Thermal transfer ribbons— Specification

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Thermal transfer ribbons — Specification.

Foreword

This Kenya Standard was prepared by the Graphical Technology Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

Kenya Bureau of Standards (KEBS) has established Technical Committees (TCs) mandated to develop Kenya Standards (KS). The Committees are composed of representatives from the public and private sector organizations in Kenya.

Kenya Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft Kenya Standards are circulated to stakeholders through the KEBS website and notifications to World Trade Organization (WTO). The comments received are discussed and incorporated before finalization of the standards, in accordance with the Procedures for Development of Kenya Standards.

Kenya Standards are subject to review, to keep pace with technological advances. Users of the Kenya Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

During the preparation of this standard, reference was made to the following document (s):

GB/T 28439:2012 – General Specification for Thermal Transfer Ribbons

Acknowledgement is hereby made for the assistance derived from these sources.

Thermal transfer ribbons— Specification

# 1 Scope

# This Standard specifies the definition, classification, requirements, test methods, inspection rules, identification, packaging, transportation and storage of thermal transfer ribbons.

# This Standard is applicable to thermal transfer printer ribbons based on the working principle of thermal transfer imaging mode.

# 2. Normative References.

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

*ISO/IEC 15416:2025 Automatic identification and data capture techniques — Bar code print quality test specification — Linear symbols*

*ISO/IEC 24790:2017 Information technology — Office equipment — Measurement of image quality attributes for hardcopy output — Monochrome text and graphic images*

*ISO 2859-1:1999 Sampling procedures for inspection by attributes Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

*ISO 14021:2016 – Environmental labels and declarations – Self-declared environmental claims (Type II labeling)*

*KS EAS 865:2024 Corrugated fibre board boxes for general packaging — Specification.*

# 3 Terms and Definitions.

For the purposes of this document, the following terms and definitions apply.

**3.1 thermal transfer ribbon; TTR**

a ribbon consisting of a ribbon base (such as PET film) and a thermal transfer layer applied on surface and other auxiliary layers. During printing, the ink layer is melted and transferred to the medium by heating through the heating element of the thermal print head.

**3.2 thermal transfer layer**

a functional layer applied on a thermal transfer ribbon that can be transferred to the medium by heating, mainly composed of colorants, hot-melt materials and auxiliary agents**.**

**3.3 Medium**

material, usually paper or synthetic material, used to receive the thermal transfer ribbon imaging substance to form an image during thermal transfer printing.

**3.4 printing image**

a mark on a thermal transfer ribbon where the image material of the thermal transfer layer is melted and transferred to the medium.

**3.5 Density.**

reflected density on the printing image.

**3.6 Resolution**

the maximum number of clearly distinguishable pixels per unit length after printing

**Note:** The unit is dots/mm or dpi.

**3.7 Print Speed.**

length of medium printed per unit time

**Note:** The unit is mm/s, ips or p/min.

**3.8 non-uniformity of image density**

non-uniformity of density on images with the same density in different positions after printing.

**4 Classification.**

**4.1 Usage**

Thermal transfer ribbons can be categorized into fax ribbon, barcode ribbon, banner ribbon and thermal coding ribbon by purpose.

**4.2 Colour**

Thermal transfer ribbons may be in black, white and other colours.

**4.3 Layer Composition.**

Thermal transfer ribbons can be categorized into general wax-based thermal transfer ribbons, enhanced wax-based thermal transfer ribbons, wax/resin mixed-base thermal transfer ribbons and resin-based thermal transfer ribbons by the composition of thermal transfer layer.

**5 Requirements**

**5.1 Service and Storage Conditions**

See Table 1 for the service and storage conditions.

**Table 1 Service and Storage Conditions.**

|  |  |  |
| --- | --- | --- |
|  | Temperatures | Relative humidity |
| Service conditions | 5℃-35℃ | 45%-85% |
| Storage conditions | -5℃-40℃ | 20%-85% |
| Atmospheric pressure | 86kPa-106kPa | |

**5.2 Appearance.**

**5.2.1** The layer shall be uniform without wrinkles, fractures and defects affecting the printing quality.

5.2.2 Both end faces of the ribbon reel shall be flat.

5.2.3 The ribbon shall have no joints.

**5.3 Dimensions.**

**5.3.1 Reel Dimension.**

Table 2 specifies the inner diameter and tolerance requirements of reel for finished ribbons.

