



BID NO.: [REDACTED]

OPENING: 2:00 P.M.
[REDACTED], 2014

MIAMI-DADE COUNTY, FLORIDA
I N V I T A T I O N
T O B I D

TITLE:
Extended and Limited Use Contactless Smartcards

This is a DRAFT and is subject to change.

FOR INFORMATION CONTACT:
Jesus Lee, 305-375-4264, fjl@miamidade.gov

IMPORTANT NOTICE TO BIDDERS:

- **READ THIS ENTIRE DOCUMENT, THE GENERAL TERMS AND CONDITIONS, AND HANDLE ALL QUESTIONS IN ACCORDANCE WITH THE TERMS OUTLINED IN PARAGRAPH 1.2(D) OF THE GENERAL TERMS AND CONDITIONS.**
- **FAILURE TO SIGN BID SUBMITTAL FORM IN SECTION 4 WILL RENDER YOUR BID NON-RESPONSIVE**



MIAMI-DADE COUNTY, FLORIDA

INVITATION TO BID

Bid Number: [REDACTED]

Bid Title: Extended and Limited Use Contactless Smartcards

Procurement Officer: Jesus Lee, CPPB

Bids will be accepted until 2:00 p.m. on [REDACTED], 2014

Bids will be publicly opened. The County provides equal access and does not discriminate on the basis of disability in its programs or services. It is our policy to make all communication available to the public, including those who may be visually or hearing impaired. If you require information in a non-traditional format please call 305-375-5278.

Instructions: The Clerk of the Board business hours are 8:00am to 4:30pm, Monday through Friday. Additionally, the Clerk of the Board is closed on holidays observed by the County. Each Bid submitted to the Clerk of the Board shall have the following information clearly marked on the face of the envelope: the Bidders name, return address, Bid number, opening date of the Bid and the title of the Bid. Included in the envelope shall be an original and two copies of the Bid Submittal, plus attachments if applicable.

All Bids received time and date stamped by the Clerk of the Board prior to the bid submittal deadline shall be accepted as timely submitted. The circumstances surrounding all bids received and time stamped by the Clerk of the Board after the bid submittal deadline will be evaluated by the procuring department, in consultation with the County Attorney's Office, to determine whether the bid will be accepted as timely.

NOTICE TO ALL BIDDERS:

- **FAILURE TO SIGN THE BID SUBMITTAL FORM WILL RENDER YOUR BID NON-RESPONSIVE.**
- **THE BID SUBMITTAL FORM CONTAINS IMPORTANT CERTIFICATIONS THAT REQUIRE REVIEW AND COMPLETION BY ANY BIDDER RESPONDING TO THIS SOLICITATION.**

SECTION 1
GENERAL TERMS AND CONDITIONS

TITLE: Extended and Limited Use Contactless Smartcards

All general terms and conditions of Miami-Dade County Procurement Contracts for Invitations to Bid are posted online. Persons and Companies that receive an award from Miami-Dade County through Miami-Dade County's competitive procurement process must anticipate the inclusion of these requirements in the resultant Contract. These standard general terms and conditions are considered non-negotiable subject to the County's final approval.

All applicable terms and conditions pertaining to this solicitation and resultant contract may be viewed online at the Miami-Dade County Procurement Management website by clicking on the below link:

<http://www.miamidade.gov/procurement/library/boilerplate/general-terms-and-conditions-r13-8.pdf>

DRAFT

SECTION 2
SPECIAL CONDITIONS

TITLE: Extended and Limited Use Contactless Smartcards

2.1 PURPOSE

The purpose of this Invitation to Bid is to establish a contract for the purchase of Proximity Integrated Circuit Cards, also known as Extended and Limited Use Contactless Smartcards for Miami-Dade Transit (MDT) department. These Smartcards are branded by MDT as “Easy Cards” and “Easy Tickets.”

