 Information Processing-interchangeable Magnetic Twelve-disk Pack (100 M bytes)

Related standards	KS C 5601	Code for Information Interchange
	KS C 5602	Glossary of Terms Used in Information Processing
	KS C 5620	Code Extension Techniques for Use with the Code for Information Interchange
	KS C 5626	Physical Characteristics of Interchangeable Magnetic Six-disk Packs
	KS C 5627	Magnetic Characteristics of Interchangeable Magnetic Six-disk Packs
	KS C 5628	Physical Characteristics of Interchangeable Magnetic Eleven-disk Packs
	KS C 5629	Magnetic Characteristics of Interchangeable Magnetic Eleven-disk Packs
	KS C 5630	Physical Characteristics of Interchangeable Magnetic Single Disk Cartridge(Top loaded)
	KS C 5641	Interchangeable Magnetic Twelve-disk Pack (200 M bytes)
	KS C 5708	Dimension and Location of Rectangular Punched Holes in Paper Card for Information Interchange.

- Appended Figure 1 Analytic View of Disk Pack
- Appended Figure 2 Structural Figure of Disk Pack
- Appended Figure 3 The Relationship between the Top Cover and the Disk Pack
- Appended Figure 4 Related Figure of Disk Pack
- Appended Figure 5 Spindle Lock
- Appended Figure 6 A Cross-section of the Outer Circumference of Magnetic Disk

2.2 Main Elements

The main elements of the disk pack are as follows (See Appended Figure 1).

- Top Cover
- Hub
- Spindle Lock
- Protective Disk
- Magnetic Disk
- Bottom Cover

Remark This disk pack consists of the top protective disk of the uppermost part, the bottom protective disk of the lowest part and 10 pieces of interchangeable magnetic disks between, so it becomes 12 pieces of interchangeable disks in total. The top protective disk and the bottom protective disk are to protect 10 pieces of interchangeable disks between them, and 10 pieces of interchangeable magnetic disks consist of 19 data recording surfaces and one servo recording surface (See Appended Figure 2 and 7).

2.3 Direction of Rotation

The disk pack shall rotate counter-clockwise when viewed from the top.

2.4 Pack Capacity

A gross information capacity of 100 M bytes (8-bit / byte) is achieved in this 12 disk pack by the use of 19 surfaces of data disk. Data are recorded on 404 tracks per data surface. The track spacing gives approximately 8 tracks per millimeter, each containing a maximum of 13030 bytes of information. The recording density varies between outer and inner tracks and reaches a maximum of 159 (bit / mm) on the inner most track.

3. General Required Details

3.1 Operation and Storage Environment

3.1.1 Operation

The operating temperature - measured within the disk pack area of the drive - shall be within

the range 15°C to 57°C at a relative humidity of 80%. The wet bulb reading shall not exceed 26°C. Before a disk pack is placed into operation, it shall be conditioned within its covers for a minimum of 2 hours in the same environment as that in which the disk drive is operating. The time which is required in the correction of temperature difference is decided according to the surrounding temperature of the disk drive and the disk pack itself. It shall be the time of leaving alone when comes out after calculating the temperature gradient of 10°C / hour when this difference exceeds 20°C. The ranges specified above does not necessarily apply to the disk drive.

3.1.2 Storage

The storage temperature shall be within the range -40°C to +65°C, the wet bulb reading not exceeding 30°C. For wet bulb temperatures between 0.5°C and 30°C the disk pack shall be able to withstand a relative humidity of 8 to 80%.

It is recommended that the pack shall not be stored under the extreme conditions of the above range. a temperature gradient of more than 10°C / hour shall be avoided. Also, the ambient stray magnetic field intensity shall not exceed 4000A / m.

3.2 Test Conditions

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

3.3 Durability of Shock and Vibration

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

3.4 Material

Unless otherwise stated, the disk pack shall be constructed from any suitable material in order that the dimensional, inertial and other functional requirements of this standard are complied with. The coefficient of thermal expansion of all the recording disk shall be the same.

4. Dimension

4.1 Reference Plane

Unless otherwise stated, all dimensions are referred to a given reference plane. This is the surface, perpendicular to the axis of the pack, on which the pack rests with its three rest

buttons (See Appended Figure 4).

4.2 External Dimensions

4.2.1 Height of Disk Pack

The height of the disk pack (h_1) with cover shall be maximum 180mm (See Appended Figure 2).

