



Card Stock Requirements Guide

Entrust® Datacard® (formerly Artista®)

CR805 Retransfer ID Card Printer

Entrust Artista® CR825 and CE875

Instant Inssuance System

Entrust® Datacard® (formerly Artista®)

RS4 Instant Inssuance System

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Revision Log
Entrust Card Stock Requirements Guide

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A	July 2018	First release of this document.
B	June 2019	Modified the document for release to users and service providers.
C	May 2021	Updated Entrust branding.
D	July 2026	Updated Datacard branding.



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Chapter 1: Introduction



About This Guide

This document provides guidelines for the plastic card stock to be used with the Entrust retransfer series printers. These guidelines are based on current knowledge of card materials and printer performance.

The guidelines are provided to help minimize problems when using the retransfer series printers. However, they are not a guarantee of performance. Work with your card supplier to identify the cards that meet the printing requirements of your site.

Technical Support

Use the following information to contact Entrust Datacard Technical Support.

US Phone Number	1-800-328-3996
North America	Email: north.america.cust.serv@entrustd.com
Latin America and Caribbean	Email: americas@entrust.com
Europe, Middle East, and Africa	Email: emea.customer.service@entrust.com
Asia Pacific	Email: dcap.admin@entrust.com



Chapter 2: Card Stock Considerations



This chapter covers information that can help you work with the cards used in the retransfer series printers.

Overview

Cards are constructed in many different ways. The material used to make the cards, the layers that make up the card, and any embedded electronics (such as a smart card chip, or chip and antenna) all have an effect on the printing performance of the card. For best results, use high-quality cards that meet the specifications and recommendations described in this chapter.

For more information about the retransfer printing process, card design, and printing best practices, refer to your printer’s *User’s Guide* and *Installation and Administrator’s Guide*.

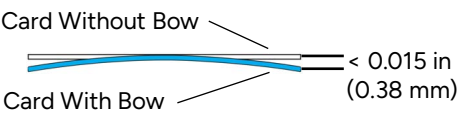
Card Size

Use ISO ID-1 (also called CR80/30) size cards with the following dimensions:

Length	3.37 ± 0.005 inches	85.60 ± 0.13 mm
Width	2.125 ± 0.002 inches	53.98 ± 0.05 mm
Thickness*	0.030 ± 0.003 inches	0.762 ± 0.076 mm

*Actual card thickness can vary by up to ten percent from the size listed.

The card bow (also called card warpage) must be less than the thickness of the card (no greater than 0.015 inch [0.38 mm]).



Card Material

The material used in the composition of the cards affects print quality. Because cards are manufactured in different ways, it is difficult to predict printing performance. Test each type of card you plan to use and work with your card supplier to obtain the best quality. Refer to ["Card Composition"](#) on [page 4](#) for more information about card materials.

Card Surface

Cards must have a smooth surface finish for proper retransfer film quality. Cards with a polished or satin finish typically work the best. Print quality may suffer on cards with a matte finish.

Cards also might have a magnetic stripe and signature panel on the back side of the card, and a smart card chip on the front side. These elements also affect printing performance.

The following sections discuss card surface elements that affect print quality.

Card Irregularities

The heated roller used by the printer to bond the retransfer film to the card must not lose close contact with the card for proper transfer to the card to take place. Large surface irregularities on a card (such as, bumps, pits, or burrs) might cause a loss of close contact, and result in print voids.

Even the highest quality manufacturing materials and processes sometimes yield cards with surface irregularities that are large enough to cause print voids. Many surface irregularities are unavoidable (for example, magnetic stripe edges, signature panel edges, or smart card chips). Work with your card supplier to determine the number and location of unacceptable surface irregularities in any batch of cards.

Refer to [Appendix A: "Card Stock Specifications"](#) for information about how to measure surface irregularities.

Card Die Cutting

Cards printed on retransfer printers have a small, and sometimes noticeable, void area (a small white border) around the perimeter of the card where the printing does not transfer to the card. The orientation of the cards during the manufacturing die cutting process has an effect on the size of the non-transferred perimeter.

To obtain the smallest void area, place the image on the card side where the die cutter exited the plastic during the manufacturing process (the burr side). In a typical card design with a full-color image on the front side, the burr side is the front of the card. A card design with color printing on both the front and back sides may need to be modified so that it has more areas that are white (non-color) making the border less obvious.