**Table 2 Inner Diameter of Reel of Finished Ribbon**

|  |  |  |
| --- | --- | --- |
| Nominal inner diameter/  mm (in) | Target value/  mm | Tolerance/  mm |
| 9 | 9.0 | +0.2  0 |
| 13 (1/2) | 13.0 | +0.2  0 |
| 14 | 14.0 | +0.2  0 |
| 15 | 15.0 | +0.2  0 |
| 18 (3/4) | 18.0 | +0.2  0 |
| 25.4 (1) | 25.4 | +0.2  0 |
| 25.6 | 25.6 | +0.2  0 |
| 26 | 26.0 | +0.2  0 |

The inner diameter is customizable. See Table 2 for tolerance specifications.

**5.3.2 Width**

Table 3 specifies the widths and tolerances of the reeled ribbon that should be used.

**Table 3 Preferred Nominal Width and Tolerance Requirements of Reeled Ribbon.**

|  |  |  |
| --- | --- | --- |
| Nominal width/  mm | Target value/  mm | Tolerance/  mm |
| 15 | 15.0 | +1.0  -0.5 |
| 20 | 20.0 | +1.0  -0.5 |
| 25 | 25.0 | +1.0  -0.5 |
| 30 | 30.0 | +1.0  -0.5 |
| 35 | 35.0 | +1.0  -0.5 |
| 40 | 40.0 | +1.0  -0.5 |
| 50 | 50.0 | +1.0  -1.0 |
| 60 | 60.0 | +1.0  -1.0 |
| 70 | 70.0 | +1.0  -1.0 |
| 80 | 80.0 | +1.0  -1.0 |
| 90 | 90.0 | +1.0  -1.0 |
| 100 | 100.0 | +1.0  -1.0 |
| 110 | 110.0 | +1.0  -1.0 |
| 120 | 120.0 | +1.0  -1.0 |
| 130 | 130.0 | +1.0  -1.0 |
| 140 | 140.0 | +1.0  -1.0 |
| 150 | 150.0 | +1.0  -1.0 |
| 160 | 160.0 | +1.0  -1.0 |
| 208 | 208.0 | +1.0  -2.0 |
| 212 | 212.0 | +1.0  -2.0 |
| 214 | 214.0 | +1.0  -2.0 |
| 216 | 216.0 | +1.0  -2.0 |
| 220 | 220.0 | +1.0  -2.0 |

Widths are customizable. See Table 4 for tolerance specifications.

**Table 4 Target Widths of Reeled Ribbon Not Listed in Table 3 and Tolerance Requirements.**

|  |  |  |
| --- | --- | --- |
| Nominal width/  mm | Target value/  mm | Tolerance/  mm |
| <15 | Nominal value | +1.0  -0.5 |
| 15-50 | Nominal value | +1.0  -0.5 |
| 50-200 | Nominal value | +1.0  -1.0 |
| >200 | Nominal value | +1.0  -2.0 |

**5.3.3 Length.**

The length of finished ribbons is generally specified by the manufacturer according to customer requirements or applicable models and given by product standards. Generally, the length specified in Table 5 should be adopted.

**Table 5 Recommended Nominal Length of Reeled Ribbon and Tolerance Requirements.**

|  |  |  |
| --- | --- | --- |
| Nominal length/  m | Target value/  m | Tolerance/  m |
| 30 | 30.0 | +0.5  -0.5 |
| 50 | 50.0 | +0.5  -0.5 |
| 70 | 70.0 | +0.5  -0.5 |
| 80 | 80.0 | +0.5  -0.5 |
| 35 | 35.0 | +0.5  -0.5 |
| 40 | 40.0 | +0.5  -0.5 |
| 50 | 50.0 | +1.0  -1.0 |
| 60 | 60.0 | +1.0  -1.0 |
| 70 | 70.0 | +1.0  -1.0 |
| 80 | 80.0 | +1.0  -1.0 |
| 90 | 90.0 | +1.0  -1.0 |
| 100 | 100.0 | +1.0  -1.0 |
| 115 | 115.0 | +1.0  -1.0 |
| 120 | 120.0 | +1.0  -1.0 |
| 150 | 150.0 | +1.5  -1.5 |
| 200 | 200.0 | +2.0  -2.0 |
| 300 | 300.0 | +3.0  -3.0 |
| 450 | 450.0 | +5.0  -5.0 |

The length is customizable. For lengths greater than 100m, the recommended tolerance is an integer of ±1% of the nominal value, and the specific value is determined according to rounding rules.

**5.3.4 Thickness**

The thickness of the ribbon shall be specified in the product standard, and the tolerance shall be within ±1 μm.