4.2.2 Outer Diameter of Disk Pack

The outer diameter of the disk pack (d_1) with cover shall be maximum 381mm (See Appended Figure 2).

4.3 Top Cover

4.3.1 Outer Radius, Pack-centerline Relationship

When measured with reference to the hub centerline the outside radius (r_1) of the top cover shall be 183.65 to 185.42mm (See Appended Figure 3).

4.3.2 Position of the Lower Edge of the Top Cover

The distance (h_2) between the reference plane and the lower edge of the top cover shall be 3.56 ± 1.47 mm (See Appended Figure 3).

4.4 Hub

4.4.1 Diameter of Flexure Pads

The diameter (d_2) of the three hub flexure pads shall be 44.432 ± 0.005 mm (See Appended Figure 4). The measuring temperature shall be 20.0 ± 0.5 °C.

4.4.2 Height of the Flexure Pads

The height (h_3) of the flexure pads shall be 1.91 ± 0.13 mm (See Appended Figure 4).

4.4.3 Surface Roughness of the Flexure Pads

The surface roughness of the flexure pads shall be 0.4a.

4.4.4 Relief of the Flexure Pads

The diameter (d_3) of the relief of the flexure pads shall be 44.478 ± 0.015 mm (See Appended Figure 4). However, the measuring temperature shall be 20.0 ± 0.5 °C.

4.4.5 Height of Flexure pads from the Reference Plane

The height (h_4) of flexure pads from the reference plane shall be 1.40 ± 0.30 mm (See Appended Figure 4).

4.4.6 Radial Compliance of Flexure Pads

The radial compliance of each flexure pad shall be $0.1 \pm 0.2 \mu\text{m} / 4.5\text{N}$ (0.46 kgf); radial force applied at the collet flexure pad with d_2 expanded to 44.4500 ± 0.0025 mm (See Appended Figure 4).

4.4.7 Rest Buttons

4.4.7.1 Location

The three rest buttons are placed in the circumference of diameter (d_4) in equal parts. Here, the d_4 shall be 139.70 ± 0.13 mm (See Appended Figure 4).

4.4.7.2 Diameter and Shape

The diameter (d_5) of the rest buttons shall be 11 ± 1 mm, and the surface of them shall be spherical. Here, the curvature radius (r_2) of the spherical surface shall be 110 ± 15 mm (See Appended Figure 4).

4.4.7.3 Surface Roughness and Hardness

The surface roughness of the rest buttons shall be $0.2\mu\text{m}$, and the hardness shall be 55 to 60 HRC.

4.5 Spindle Lock

4.5.1 Thread of the Spindle Lock

The thread of the spindle lock shall be a double and 3/8 lead thread of type 24 UNF-2A (See Appended Figure 5).

4.5.2 Diameter of the Lower Part of the Spindle Lock

The diameter (d_6) of the lower part of the spindle lock shall be 9.37 ± 0.13 mm (See Appended Figure 5).

4.5.3 Minimum Efficiency Thread Length

The minimum efficiency thread length (h_5) shall be 7.14 mm (See Appended Figure 5).

4.5.4 Chamfer

The angle (α) for the chamfer in the lower end of the spindle lock shall be $45 \pm 2^\circ$, and the diameter (d_7) shall be $8.00 \pm 0.13\text{mm}$ (See Appended Figure 5).

4.5.5 Location of the Shoulder of the Spindle Lock

The distance (h_6) from the reference plane to the shoulder of the spindle lock (refer to as the shoulder) shall be $13.51 \text{ S} + 0.23\text{mm}$ (See Appended Figure 5).
-0.30

4.5.6 Length of the Lower Part of the Spindle Lock

The length of the lower part of the spindle lock shall be $19.15 \pm 0.076\text{mm}$ (See Appended Figure 5).

4.5.7 Maximum Diameter of the Lower Part of the Spindle Lock

The diameter (d_8) of the lower part of the spindle lock with the safety balls expanded shall be $10.7 \pm 0.1\text{mm}$. The safety balls shall not expand before the lock-shaft pin is at a distance (h_8) of Maximum 16.97mm from the shoulder of the spindle lock. The safety balls shall cease to expand when the lock-shaft pin is at distance (h_9) of Minimum 9.53mm from the shoulder of the spindle lock. The diameter (d_9) with relaxed balls shall be Minimum 9.53mm (See Appended Figure 5).

