

Thermal Printing Technology provides for instant printing on command. No warm-up time is required for the first page. Laser printers can take 20 seconds or more to start printing the first page. This is very important for kiosk applications because the consumer will not wait and therefore will be unhappy with the service they expected from the kiosk and tend not to use it again.

The use of roll paper can also reduce the amount of paper used and improve performance by printing a page equal to the length necessary to present the printed information. (For example, if a document is equal to 14 inches of text a graphic information, sheet feed printers require two full pages or 22 inches of paper where the roll design can print, cut and deliver a 14-inch page.)

Choosing the right thermal paper is as important as choosing the right printer. Different thermal sensitivities, calipers, and constructions make the thermal paper decision a difficult one. That is why Telpar offers a wide variety of thermal papers to satisfy your printing needs. Telpar offers various types of paper for the following applications:

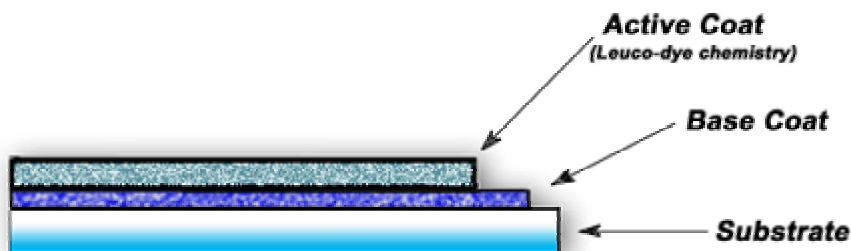
- Coupons
- Receipts
- Kiosk
- Bottle Redemption
- Gaming & Wagering
- Tickets

Aside from the various widths and diameters, Telpar offers paper that vary in construction and lifespan. Below are some basic specifications to consider when choosing paper.

- Basis Weight - the measurement of the weight in pounds of one ream (500 sheets of paper that measures 17" x 22"), or the weight in grams of one square meter of paper. Typical basis weights of thermal papers are usually 15# (56 g/m<sup>2</sup>) and 20# (72 g/m<sup>2</sup>).
- Caliper - the thickness of paper, usually measured in inches. Typical calipers are .0024" (15#) and .0033" (20#).
- Smoothness - this is an indicator of gloss levels, and can also show a coating that may be abrasive.
- Brightness - a measurement of how white the paper is, and is important for maintaining a good contrast between the image and the paper, and can also show premature activation.
- Tear/Tensile - measurements of the internal fiber strength of the paper.
- Moisture Content - Critical to high-quality processing and maintaining dimensional stability in the field. Typical moisture readings are 4.5% - 6%.
- Thermal Characteristics - Defines the sensitivity of the paper - directly related to the performance of the product.

Construction of the paper is also an important choice when choosing paper. Below is a description of the various paper constructions offered by Telpar, Inc.

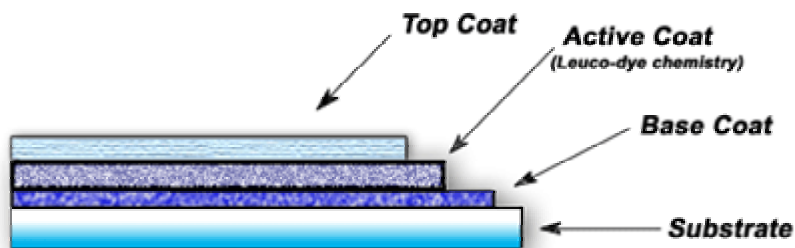
## Conventional Thermal



### Features:

- Five Year Lifespan
- Wide range of calipers and thermal sensitivities
- Adhesion/Cohesion properties designed for Graphic Arts printing
- No head wear or residue

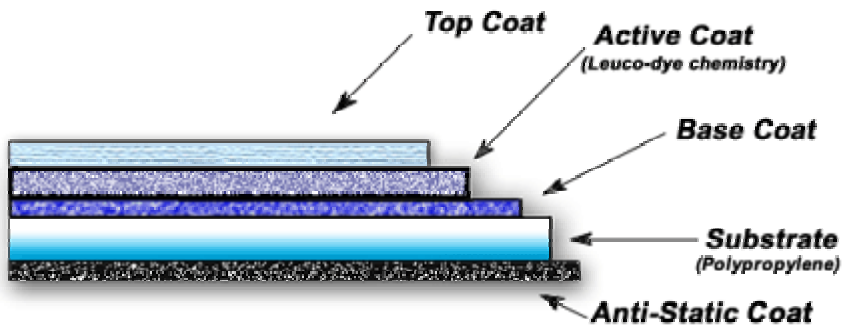
## Topcoated Thermal



### Features:

- Seven Year Lifespan
- Excellent Environmental Resistance
- Cost-effective consumer construction

# Synthetic-base Thermal



## Features:

- Seven Year Lifespan
- Excellent Environmental Resistance
- Cost-effective consumer construction

Thermal printers and paper cater to the needs of the industry. The following features make thermal printing .