2.2 TERM OF CONTRACT: TWELVE (24) MONTHS

This contract shall commence on the first calendar day of the month succeeding approval of the contract by the Board of County Commissioners, or designee, unless otherwise stipulated in the Notice of Award Letter which is distributed by the County's Procurement Management Division, and contingent upon the completion and submittal of all required bid documents. The contract shall expire on the last day of the last month of the twenty-fourth (24) month.

2.3 OPTION TO RENEW – THREE (3) ADDITIONAL ONE YEAR TERMS WITH PRICE ADJUSTMENT

The initial contract prices resultant from this solicitation shall prevail for a two (2) year period from the contract's initial effective date. Prior to or upon completion of that initial term, the County shall have the option to renew this contract for an additional three (3), one year terms, on a year to year basis. Prior to completion of each exercised term, the County may consider an adjustment to prices (see paragraph 2.5) based on changes in the Consumers Price Index (CPI) - All Urban Consumers U.S. City Average for All Items, as published by the U. S. Department of Labor, Bureau of Labor Statistics.

2.4 METHOD OF AWARD

Award of this solicitation will be made to the two (2) lowest, responsive, responsible, Bidders on a group by group basis. The two groups for this solicitation are:

Group 1: Easy Cards (Standard Use Proximity Integrated Circuit Cards)

Group 2: Easy Tickets (Limited Use Proximity Integrated Circuit Cards)

To be considered for award by group, the Bidder shall offer unit prices for all items within a given group. If a Bidder fails to submit an offer for all items within a group, its offer for that group may be rejected. The County will select the lowest Bidder for award for each group by multiplying each line item's unit price times the quantity to obtain a total for the line item, and then totaling all line item totals for each group and awarding to the two lowest priced, responsive and responsible Bidders for that group.

Bidder's prices shall include all applicable taxes and government fees if the County is not exempt from such taxes, fees, charges, and costs involved in providing the products herein to the County, including delivery. See paragraph 2.10 for shipping terms.

While the award will be made to two Bidders by group to ensure availability, the lowest priced responsive and responsible Bidder for each group will be designated as the primary bidder for the corresponding group, and will be given the first opportunity to perform under the contract. The second lowest priced responsive and responsible Bidder per group will be designated as the secondary Bidder for the corresponding group. Should the primary Bidder fail to perform the contract requirements, the County may, at its sole discretion, obtain contract products from the secondary Bidder for that group.

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In addition to complying with the requirements set forth above, Bidders shall comply with the following group-specific requirements:

- 2.4.1 To be considered for award of Group 1, the Bidder shall be a manufacturer, agent, dealer, representative, or distributor of extended use contactless smartcards, as specified in Section 3 Technical Specifications and Exhibit 1. Bidder shall provide documentation from the manufacturer in the form of a letter on the manufacturer's letterhead or any other type of documentation that is verifiable by the County.
- 2.4.2 To be considered for award of Group 2 the Bidder shall be manufacturer, agent, dealer, representative, or distributor of limited use contactless smartcards, as specified in Section 3 Technical Specifications and Exhibit 2. Bidder shall provide documentation from the manufacturer in the form of a letter on the manufacturer's letterhead or any other type of documentation that is verifiable by the County.
- 2.4.3 The manufacturer's name, brand names and/or other product information contained in this solicitation are being used for the sole purpose of establishing the minimum requirement of quality, standard of performance and design, and is in no way intended to prohibit the offer of any manufacturer's items of equal material unless otherwise indicated.

Bidders shall submit Product Information Sheets with their bid which allows the County to verify that the product(s) offered complies with the Bid's specifications. Where product literature is submitted with bid, and the product literature offers information that does not fully comply with the technical specifications of the solicitation, the Bidder shall clearly state on their company stationary the differences between their product and the required specifications. Bids submitted without the letter explaining compliance may result in the bid being rejected for not meeting the specifications.