Work with your card supplier to manage the card manufacturing and packaging to ensure the correct orientation of the die-cut cards before shipment. Operators also must be aware that they need to load the cards in the correct orientation into the card printer.



This is an issue only when using cards with blank white surfaces on both sides since the burr side is not obvious after the card is removed from the card tray. Label trays of blank white cards to indicate the burr side.

Cards with a smart card chip and/or magnetic stripe and signature panel should be loaded in the printer as shown in the input hopper diagrams on the printer.

Smart Cards

Cards with a smart card chip might present print quality issues. Card personalization programs and the XPS Card Printer Driver have pre-set masks that identify standard non-printing areas around the front-side chip. However, the location, size, and shape of the chip varies. This affects how the retransfer film adheres to the card and may create printing voids. Refer to the card design information in the printer's *Installation and Administrator's Guide* for more information about non-printing areas and how to define custom non-printing areas in your card design.

Additionally, the back side of the card might have a depression (or dimple) at the location of the smart card chip (opposite the front card side). Because the heated roller might not be able to press deeply enough into the depression, it prevents the retransfer film from adhering properly in the depression. If possible, modify the back side card design so that no printing occurs in that location.

Contactless smart cards also may have surface irregularities that affect printing. Contactless chips do not have a standard location and vary by manufacturer.

Test your card stock regularly to make sure that surface defects do not degrade print quality.

Refer to [Appendix A: "Card Stock Specifications"](#) for smart card specifications.

Cards With a Signature Panel

Signature panels also present print quality issues. Retransfer film cannot be placed over the signature panel. The inhibitor panel of the ink ribbon is designed to prevent the retransfer film from bonding to the signature panel. However, consider the following when your card has a signature panel:

- Signature panels do not have a standard location or size. You must specify the signature panel non-printing area using your card personalization program, or by using an escape in your card design when you use the XPS Card Printer Driver. Refer to your application documentation, or the *XPS Card Printer Driver User's Guide*.
- Signature panels add thickness to the card. This affects how the retransfer film adheres to the card.
- Signature panels might transfer material to other cards during storage, causing contamination issues. The transferred material from the panel prevents the retransfer film from adhering properly during printing.

Surface Reflectivity (Bar Code Applications)

Another aspect to be aware of is the surface reflectivity of the card. This is especially important when printing a bar code on the card.

The card surface must provide an acceptable reflectivity profile for the card and bar code combination. The clear surface material used in making cards can dramatically change the reflectivity, especially in the bar code spaces, which affects the bar code quality and readability.

Refer to [Appendix A: "Card Stock Specifications"](#) for reflectivity measures.

Card Composition

How cards are manufactured, the materials used in the card, and how they respond to the printer affect the print quality and durability of the printed card.



Perform print tests on candidate cards before you commit to a specific card stock.

PVC Cards

Cards made of polyvinyl chloride (PVC) or a vinyl chloride/vinyl acetate copolymer commonly are used with the retransfer printers. The material can be clear or pigmented.

- Some PVC cards can delaminate when exposed to the temperatures produced in the heated roller when it applies the retransfer film. The outer clear surface material detaches from the core material. Test proposed card stock and purchase cards that do not delaminate when used in the printer.
- The surface material must be free from additives that might migrate to the surface of the cards (called blooming). Additives make the card surface oily, resulting in poor appearance and poor print durability. The additives normally are added to aid the manufacturing process.



A material known to be unacceptable is a stress plastic overlay, which contains a solid barium/cadmium stabilizer in a fatty acid carrier.

- The temperature at which the plastic card material softens (the Vicat softening point) affects how easily the retransfer film bonds to the card surface. Use cards whose surface material has a Vicat softening point of less than or equal to 82°C to minimize retransfer film voids.

Cards with a higher Vicat softening point may work with the retransfer printer, but they are much more sensitive to machine and supply variations. Avoid using cards whose surface material has a Vicat temperature greater than 82°C.

PVC Composite Cards

Common composite cards have PVC outer layers and at least some amount of a durable material, such as polyester, in the core of the card. Test your card stock to verify that the print quality is acceptable.

Non-PVC Cards

Non-PVC (polycarbonate) card surfaces also work with the retransfer printers. The retransfer film typically bonds successfully to the card surface of non-PVC cards. If you use a CR805™ Retransfer Card Printer with the inline lamination module, the overlay patch placed by the laminator is generally acceptable. However, you may need to test different patch materials or thicknesses to identify the one that produces the best quality.