4.5.8 Location of the Safety Balls

The center (h_{10}) of the safety balls shall be $9.04 \pm 0.23\text{mm}$ from the shoulder (See Appended Figure 5).

4.5.9 Diameter of the Hole Inserting the Lock Shaft pin

The diameter (d_{10}) of the hole of the spindle lock which inserts the lock shaft pin shall be $3.18 \pm 0.13\text{mm}$ (See Appended Figure 5).

4.5.10 Depth for Inserting the Lock Shaft Pin

The depth for inserting the lock shaft pin into the spindle lock (h_{11}) shall be Maximum 13.84mm from the shoulder (See Appended Figure 5).

4.5.11 Location of the Lock shaft Pin Removal of the Top cover

It shall be possible to remove the top cover when the lock shaft has penetrated into the spindle lock to a distance (h_{12}) of $14.44 \pm 0.21\text{mm}$ from the shoulder (See Appended Figure 5).

4.5.12 Hardness

The hardness in the thread area of the spindle lock shall be 55 to 60 HRC.

4.6 Bottom Protective Disk

4.6.1 Diameter

The diameter (d_{11}) of the bottom protective disk shall be $3.60 \pm 0.25\text{mm}$ (See Appended Figure 4).

4.6.2 Thickness

The thickness (e_1) of the bottom protective disk shall be $1.30 \pm 0.08\text{mm}$ (See Appended Figure 4).

4.7 Recording Disk Spacer

The outer circumference of the recording disk should not come out of the outer surface of radius (r_3) 90.9mm centering around the turning axis of the disk pack (See Appended Figure 4).

4.8 Recording Disks

4.8.1 Diameter

The diameter (d_{12}) of the recording disks shall be $356.25 \pm 0.15\text{mm}$ (See Appended Figure 4).

4.8.2 Thickness

The thickness (e_2) of the recording disks shall be $1.905 \pm 0.025\text{mm}$ (See Appended Figure 4 and 6).

4.8.3 Disk Edge Chamfer

For a distance (b) of less than 1.3mm from the outside edge of the disk, the disk contour shall be relieved within the extended boundaries of the disk surfaces.

4.9 Top Protective Disk

4.9.1 Diameter

The diameter (d_{13}) of the top protective disk shall be $356.25 \pm 0.15\text{mm}$ (See Appended Figure 4).

4.9.2 Thickness

The thickness (e_3) of the top protective disk shall be $1.27 \pm 0.05\text{mm}$ (See Appended Figure 4).

4.10 Distance from Reference Plane

The distance between the reference plane and each recording disk, the top and bottom protective disks are as follows (See Appended Figure 4).

4.10.1 Bottom Protective Disk

The distance (h_{13}) between the reference plane and the lower surface of the bottom protective disk the range of 0.56 to 1.41mm (See Appended Figure 4).

4.10.2 Recording Disks

The distances (h_{14} to h_{23}) between the reference plane and the lower surface of each recording disk are as follows (See Appended Figure 4).

$$h_{14} = 10.478 \pm 0.203\text{mm}$$

$$h_{15} = 20.003 \pm 0.203\text{mm}$$

$$h_{16} = 29.528 \pm 0.203\text{mm}$$

$$h_{17} = 39.053 \pm 0.203\text{mm}$$

$$h_{18} = 48.578 \pm 0.203\text{mm}$$

$$h_{19} = 58.103 \pm 0.203\text{mm}$$

$$h_{20} = 67.628 \pm 0.203\text{mm}$$

$$h_{21} = 77.153 \pm 0.203\text{mm}$$

$$h_{22} = 86.678 \pm 0.203\text{mm}$$

$$h_{23} = 96.203 \pm 0.203\text{mm}$$

4.10.3 Top Protective Disk

The distance (h_{24}) between the reference plane and the lower surface of the top protective disk shall be $105.982 \pm 0.432\text{mm}$.

4.11 Location of the Lowest Part of Disk Pack

The lowest part of the disk pack shall not extend outside an annular space defined by a distance (h_{25}) below the reference plane of maximum 7.6mm and inner (r_4) and outer (r_5) radii shall be 78.0mm and 96.5mm (See Appended Figure 4).