**5.4 Antistatic Property**

The static electricity of the ribbon shall not affect normal use, and the surface resistance shall not be more than 5×1012 Ω/cm2.

**5.5 Installation Compatibility**

**5.5.1** The ribbon shall be Fitted in sound conditions.

**5.5.2** The ribbon running is normal**.**

**5.6 Printing Image**

**5.6.1 Density**

See Table 6 for the printing image density requirements of ribbons.

**Table 6 Printing Image Density Requirements for Thermal Transfer Printing.**

|  |  |  |
| --- | --- | --- |
| Ribbon | Density of black | Density of other colors (except white) |
| Thermal transfer facsimile ribbon | ≥1.20 | ≥0.80 |
| Thermal transfer barcode ribbon | ≥1.80 |
| Thermal transfer banner ribbon | As per product standard |
| Thermal coding ribbon | ≥1.50 |

**5.6.2 Clarity**

Characters printed by corresponding thermal transfer printer shall be of clear printing image with well-defined outline but without abrupt colour change or stain.

**5.6.3 Rub Resistance**

See Table 7 for the requirements for rub resistance.

**Table 7 Rub Resistance of Printing Image**

|  |  |  |
| --- | --- | --- |
| Ribbon | Medium | Rubbing times by 500g standard weight |
| Thermal transfer facsimile ribbon | 70g ordinary copy paper | ≥10 times |
| Thermal transfer barcode ribbon | Coated paper | ≥10 times |
| Thermal transfer banner ribbon | Banners and flags | ≥10 times |
| Thermal coding ribbon | Coated paper | ≥10 times |

**5.6.4 Water Resistance.**

The attenuation rate shall be less than or equal to 10%.

**5.6.5 Ultraviolet Radiation Resistance Test.**

The attenuation rate shall be less than or equal to 5% for black and 20% for other colors.

**5.6.6 Quality of Barcode Printed with Barcode Ribbon.**

The quality of barcode printed with barcode ribbon shall conform to ISO/IEC 15416:2025

**5.7 Print Speed**

According to the speed of the machine Flat head – 16IPS, Near Edge – 32IPS

**5.8 Resolution**

The resolution shall be 203/300dpi with an error kept within ±2%.

**5.9 Non-uniformity of Image Density**

The non-uniformity of image density shall not be: ±2 ODR

**5.10 Limits of Toxic and Hazardous Substances.**

The limits of toxic and hazardous substances Depends on grade, but most shall conform to relevant national laws and regulations.

**6 Test Method**

**6.1 Test Conditions**

Except for the environmental adaptability test, all tests shall be carried out under the conditions specified in Table 8 and the tested product and the medium to be used shall be placed for 16hrs under this condition in advance.

**Table 8 Ambient Conditions for Test**

|  |  |  |  |
| --- | --- | --- | --- |
| ` | Temperatures | Relative humidity | Atmospheric pressure |
| Test Conditions | 5℃-35℃ | 45%-75% | 86kPa-106kPa |

**6.2 Appearance**

Visual inspection shall be adopted.

**6.3 Geometric Dimension**

**6.3.1 Inside Diameter**

To be checked with a vernier caliper with a measurement accuracy of 0.02 mm.

**6.3.2 Width**

To be checked with a vernier caliper with a measurement accuracy of 0.02 mm.

**6.3.3 Length**

To be checked with a length measuring tool with a measurement accuracy of 10 mm.

**6.3.4 Thickness**

To be measured with a micrometer with a measurement accuracy of 0.1 μm.

**6.4 Antistatic Property**

The surface resistance of the thermal transfer layer surface of the ribbon shall be tested with a surface resistance meter or megger in an environment with a temperature of 25°C±2°C and a relative humidity of 40%-60%.

**6.5 Fitting Compatibility**

**6.5.1** The ribbon shall be fitted and removed smoothly.

**6.5.2** The ribbon shall be tested with the corresponding thermal transfer printer. It shall run normally without seizure after being fitted.

**6.6 Printing image**

**6.6.1 Medium**

See Table 9 for the medium used for testing the printing image of ribbon.

**Table 9 Medium Used for Testing of Printing Image**

|  |  |
| --- | --- |
| Ribbon | Medium |
| Thermal transfer facsimile ribbon | 70g ordinary copy paper |
| Thermal transfer barcode ribbon | Coated paper |
| Thermal transfer banner ribbon | Banners and flags |
| Thermal coding ribbon | Coated paper |

**6.6.2 Density**

Print a 15 mm × 15 mm saturated color patch on the medium specified in 6.6.1 with a corresponding thermal transfer printer, and then measure the density on a reflection densitometer in T-response mode.