Test all non-PVC card surfaces to determine if they work acceptably in the printer.

Particulate Matter

Particulate matter on cards often consists of small plastic shavings, flakes of magnetic stripe, flakes of the signature panel material, airborne particulates, and anti-block powders used in card manufacture. The debris, if large enough, causes retransfer film voids if the debris particles become trapped between the card and the retransfer film. This creates a visual defect and becomes a site for premature wear of the card surface.

The cleaning sleeve in the printer removes much of this debris, but some debris might remain on the card.

Work with your card supplier to determine the amount of card debris that is acceptable in any batch of cards.

Also, clean your printer according to the printer cleaning schedule found in your printer's *User's Guide* and the *Retransfer Series Printers Cleaning Guide*. Cleaning the printer removes any additional debris that may be in the printer itself.

Card Handling

Use the following guidelines when handling unprinted cards.

- Debris or particles on blank card stock reduces card quality and damages the system.
- Grease or oils, such as oils from your fingers, reduces print quality. Keep cards completely clean. Do not touch the print surface of a card with your fingers or hands.
- Handle blank card stock by the edges only, or wear approved card inspection gloves.
- Avoid using latex or neoprene gloves as they can transfer material to the card, which reduces adhesion of the retransfer film.
- Always place cards on a clean surface when removing them from the printer (for example, during cleaning).
- Do not use a rubber band to bind blank cards together.
- If you drop a card on the floor, clean it using a lint-free cloth before using it in the system.
- Never use solvents to clean the card.

Card Storage

These guidelines apply to both blank card stock and processed cards.

- Use cards that are at room temperature. If cards are stored in a cooler environment than the printer, allow them to reach room temperature before using them.
- Stack cards so that they will not shift and rub against each other.
- Make sure that the magnetic stripe on one card does not come in contact with the magnetic stripe on another card.
- Make sure that cards with magnetic stripes are stored away from magnetic objects.
- Store cards in a cool, dry, and dark place. Excessive light might cause yellowing of cards on exposed edges.

- Avoid storing the cards in locations exposed to direct sunlight, or with high temperature and high humidity.
- Store cards in their original packaging.



Appendix A: Card Stock Specifications



This appendix contains card stock specifications that users and service personnel should provide to suppliers and use to evaluate the card stock before purchase.

The following information provides technical measurements and specifications for card stock.

- **Surface Finish**

Use cards with a smooth surface finish.

Surface finish is measured by using a surface profilometer with a 2.5 μ m radius stylus. Use a short pass filter cutoff length of 25 microns to eliminate the effect of waviness and card flatness.

The acceptable surface roughness average (R_a) is 0.25 microns maximum

- **Surface Flatness**

Large surface irregularities (such as bumps, pits, or burrs) that occur during manufacture might result in printing voids.

The void radius is proportional to the height and depth of the irregularity. For every 0.002 inches (0.050 mm) height-to-depth ratio, a void radius of 0.100 inches (2.5 mm) is expected. A larger irregularity results in a proportionally larger void; a smaller irregularity results in a proportionally smaller void.

Unacceptable surface irregularities have a height-to-depth ratio greater than 0.0005 inches (0.012 mm) and have a depth-to-length ratio (slope) greater than 1 per 200 (a very subtle change in flatness).

Measure suspect surface irregularities using a surface profilometer.

- **Smart Cards**

The height of the chip on a contact smart card and the depression (or dimple) on the back of the card opposite the chip affects printing quality. Use the following measurements to evaluate smart cards:

- The contact plate height limit of the smart card chip should be ± 0.004 inches (0.10 mm).
- The back side dimple depth should be ± 0.004 inches (0.10 mm).

When evaluating the back side dimple, look at the following:

- ◆ Depth
- ◆ Local surface slope
- ◆ Milling depth
- ◆ Remaining material thickness
- ◆ How the milled pocket is filled (or not filled)
- ◆ Waviness in the dimple

Unacceptable irregularities on the back side occur when the height-to-depth ratio is greater than 0.0001 inches (0.025 mm) and the depth-to-length ratio (slope) is greater than 1 per 25 (a step change).

- **Surface Reflectivity**

Bar code printed cards should pass all ANSI bar code requirements as tested using an

ANSI X3.182-compliant bar code analyzer with both 660 nanometer and 940 nanometer light sources. This means the clear card surface material should be limited to a maximum thickness of 0.002 inches (0.05 mm).

Testing card stock regularly is the best method to ensure print quality.