Miami-Dade County, at its sole discretion, may allow Bidders to complete or supplement the information sheets during the bid evaluation period. Failure to provide proof of compliance to the specifications, as specified shall result in the Bidder's bid being declared non-responsive. Miami-Dade County shall be the sole judge of the product's conformance with requirements and its decision shall be final, in its best interest. Miami-Dade County reserves the right to verify the information submitted by the bidder and to obtain and evaluate additional information, as it deems necessary to ascertain the product's conformance to requirements.

- 2.4.4 The Bidder's ISO 9000-2000 certification documentation for their Smartcard shall be submitted with bid.

The County reserves the right to request and evaluate any additional information from the Bidders during evaluation.

2.5 PRICES

If a Bidder is awarded a contract under this solicitation, the line item prices proposed by the awarded Bidder shall remain fixed for the first two year term of the contract. Thereafter, the line item prices may be adjusted yearly by multiplying the awarded line item price by the

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TITLE: Extended and Limited Use Contactless Smartcards

yearly percentage of change of the price index listed below. The adjustments may be upward or downward.

Series Id: CUUR0000SA0, CUUS0000SA0
 Not Seasonally Adjusted
 Area: U.S. city average
 Item: All items
<http://data.bls.gov/timeseries/CUUR0000SA0>

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2012	226.665	227.663	229.392	230.085	229.815	229.478	229.104	230.379	231.407	231.317	230.221	229.601	229.594
2013	230.280	232.166	232.773	232.531	232.945	233.504	233.596	233.877	234.149	233.546	233.069	233.049	232.957
2014	233.916	234.781	236.293	237.072									

Price adjustments shall be calculated during the month prior to the start of next term of the contract. The period used to calculate the adjustment will include no more than the previous twelve (12) months, using the index above, and include as many months as published, including preliminary [P] numbers, as not all twelve months may be available for calculations at this time.

Example:

If the current term began January 1, 2013 (230.280); the percentage of change calculated on December 2013 (233.049) is one (1) percent, calculated as follows:

$$233.049 \div 230.280 = 1.02$$

$$1.02 \div 230.280 = .01$$

$$.01 \times 100 = 1\%$$

$$1\% \times \text{line item price} = \text{adjusted line item price.}$$

In the example above, if the County authorizes such an increase, the line item's awarded price will be multiplied by one (1) percent, and that amount will added to any line item prices for next twelve months commencing January 2014.

The submission of an upward adjustment request to the County is the responsibility of all the awarded Bidders, and will not be granted automatically by the County. These requests must be submitted to the Procurement Contracting Officer assigned to the contract during the last (30) calendar days before the end of each term.

It shall be further understood that the County reserves the right to reject any upward price adjustments submitted by awarded Bidders or to terminate the contract for convenience with the primary Bidder based on such price adjustment requests.

All downward adjustments will be reviewed by the County and may be exercised at the sole discretion of the County if it's in its best interest.

2.6 METHOD OF PAYMENT

The Bidder(s) shall submit an invoice(s) to the County user department after purchase has been completed, whether the specific item(s) were picked up by authorized County personnel or delivered to the site by the Bidder. In addition to the general invoice

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requirements set forth below, the invoices shall reference the corresponding delivery ticket number or packing slip number that was signed by an authorized representative of the County user department at the time the items were delivered. Submittal of these periodic invoices shall not exceed thirty (30) calendar days from the delivery of the items. Under no circumstances shall the invoices be submitted to the County in advance of the delivery and acceptance of the items.

All invoices shall contain the following basic information:

- I. Bidder Information:
 - The name of the business organization as specified on the contract between Miami-Dade County and Bidder
 - Date of invoice
 - Invoice number
 - Bidder's Federal Identification Number on file with Miami-Dade County
- II. County Information:
 - Miami-Dade County Release Purchase Order or Small Purchase Order Number
- III. Pricing Information:
 - Unit price of the goods, services or property provided
 - Extended total price of the goods, services or property
 - Applicable discounts
- IV. Goods or Services Provided per Contract:
 - Description
 - Quantity
- V. Delivery Information:
 - Delivery terms set forth within the Miami-Dade County Release Purchase Order
 - Location and date of delivery of goods, services or property

2.7 CONTACT PERSON

For any additional information regarding the terms and conditions of this solicitation and resultant contract, Contact: Jesus Lee, at (305) 375-4264 email – fjl@miamidade.gov.