4.12 Height of the Disk Pack

The height (h_{26}) of the disk pack from the reference plane shall be maximum 123.00mm (See Appended Figure 4).

4.13 Relationship between the Hub and the Disk

4.13.1 Distance from the Reference Plane in the Operation of Rotation

the interval from the reference plane defined in sub-clause 4.10 is applicable even when the disk turns within the range of 2500 to 3700 min^{-1} . This requirement shall apply to the annular area of all disk surfaces between an outer radius of 175.08mm minimum and an inner radius of 98.42mm minimum.

4.13.2 Axial Runout of Disks

The axial runout of disks shall be maximum 0.15mm in the recording disks, and maximum 0.51mm in the top and bottom protective disks, regardless of the rotational number as far as not more than the maximum allowable rotational number (See sub-clause 5.3).

4.13.3 Acceleration of Axial Runout

When the disk pack turns round in $3600 \pm 72 \text{ min}^{-1}$, the peak value of the axial acceleration of the recording disk surfaces shall not exceed $\pm 76 \text{ m/s}^2$, provided that the scope shall be the annular area defined in sub-clause 4.13.1, the measuring shall be performed by the measuring instrument with cut-off frequency of 2200 Hz, attenuation of 18dB / octave.

4.13.4 horizontal Runout of Disks

The horizontal runout shall not exceed 0.25mm for the recording disks and 0.51mm for the top and bottom protective disks with respect to the centerline of the disk pack hub.

4.13.5 Angular Shift between Disks and Hub

After the disk pack has experienced a positive or negative acceleration during normal operation, the angular shift between disks and hub shall remain equal to zero.

4.14 Efficient Surface of Magnetic Layer

The efficient surface of the magnetic layer of the recording disks shall be the annular area which is surrounded by the two circles, the outer circumference of the recording disk and concentric inner diameter 190.5mm and outer diameter 352.0mm.

5. Mechanical Characteristics and the Related Characteristics

5.1 Inertia Moment

the inertia moment of the disk pack shall not exceed $10.7 \times 10^{-4} \text{ Kg.m}^2$.

5.2 Movement Balance

The movement balance of the disk pack shall be maximum 100 g.mm on the level which runs parallel to the magnetic disk lying on 5.84 ± 1.3 mm toward the upper direction and the lower direction respectively from the upper surface of the top protective disk and the lower surface of the bottom protective disk. This measuring is performed not to influence the unique vibration of the measuring instrument. Also, it can be carried out on the level with the rotational axis.

5.3 Maximum Rotational Speed

The disk pack shall be able to withstand the rotational speed of 3700 min^{-1} counter-clockwise as viewed from the top.

5.4 Locking pull

The disk pack shall be held to the disk drive spindle by a force of 1100 to 2000 N (112 to 204 kgf), exerted by the downward pull of the disk drive lock shaft on the disk pack spindle lock.

5.5 Air Supply condition

5.5.1 Air Cleanness Class

The air which is supplied in the disk pack from the disk drive shall be the cleanness class that a number of particles per one liter of air, which are of diameter not less than 0.5 μm , do not exceed 3.5 units (See Reference 1).

5.5.2 Pressure

The immediate area of the disk pack in the operation of setting shall be keeping the static pressure of more than 25 Pa (0.25 mm bar) to prevent the mixing of dust from the environment of the drive.

5.6 Thermal Time Constant

The disk pack thermal time constant shall not exceed 1 minute when measured with the disk pack rotating at $3600 \pm 72 \text{ min}^{-1}$. Also, the thermal time constant is the time until the difference between the drive and the disk pack reaches 1 / 3 of initial temperature difference.

5.7 Electrical Earthing

The electrical earthing circuit which passes the drive through the hub from the magnetic disk shall be made up.

5.8 Physical Characteristics of Magnetic Layer

5.8.1 Surface Roughness

The surface roughness of the magnetic layer shall be 0.05 μm and 0.38 μm R_{max} . Provided that the front curvature radius of stylus for measuring shall be 2.5 μm .

5.8.2 Durability

5.8.2.1 Durability in Solvents

The magnetic layer should resist 91% isopropyl alcohol or the other substitutes which are used for cleaning surface.

5.8.2.2 Intensity of Adhesion

The magnetic layer should have enough intensity of adhesion not to get desquamation in use or in keeping.

