

JIS

JAPANESE INDUSTRIAL STANDARD

**9-Track, 12.7 mm Wide
Magnetic Tape for Information
Interchange-Format and Recording,
Using NRZ-1 at 32 cpmm**

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

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9-Track, 12.7 mm Wide Magnetic Tape for
Information Interchange — Format and
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1. Scope

This Japanese Industrial Standard specifies the format and recording standard for 9-track, 12.7 mm wide and data density 32 cpmm magnetic tape, hereafter referred to as the "tape", to be used by NRZ-1 system for information interchange between digital computers and similar machines.

2. Definitions

For the purposes of this Standard, the following definitions apply:

- (1) NRZ-1 method A recording method in which the flux transition occurs for the code "1" and does not occur for the code "0" when the binary codes are recorded consecutively on a track of a tape.
- (2) reference tape A tape which is to be used for the reference of the electromagnetic transducing characteristics, and the characteristic values of which are specified by the International Organization for Standardization (ISO).
- (3) secondary reference tape This is a tape to be described as follows. It is to be used for comparing the electromagnetic transducing characteristics of a tape with those of the reference tape, and the deviations of its characteristics from those of the reference tape are clearly indicated, and by correcting the deviations of the actually measured values it is made possible to carry out an indirect comparison between the characteristics of the tape to be tested and those of the reference tape.
- (4) reference magnetic field The minimum magnetic field applied to the reference tape which causes an output signal equal to 95 % of the maximum (saturated) output when consecutive flux transitions recorded at the specified packing density of 31.5 ftpmm on the reference tape are reproduced.
- (5) reference peak output voltage The average peak (P-P) output voltage obtained when the reference tape is reproduced on which consecutive flux transitions are recorded with the recording current 2.1 times the current sufficient to generate the reference magnetic field at the packing density of 31.5 ftpmm.
- (6) reference edge The edge further from an observer when a tape is lying flat with the magnetic surface uppermost and the direction of movement of the tape at time of recording is from left to right.

Applicable Standards, Corresponding International and
Reference Standards: See page 11.

- (7) track A linear portion on the surface of the magnetic tape which is capable of storing a series of information and being read or written with one head.
- (8) row A portion of a tape in which nine bits of a set are recorded across the width.
- (9) density of recording The number of recorded flux transitions per unit length of a track (ftpmm).
- (10) data density The number of data characters recorded per unit length of a tape (cpmm).
- (11) static skew An averaged value of the maximum distances in the longitudinal direction of the tape of two bits belonging to the same row but to different tracks.

3. Operating Conditions of Tapes

3.1 Operating Environmental Conditions The operating environmental conditions of the tapes at times of recording and reproducing shall be as follows:

Temperature	16 to 32°C
Relative humidity	20 to 80 %
Wet-bulb temperature	not higher than 25°C

If a tape has been exposed during storage or transportation to conditions outside the above values, it should be conditioned before use for a period of 2 to 12 h depending on the extent of exposure.

3.2 Storage Environmental Conditions for Recorded Tapes The storage environmental conditions of the recorded tapes to be used for information interchange shall be as follows:

Temperature	5 to 32°C
Relative humidity	20 to 80 %
Wet-bulb temperature	not higher than 26°C

3.3 Transportation Conditions for Recorded Tapes The sender shall take appropriate measures against matters specified in Appendix 1 for protecting the tapes from damage during transportation.

3.4 Winding Tension The winding tension of the recorded tape shall be 2 to 3.6 N.

3.5 Tapes to Be Used The tapes to be used for information interchange shall be those conforming to the designation of recording density 32 ftpmm specified in JIS X 6101.

4. General Requirements of Recording

4.1 Recording System The recording system shall be NRZ-1 system, and the recording magnetization shall be carried out in the longitudinal direction of the tape.

4.2 Density of Recording The nominal density of recording shall be 32 ftpmm, and the actual density of recording shall be 31.5 ftpmm. The nominal flux transition spacing shall be 31.75 μm .

4.3 Average Flux Transition Spacing The average flux transition spacing shall be 31.75 $\mu\text{m} \pm 3\%$, which is the average of the flux transition spacings of 1.2×10^5 pieces in succession over the upper and lower limits of operating environmental conditions. The measurement of the average flux transition spacing shall be carried out by using a tape which has been recorded continuously at 31.5 ftpmm in the same phase in all tracks.

4.4 Instantaneous Flux Transition Spacing The instantaneous flux transition spacing may be influenced by the reading and writing processes, recording process, pattern recorded (pulse crowding effects) and other factors. The instantaneous flux transition spacing shall conform to the following conditions, as measured from the leading edge to the leading edge of flux transitions.

- (1) The spacing between each of the first detected bits of successive rows shall exceed 22.9 μm .
- (2) The spacing between the first detected bit and the last detected bit in the same row shall be less than 10.8 μm .
- (3) There shall be a spacing not less than 11.2 μm between any bits of successive rows.

4.5 Static Skew The static skew shall be less than 3.81 μm .

4.6 Signal Amplitude The signal amplitude shall be as given in the following:

- (1) **Average Signal Amplitude** The average signal amplitude shall be the average value of the first reproduced output after recording over not less than 4000 consecutive flux transitions, which shall be, at a recording density of 31.5 ftpmm, 70 to 115 % of the reference peak output voltage.
- (2) **Maximum Signal Amplitude** At the first reproduction after recording, the pulse amplitude value as referred to the 0 V of the reproduced voltage shall be not more than 120 % of half the reference peak output voltage.
- (3) **Minimum Signal Amplitude** At the first reproduction after recording, the pulse amplitude value as referred to the 0 V of the reproduced voltage shall be not less than 35 % of half the reference peak output voltage.

4.7 Erase The erasure shall be as given in the following:

- (1) **Polarity of Erase** The magnetization at the erasing part of the tape shall be such that the beginning end of the tape is the direction indicating the north pole and the terminating end of the tape is the direction indicating the south pole.