2.8 LIQUIDATED DAMAGES FOR LATE DELIVERY

Failure to deliver the product(s) herein in accordance with the specifications and to the satisfaction of the County within the time stated **in paragraphs 2.10 and 2.12** shall cause the awarded Bidder to be subject to charges for liquidated damages in the amount of \$1,500 for each and every calendar day that the product is not delivered and accepted by the County.

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As compensation due the County for loss of use and for additional costs incurred by the County due to such untimely delivery, the County shall have the right to deduct said liquidated damages from any amount due, or that may become due, to the awarded Bidder under this contract, or to invoice the awarded Bidder for such damages if the costs incurred exceed the amount due the awarded Bidder.

2.9 SHIPPING TERMS

Bidders shall quote prices based on F.O.B. Destination and shall hold title to the goods until such time as they are delivered and accepted by an authorized County representative at:

Miami-Dade Transit
6601 NW 72nd Avenue
Miami FL 33166.

2.10 DELIVERY SHALL BE (45) DAYS AFTER DATE OF ORDER

Unless otherwise indicated in writing by MDT, when the product(s) are ordered, the awarded Bidder shall make deliveries within forty-five (45) calendar days after the day the County approves samples, hereinafter also called proof.

All deliveries shall be made in accordance with good commercial practices and completed in accordance with the schedule above; except in such cases where the delivery will be delayed due to acts of nature, strikes, or other causes beyond the control of the Bidder.

The estimated monthly deliveries are:

EASY Cards	100,000
EASY Tickets (roll)	1,000,000
EASY Tickets (pre-cut)	200,000

These estimates are not guaranteed.

2.11 BACK ORDER DELAYS IN DELIVERY

The County shall not allow any late deliveries attributed to product back order situations under this contract. Accordingly, the awarded Bidder is required to deliver all items to the County within the time specified and no grace period on account of back order situations shall be honored, unless written authorization is issued by MDT, and a new delivery date is mutually established. In the event that the awarded Bidder fails to deliver the products within the time specified, the County reserves the right to cancel the order, seek the items from another Bidder, and charge the awarded Bidder for any re-procurement costs. If the awarded Bidder fails to honor these re-procurement costs, the County may terminate the contract for default.

2.12 WARRANTIES AGAINST DEFECTS

Warranty against any defects for EASY CARDS (Group 1) shall be thirty-six (36) months from date of acceptance by the County. The awarded Bidder shall promptly replace defective cards, without cost to the County, within 30 calendar days after the County notifies the awarded Bidder of such defects in writing or electronic mail. Payment for delivered and accepted cards does not constitute a waiver of warranty.

Warranty against any defects for EASY TICKETS (Group 2) shall be twelve (12) months from date of acceptance by the County. The awarded Bidder shall promptly replace defective cards, without cost to the County, within 30 calendar days after the County notifies

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the awarded Bidder of such defects in writing or electronic mail. Payment in full for the work does not constitute a waiver of warranty.

The County shall be the sole judge of what is a defect.

2.13 PURCHASE OF OTHER ITEMS NOT LISTED WITHIN THIS SOLICITATION BASED ON PRICE QUOTES

While the County has listed all major items within this solicitation which are utilized by MDT in conjunction with their operations, there may be similar items that must be purchased by the County during the term of this contract. Under these circumstances, a County representative will contact all awarded Bidder(s) to obtain a price quote for similar items. The County reserves the right to award these similar items to the awarded Bidder(s) based on the lowest price quoted, or to acquire the items through a separate solicitation.