5.8.2.3 Abrasive Wear Resistance

The magnetic layer shall be able to withstand abrasion in operating.

6. Track and Recording Information on Data Surfaces

6.1 Surfaces and Magnetic Heads

The magnetic heads is arranged about the recording surfaces as indicated in Appended Figure 7 and 13. Track location shall be referred to a Cartesian Coordinate system, axes X and Y, with its origin on the axis of rotation of the disk pack.

6.2 Track

6.2.1 Number of Tracks

There shall be 411 discrete concentric tracks per data surface.

6.2.2 Width of Tracks

The recorded track width on the data surface shall be $109 \pm 5 \mu\text{m}$.

Reference The measuring method of track width is shown in Reference 2.

6.2.3 Allowing Error of Track Location

The centerline of any track shall lie within $\pm 5 \mu\text{m}$ of its corresponding track center-line as defined in sub-clause 10.1.5.3. The moving pitch and accuracy of the magnetic head

are defined by the servo track information and the servo track spacing (See sub-class 10.1.5.4).

6.2.4 Moving Locus of Magnetic Head

The magnetic head shall be to have moving locus A or B of Appended Figure 13. In Appended Figure 13 these moving locus is parallel to X axis, and the nominal value is as follows.

$$Y_A = +7.772 \text{ mm}$$

$$Y_B = -7.772 \text{ mm}$$

6.2.5 Adhesion Angle of Magnetic Head and Moving Locus

The magnetic head shall be to attach the recording regeneration gap in parallel with the moving locus of the magnetic head, and the allowing error shall be $\pm 30^\circ$.

6.2.6 Track Address

Each track is given the track address which defines in the following.

6.2.6.1 Track Address

The track address shall be expressed in three-digit decimal number, the outermost and innermost circumference at the information can be recorded in 000 and 410 respectively.

6.2.6.2 Data Surface Address

The data surface address shall be a twodigit decimal number from 00 to 18 to correspond with the head numbers shown Appended Figure 7.

6.2.6.3 Cylinder Address

A cylinder is the set of tracks on the data surfaces having the same track address.

6.2.6.4 Designation of Specific Track Address within the Disk Pack

The specific track address within the disk pack is written in a five-digit decimal number, and expressed in the cylinder address and the data surface address in turn.

7. Test Conditions and Equipment - Data Surfaces

7.1 General Conditions

7.1.1 Rotational Number

The rotational number shall be $3600 \pm 72 \text{ min}^{-1}$ in any test. Rotation shall be counter-clockwise when viewed from above.

7.1.2 Temperature

The temperature of the air entering the disk pack area shall be $27 \pm 2^\circ\text{C}$.

7.1.3 Humidity

The relative humidity of the air entering the disk pack shall be between 30 and 70%.

7.1.4 Pre-processing

Before starting measurements, the disk pack shall be conditioned for 24 hours min. in the same environment as that in which the test equipment is operating.

7.2 Standard Output Data Disk

7.2.1 Characteristics of Standard Output Data Disk

The standard output data disk shall be characterized the innermost and outermost track. The average regeneration output voltage (V_{TA} , See sub-clause 7.7) of respective tracks which are recorded and reproduced 1f and 2f (See sub-clause 7.8) by using a data test head is as follows.

Frequency	Track Address	V_{TA} mV
1 f	000	3.75
	410	1.9
2 f	000	2.7
	410	1.3

7.2.2 Secondary Standard Output Data Disk

This shall be the magnetic disk that V_{TA} is corrected by the standard output data disk by using a data test head. The correction C_D shall measure V_{TA} at both tracks and at both frequencies defined in sub-clause 7.2.1, and it shall be in the range of 0.90 to 1.10 when it is computed by the following formula.

$$C_D = \frac{\text{Standard Output Data Disk } V_{TA}}{\text{Secondary Standard Output Data Disk } V_{TA}}$$

7.3 Data Test Head

7.3.1 Characteristics of the Data Test Head

The measuring of the disk pack shall be taken with a test head which satisfy the following specification. The test head shall be corrected by the standard output data disk.

7.3.2 Gap Width of the Data Test Head

The gap width of the data test head (corresponded to the track width) shall be $109 \pm 2.5 \mu\text{m}$ by measuring optically.