- Clean, high resolution image quality
- Fast, quiet operation
- Fewer mechanical moving parts
- Lower operating cost over the life of the printer

Telpar also offers custom-printed paper, including:

- Front and back side printing
- Security features
- Logos
- Sales messages

Paper available to fit the following printers:

- Axiohm
- Citizen
- Cybertech
- Elm
- Epson
- Fujitsu
- Magnetec
- O'Neil
- Panasonic
- Practical Automation
- Seiko
- Star Micronics
- Swecoin
- Telpar

## Brief glossary of terms:

- Substrate - Paper or base that coatings are applied to.
- Base Coat - Used as a "primer" to seal the substrate and provide a surface that the thermal coating will adhere to.
- Active Coat – This is the thermal coating, primarily a leuco-dye based system.
- Top Coat - A thin, clearcoat layer of PVA that seals the active coat and provides environmental resistance.
- Antistatic Coat - Applied to the backside of some papers, but primarily used on synthetic products.
- **Direct Thermal Technology**- Direct thermal imaging technology uses a document media which contains the "ink" in a colorless form as a coating on the surface. Heat generated in the tiny printhead element transfers to the thermal paper roll and activates the ink to develop color. Direct thermal imaging uses a single consumable.
- **Thermal Transfer Technology**- Thermal transfer imaging technology uses a transfer ribbon in addition to the document media. Heat generated in the tiny printhead is transferred to the plastic ribbon, which in turn releases the ink to be deposited on the receptor media. Thermal transfer requires two consumables – the ribbon and the document.
- **CB Paper**- Paper that has a carbonless coating applied to the back. The CB paper will transfer an image to the CFB or to the CF paper.
- **CFB Paper**- Paper that has the carbonless coating applied to the front and back. The CFB paper will transfer an image to another CFB paper or to a CF paper.
- **CF Paper**- Paper that has the carbonless coating applied to the front. The CF paper does not transfer an image. It accepts the image from the CB or CFB paper.

## Thermal Paper Storage and Shelf Life

**Shelf life** – Storing thermal products in a dark place at a relative humidity between 45% and 65% and a temperature below 77°F may assure satisfactory performance for at least three years from the date of manufacture.

**Stability** – Once thermal products have been imaged on the recommended equipment, the image should remain legible for at least seven years, assuming the documents are properly stored with compatible materials under normal filing conditions, with a relative humidity between 45% and 65% as well as a temperature below 77°F.

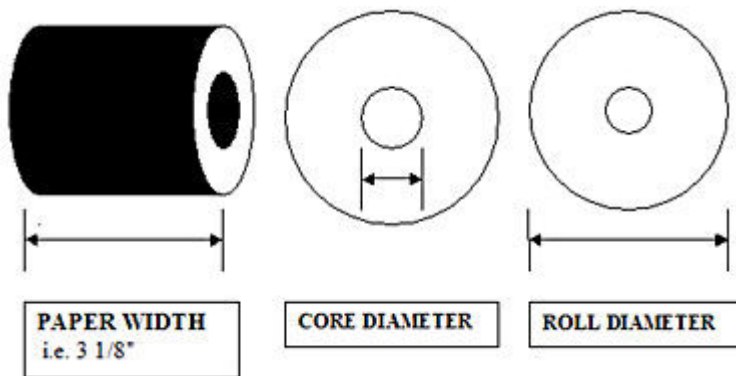
**Fade Resistant** – Thermal products use dye and coreactant technology to form an image. The combination is slightly sensitive to ultraviolet (UV) light and may exhibit some image decline with extended exposure to office light or shorter exposure to intense UV light. The stability of the image will depend upon the degree to which the image was originally developed, the individual product design, the intensity of the UV light and the character of UV (percent of UV range in a light source). Sheet discoloration may also occur with prolonged exposure to UV light.

**Contact Storage** –We recommend that thermal grade printer paper rolls not be exposed for long periods to certain vinyls, plastics, shrink wraps, adhesives, wet-toner copies or certain carbon papers. An exception to these general guidelines would be our specially topcoated tag, ticket and label grades. Top-coated grades are more resistant to these incompatible materials, but images can still be affected with prolonged exposure.

### Critical measurements used in Paper Roll specifications

- **Inside diameter of the core.** This measures the actual space between the inside walls of the core.
- **Outside diameter of the core.** This measures the distance from outside surface to outside surface.
- **Length** - The length of the paper in feet
- **Width** - The wide of the roll in inches.

### How do I measure my paper roll?



### How to convert millimeters to inches?

Multiply the millimeters by .03937 *Example:* 76 millimeters X .03937 = 2.99212 inches

### How to convert inches to millimeters?

Multiply the inches by 25.4 *Example:* 4.333 inches X 25.4 = 110.0582 millimeters