2.14 SAMPLES MAY BE REQUIRED DURING EVALUATION

After the County opens submittals, Bidders may be required to submit samples of their product for evaluation by, and at no cost to the County. If samples are required, the County will notify the Bidder(s) of such in writing and will specify the details of the samples needed and deadline for submission. Each individual sample or batch shall be clearly labeled with the Bidder's name, bid number, bid title, manufacturer's name and brand name, and style/model number if applicable. If a Bidder fails to submit the samples, properly labeled, within the specified date stipulated in the County notice, the County may not consider the bidder's offer for that item(s); provided however, that in the event of a group or aggregate award, the bidder's offer may not be eligible for that group or in the aggregate as applicable. All samples shall become the property of Miami-Dade County.

The County reserves the right to perform its own testing procedures or to send any and all samples to an [independent](#) third party laboratory chosen by the County for analysis. Any costs for testing shall be borne by the Bidder. On the basis of this testing and analysis, the County shall be sole judge of the acceptability of the sample in conformance with the bid specifications and its decision shall be final. Any sample submitted shall create an express warranty that the whole of the goods and/or services to be provided by the Bidder during the contract period shall conform to the sample submitted. The Bidder shall be required to provide adequate restitution to the County, in the manner prescribed by the County, if this warranty is violated during the term of the contract.

2.15 TESTING OF RANDOM SAMPLES OF DELIVERED PRODUCTS

During the term of the contract, samples of delivered items may be randomly selected and tested, at the County's expense, for compliance with these specifications. If it is found that the delivered products do not conform to the specifications herein, the County shall require replacement within the time specified in paragraph 2.12, or may terminate the contract for cause.

2.16 ACCEPTANCE OF PRODUCT BY THE COUNTY

The products to be provided hereunder shall be in full compliance with the specifications and requirements set forth in this contract. If a Bidder's product is determined by MDT to not meet the specifications and requirements of this contract, either prior to acceptance or upon initial inspection after acceptance, the products may be returned to the awarded Bidder at their expense. At the County's option, the awarded Bidder shall either provide a direct replacement for the products and [include documentation that the replacement product complies with specification by an independent third party laboratory chosen by the County,](#)

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or provide a full credit for the returned products. The awarded Bidder shall be assessed any additional charges for any conforming action taken by the County under this clause.

2.17 PACKING SLIP/DELIVERY TICKET TO ACCOMPANY ITEMS DURING DELIVERY

The awarded Bidder shall enclose a complete packing slip or delivery ticket with any items to be delivered in conjunction with this contract. The packing slip shall be attached to the shipping carton(s) which contain the items and shall be made available to the County's authorized representative during delivery. The packing slip or delivery ticket shall include, at a minimum, the following information: purchase order number; date of order; a complete listing of items being delivered.

2.18 PATENTS

The awarded Bidder(s) shall assume all costs arising from the use of patented materials, equipment, devices, or processes, as and when furnished by the awarded Bidder(s), that are not furnished by the County, which are used on or incorporated in the Work and shall bear all responsibility for use of such materials and shall indemnify and hold harmless the County and their duly authorized representatives, officers, directors, employees, and agents, from all suits at law, actions, cost, damage and expense (including reasonable attorney's fees), of every kind or nature, arising from, for, or on account of, the use of any patented materials, equipment, devices or processes and settle or pay damages related thereto.

If such materials, equipment, devices or processes are held to constitute an infringement and their use enjoined, the Contractor, at its expense, shall, without prejudice to any other rights of the County or the Project Manager:

- (A) Secure for the County the right to continue using such materials, equipment, devices or processes by suspension of the injunction or by procuring a license or licenses; or
- (B) Replace such materials, equipment, devices or processes with materials, equipment, devices or processes acceptable to the County; or
- (C) Modify such materials, equipment, devices or processes so that they become non-infringing, which modification shall not adversely affect the functionality of such materials, equipment, devices or processes, as determined by the County.