7.3.3 Gap Width of the Data Test Head

The gap width of the data test head shall be $2.54 \pm 63 \mu\text{m}$.

7.3.4 Data Test Head and Adhesion Angle with its Moving Locus

In the data test head its recording reproduction gap shall be taken to the moving locus of recording head in parallel, and the allowing error shall be $\pm 30^\circ$.

7.3.5 Flying Height of the Data Test Head

The flying height of the data test head shall be $1.14 \pm 0.05 \mu\text{m}$ on the track address 410.

7.3.6 Inductance of the Data Test Head

The recording regeneration coil of the data test head shall have an intermediate terminal. The Whole coils and inductance of respective coils are as follows, measured at 1 MHz.

Items	Inductance H
Full Winding	9.4 ± 0.2
Winding of One Side	2.70 ± 0.05
Winding of the Other Side	2.85 ± 0.05

7.3.7 Resonant Frequency of the Data Test Head

As measured at the connector, the resonant frequency of the data test shall be 19.5 ± 0.5 MHz.

7.3.8 Resolution of the Data Test Head

When the data test head resolution is computed by the following formula after the V_T of 1f and 2f is measured, it shall lie between 65% at the track address 000, and between

61% and 75% at the track address 410.

$$\text{Resolution} = \frac{V_{TA} \text{ of } 2f}{V_{TA} \text{ of } 1f} \times 100(\%)$$

7.3.9 Loading Force of the Data Test Head

The loading force of the data test head shall be such as to achieve the flying height given in sub-clause 7.3.5 and shall be $3.4 \pm 0.4\text{N}$ ($0.35 \pm 0.04 \text{ kgf}$).

7.3.10 Correction Factor of the Data Test Head

The data test head correction factors C_H at 1f and 2f shall satisfy the range of C_H from 0.30 to 1.10. In case that C_H is corrected by using the standard output data disk, it is computed by the following formula after each V_{TA} is measured.

$$C_H = \frac{V_{TA} \text{ of the standard output data disk}}{V_{TA} \text{ of the standard output data disk by the data test head}}$$

Also, in case that C_H is corrected by using the secondary standard output data disk, it is computed by the following formula after the respective V_{TA} is measured.

$$C_H = \frac{V_{TA} \text{ of the standard output data disk}}{(V_{TA} \text{ of the secondary standard output data disk} \times C_D \text{ by the data test head})}$$

7.3.11 Overwrite Characteristics of the Data Test Head

The overwrite characteristics of the data test head shall satisfy the following conditions. Write with 1f on track 000 of the standard output data disk and measure the average regeneration output voltage of 1f with a frequency-selective voltmeter. And then, without DC erase, overwrite once at 2f and measure the average regeneration output voltage of the residual track of 1f with a frequency-selective voltmeter. The ratio of voltage and current shall be the range of $150 \pm 5 \text{ dB}$ in the decibel conversion when it is computed by the following formula.

$$\text{Ratio} = \frac{\text{Average regeneration output voltage of the residual track of 1f after overwrite with 2f.}}{\text{Average regeneration output voltage of 1f before overwrite with 2f.}}$$

7.4 Conditions for Measurements Using the Data Test Head

7.4.1 Recording Current

In the frequency 2f, the recording current ($I_{w1} + I_{w2}$) which is measured at the connector of the data test head is as follows, according to the specification shown in Appended Figure 8. Also, the allowing error of the recording current shall be $\pm 1\%$.

Track Address	Recording Current mA
0 to 63	180
64 to 127	173
128 to 191	166
192 to 255	160
256 to 319	153
320 to 383	147
384 to 410	140

Where,

$$I_{W1} - I_{W2} < 2\text{mA}$$

$$T_R = 46 \pm 3 \text{ ns}$$

$$T_F = 46 \pm 3 \text{ ns}$$

$$\text{overshoot} : (6.5 \pm 0.5)\% \times I_W \left(I_W = \frac{I_{W1} + I_{W2}}{2} \right)$$

Also, T_1 and T_2 shall be within the range of 2% for $\frac{T_1 + T_2}{2}$

7.4.2 DC Erase Current

When DC erase current is carried out by using the data test head, DC erase current which flows between an intermediate terminal of the whole coils and a terminal of the one side is as follows. Also, the allowing error of DC erase current shall be $\pm 1\%$.