**6.6.3 Clarity**

Print the test texts or patterns specified in Table 10 on the medium specified in 6.6.1 with a corresponding thermal transfer printer, and check whether the printing image meets the requirements of 5.6.2.

**Table 10 Printed Content for Clarity Test**

|  |  |
| --- | --- |
| Ribbon | Printed content |
| Thermal transfer facsimile ribbon | Arial font "F" in English (16 pounds, 12 pounds and 10 pounds) and Song typeface "型" in Chinese (12 pt) |
| Thermal transfer barcode ribbon | Horizontal barcode 12345, vertical barcode 12345678, Code-39; any content in Chinese (6.5 pt) and English Arial (6.5 pounds), bold font |
| Thermal transfer banner ribbon | Any content in Chinese (14 pt) and English Arial font (14 pounds) |
| Thermal coding ribbon | Any content in Chinese (14 pt) and English Arial font (14 pounds) |

**6.6.4 Rub Resistance**

Cover a 70g ordinary copy paper on the printing image on the medium specified in 6.6.1, then place a 500g standard weight on the copy paper, drag the copy paper back and forth at a constant speed on the printing image, and record the number of drags when the printing image becomes unclear.

**6.6.5 Water Resistance**

Print a 15 mm × 15 mm color block on the medium specified in 6.6.1. After measuring its density, immerse it in purified water at 30°C±5°C for 2h and then take it out. Place it in an oven at 100°C±2°C for 10 min and measure its density again. Calculate the attenuation rate with the following formula.

Attenuation rate = (density before soaking - density after soaking)/density before soaking × 100%

**6.6.6 Ultraviolet Radiation Resistance Test**

Print a 15 mm×15 mm color block on the medium specified in 6.6.1, measure its density and then put it into an ultraviolet illumination test chamber for 2h (30W UV lamp tube with 254 nm wavelength with 150 mm ± 10 mm from the color block). Then take it out and measure the density. Calculate the attenuation rate with the following formula.

Attenuation rate = (density before irradiation - density after irradiation)/density before irradiation × 100%

**6.6.7 Quality of Barcode Printed with Barcode Ribbon**

The quality of barcode printed with barcode ribbon shall be tested according to ISO/IEC 15416:2025

**6.7 Environmental Adaptability Test**

**6.7.1 Service Environment Test**

Put the ribbon sample into the printer and then put the printer into a thermotank with constant humidity. Gradually increase the temperature of the thermotank to the limit of service conditions in Table 1 with the printer turned off and carry out printing test after the temperature and humidity are stable.

**6.7.2 Storage Test**

High-temperature test: Place the ribbon sample in a thermotank at 50°C±1°C for 5hr, take it out and condition it for 16h. Then print it under the conditions specified in 6.1.

Low-temperature test: Place the ribbon sample in a thermotank at -15°C±1°C for 3hr, take it out and condition it for 16h. Then print it under the conditions specified in Table 1.

**6.8 Print Speed**

Print the narrowest barcode and the barcode with a spacing of 0.254 mm at the corresponding test speed and grade the barcode according to ISO/IEC 15416:2025. The barcode shall be of a grade higher than 1.

**6.9 Resolution**

Measure it according to ISO/IEC 24790:2017

**6.10 non-uniformity of image density**

Measure it according to ISO/IEC 24790:2017

**6.11 Limits of Toxic and Hazardous Substances**

The limits of toxic and hazardous substances Depends on grade, but most shall conform to relevant national regulations.

**7 Inspection Rules**

**7.1 General Principles**

The products shall be inspected according to this Standard, during design and, production process, and all indicators shall meet the specified requirements.

**7.2 Inspection Classification**

There are two types of inspections:

a) Final inspection

b) Acceptance inspection.