Track Address	DC Erase Current mA
0 to 63	90.0
64 to 127	86.5
128 to 191	83.0
192 to 255	80.0
256 to 319	76.5
320 to 383	73.5
384 to 410	70.0

7.5 Regeneration Circuit

7.5.1 Input Impedance

The differential input impedance of the regeneration circuit (including the pre-amplifier input impedance and all other distributed and lumped impedance) shall be $900 \pm 45 \Omega$ in parallel with $25 \pm 2\text{pF}$, measured at the head termination connector.

7.5.2 Frequency and Phase Characteristics

The regeneration circuit shall satisfy the following frequency and phase characteristics.

- (a) The frequency response shall be flat within $\pm 0.25\text{dB}$ from 0.1 MHz to 6.45 MHz (0.06f to 4f).
- (b) The -3dB roll-off point shall be at 9.675 MHz (6f).
- (c) The attenuation of Min. 9.675 MHz shall not be less than that given by a line drawn through zero at 9.675 MHz with a slope of -18dB / octave.
- (d) The phase shift shall be less than $\pm 5^\circ$ between 0.1 MHz and 6.45 MHz (0.06f and 4f).

7.5.3 Linearity Upon Voltage

The regeneration circuit shall operate for inputs between 0.3mV and 10.0mV, and its linearity shall be within $\pm 3\%$ or $\pm 50\mu\text{V}$.

7.6 automatic Gain Controlled Amplifier

The AGC-amplifier shall produce an constant output voltage VAGC within $\pm 1\%$ for input voltages from 0.3mV to 10.0 mV (See Appended Figure 9). Its response time shall be 3.4 μs . All frequencies Max. 10 KHz shall be attenuated at a rate of 6dB / octave.

7.7 Track Average Regeneration Output Voltage (V_{TA})

The track average regeneration output voltage (V_{TA}) is the average of the peak-to-peak values of the signals over one revolution of the disk measured at the output of the data test head which connects the regeneration circuit defined in sub-clause 7.5.

7.8 Recording Frequency

The recording frequencies specified of 1f and 2f shall be as follows.

$$\begin{aligned} 1f &= (3225 \pm 3.225) \times 10^4 \text{ transitions / s} \\ &= 1.6125\text{MHz} \pm 1.6125\text{kHz} \\ 2f &= (6450 \pm 6.450) \times 10^3 \text{ transitions / s} \\ &= 3.225\text{MHz} \pm 3.225\text{kHz} \end{aligned}$$

7.9 Use of DC Erase

Unless otherwise specified, all write operations shall be procedure by a DC erase operation.

8. Electrical and Magnetic Performance Test of Data Surfaces

8.1 Surface Tests

8.1.1 Regeneration Output Voltage

Write on any part of the data surface at 2f by using the data test head defined in sub-clause 7.3.1, read back and measure the track average regeneration output voltage (V_{TA}). At this time, the value which is converted by the correction factor (C_H) of the data test head defined in sub-clause 7.3.10 shall be between the upper limit and the lower limit shown in Appended Figure 10 in accordance with the track address.

8.1.2 Resolution

Write on any part of the data surface at 1f by using the data test head defined in sub-clause 7.3.1, read back and measure the V_{TA} . Then DC erase, write at the same position at 2f, read back and again measure the V_{TA} and when the resolution is computed by the following formula, it shall be in the range of 50 to 90%.

$$\text{Resolution} = \frac{V_{TA \text{ of } 2f}}{V_{TA \text{ of } 1f}} \times 100(\%)$$

8.1.3 Overwrite

Write on track 000 at 1f by using the data test head defined in sub-clause 7.3.1 and measure the track average regeneration output voltage of the 1f with a frequency-selective voltmeter. Without DC erase, overwrite once at 2f and measure the residual track average regeneration output voltage of the 1f with the frequency-selective voltmeter. When the residual voltage ratio is computed by the following formula, it shall be maximum -40dB in the decibel conversion.

Residual Voltage Ratio =

Residual track average regeneration output voltage of the 1f after overwrite > Track average regeneration output voltage of the 1f before overwrite >

8.1.4 Residual Noise

The average reproduction output voltage of 2f shall be measured after recording 2f on track 410 using magnetic head used for data testing specified in sub-clause 7.3.1. And after performing the D.C erasion one time, the relation between the residual noise and the number of pulse all over the track, shall be as follows.