**See Table 11 for inspection items and sequences.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Inspection Items | Clause No. of technical requirements | Clause No. of test method | Final inspection | Acceptance inspection |
| 1 | Appearance | 5.2 | 6.2 | √ | √ |
| 2 | Dimensions (reel, width, length and thickness) | 5.3 | 6.3 | √ |  |
| 3 | Antistatic property | 5.4 | 6.4 | √ | — |
| 4 | Fitting Compatibility | 5.5 | 6.5 | √ | √ |
| 5 | Density | 5.6.1 | 6.6.2 | √ | √ |
| 6 | Clarity | 5.6.2 | 6.6.3 | √ | √ |
| 7 | Rub Resistance | 5.6.3 | 6.6.4 | √ | — |
| 8 | Water Resistance | 5.6.4 | 6.6.5 | √ | — |
| 9 | Ultraviolet Radiation Resistance Test | 5.6.5 | 6.6.6 | √ | — |
| 10 | Barcode printing quality a | 5.6.6 | 6.6.7 | √ | √ |
| 11 | Environmental adaptability | 5.1 | 6.7 | √ | — |
| 12 | Print speed b | 5.7 | 6.8 | √ | — |
| 13 | Resolution | 5.8 | 6.9 | √ | — |
| 14 | Non-uniformity of image density | 5.9 | 6.10 | √ | — |
| 15 | Limits of Toxic and Hazardous Substances | 5.10 | 6.11 | √ | — |
| a For thermal transfer barcode ribbons only  b Not necessary for thermal transfer facsimile ribbon | | | | | |

**7.3 Final inspection**

**7.3.1** Final inspection shall be carried out during design and production of ribbons.

**7.3.2** The final inspection shall be carried out by the quality inspection department of the manufacturer or the quality inspection organization designated or entrusted by the superior competent department.

**7.3.3** The number of samples for final inspection shall be determined according to product batch, test time and cost.

**7.4 Acceptance inspection**

**7.4.1** Ribbons produced in batches or continuously shall be subject to acceptance inspection batch by batch. Acceptance inspection can be spot inspection carried out according to this standard. The sampling scheme and handling method after rejection shall be specified in the product standard.

**7.4.2** The acceptance inspection shall be carried out by the quality inspection department of the manufacturer.

**8 Identification, Packaging, Transportation and Storage**

**8.1 Identification**

**8.1.1 Product Identification**

Each product shall be attached with a self-adhesive sealed label printed with the product name, number, specification, production date and other information on the inner side of the reel or the outer side of the film. Neutral marks or special marks can also be used according to user requirements.

**8.1.2 Identification of Transport Package**

The following clear and firm storage and transportation marks shall be provided:

a) Product name and designation; and

b) Name, address, telephone number and postal code of the manufacturer.

c) Standard number followed for the product

d) Product specification, color, quantity and quality;

e) Registered trademarks;

f) Production date;

g) Batch number;

h) Statement of conformance to this standard.

i) Overall dimensions of the packing box.

**8.1.3 Package Recycling Mark**

The package recycling mark shall comply with ISO 14021:2016

**8.1.4 Content Identification of Toxic and Harmful Substances**

The content identification of toxic and harmful substances shall comply with any national regulation.

**8.2 Packaging**

**8.2.1 Packaging Requirements**

The product shall be placed in a transparent plastic bag and sealed.

The technical indicators of corrugated box shall comply with KS EAS 865:2024

The package shall be moisture-proof, dust-proof and shock-proof. Packing list, product qualification certificate, product manual, etc. shall be placed in the package.

The package shall be sealed with self-adhesive tape and then tied up in the shape of "cross" or "# STRAP".

**8.2.2 Product Qualification Certificate**

Each package shall be attached with a product qualification certificate issued by the quality inspection department of the manufacturer, indicating the following contents:

a) Product name and designation; and

b) Name and number of the standard followed for product quality;

c) Production date;

d) Inspection date;

e) Warranty period;

f) Signature of inspector and quality inspection seal.

**8.3 Transportation and Storage**

**8.3.1 Transportation Requirements**

The products shall be transported with a covered means of transport. The products shall not be thrown, dropped, lost or tossed during transportation to avoid squeezing, impact, rain and sunshine. The products shall not be transported in open cabins or carriages, stored in an open warehouse during transshipment, or shipped together with flammable, explosive and corrosive articles by vehicle or ship.

**8.3.2 Product Storage**

**8.3.2.1** The products shall be stored under the environmental conditions specified in 5.1 and shall not be mixed with corrosive substances. The products shall be stored in the original package. There shall be no harmful gases, flammable and explosive articles and corrosive chemicals and no strong mechanical vibration or impact in the warehouse storing the products.

**8.3.2.2** When the products are stacked, they shall be placed on a flat ground or plank in the direction indicated by the arrow on the carton, and 1m away from the heat source. The products shall be kept in their original packaging state, and the stacking height shall not exceed 1.2m.

**8.3.2.3** The products shall be stored in a condusive environment from the date of production.