SECTION 3
TECHNICAL SPECIFICATIONS

TITLE: Extended and Limited Use Contactless Smartcards

3.1 SCOPE OF WORK

The technical specifications in Exhibits 1, 2, 3 and the technical drawings in Appendix A define the specific MDT requirements for materials, manufacturing, handling, packaging, quality assurance, testing and delivery of the Extended-Use contactless smartcards (EASY Cards), and the Limited Use contactless smartcards (EASY Tickets) to be used in the Miami Dade Transit Automated Fare Collection System.

SEE EXHIBITS 1, 2 AND 3, **UNDER SEPARATE COVER** FOR THE SPECIFICATIONS

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SECTION 4
BID SUBMITTAL FORM

Submit Bid To:
CLERK OF THE BOARD
Stephen P. Clark Center
111 NW 1st Street
17th Floor, Suite 202
Miami, Florida 33128-1983

OPENING: 2:00 P.M.

[Redacted]
[Redacted], 2014



**PLEASE QUOTE PRICES F.O.B. DESTINATION, FREIGHT ALLOWED, LESS TAXES,
DELIVERED IN MIAMI-DADE COUNTY, FLORIDA.**

NOTE: Miami-Dade County is exempt from all taxes (Federal, State, Local). Bid price should be less all taxes. Tax Exemption Certificate furnished upon request.

Issued by: ISD/PM Date Issued: This Bid Submittal Consists of
J. Lee [Redacted] Pages [Redacted] through [Redacted]

Sealed bids subject to the Terms and Conditions of this Invitation to Bid and the accompanying Bid Submittal. Such other contract provisions, specifications, drawings or other data as are attached or incorporated by reference in the Bid Submittal, will be received at the office of the Clerk of the Board at the address shown above until the above stated time and date, and at that time, publicly opened for furnishing the supplies or services described in the accompanying Bid Submittal Requirement.

Title:

Extended and Limited Use Contactless Smartcards

A Bid Deposit in the amount of **N/A** the total amount of the bid shall accompany all bids.

A Performance Bond in the amount of **N/A** the total amount of the bid will be required upon execution of the contract by the successful bidder and Miami-Dade County.

DO NOT WRITE IN THIS SPACE	
ACCEPTED _____	HIGHER THAN LOW _____
NON-RESPONSIVE _____	NON-RESPONSIBLE _____
DATE B.C.C. _____	NO BID _____
ITEM NOS. ACCEPTED _____	
COMMODITY CODE:	
Procurement Contracting Officer:	

FIRM NAME _____

RETURN ONE ORIGINAL AND TWO COPIES OF BID SUBMITTAL PAGES AND AFFIDAVITS.

FAILURE TO SIGN THE BID SUBMITTAL FORM IN SECTION 4 WILL RENDER YOUR BID NON-RESPONSIVE.

SECTION 4
 BID SUBMITTAL FOR:

FIRM NAME: _____

GROUP 1: Extended Use Contactless Smart Cards (EASY Cards)

Item No.	Fare Media	Product Manufacturer's Name:	Estimated Quantity (initial two year term)	Unit Price
1	Standard Use Proximity Integrated Circuit Card (EASY Cards) – Serialized with graphics on Both Sides – Pre-Cut		1,000,000 Ea.	\$ _____

***Quantities listed are two-year estimates only and are not guaranteed.**

	Pursuant to 2.4.1; the Bidder shall be a manufacturer, agent, dealer, representative, or distributor of extended use contactless smartcards, as specified in Section 3 Technical Specifications and Exhibit 1, and shall provide documentation.	X: _____ (Initial here to indicate document(s) submitted)
	Pursuant to 2.4.3; submit Product Information Sheets with bid.	X: _____ (Initial here to indicate document(s) submitted)
	Pursuant to 2.4.4; submit ISO Certificate with bid.	X: _____ (Initial here to indicate document(s) submitted)

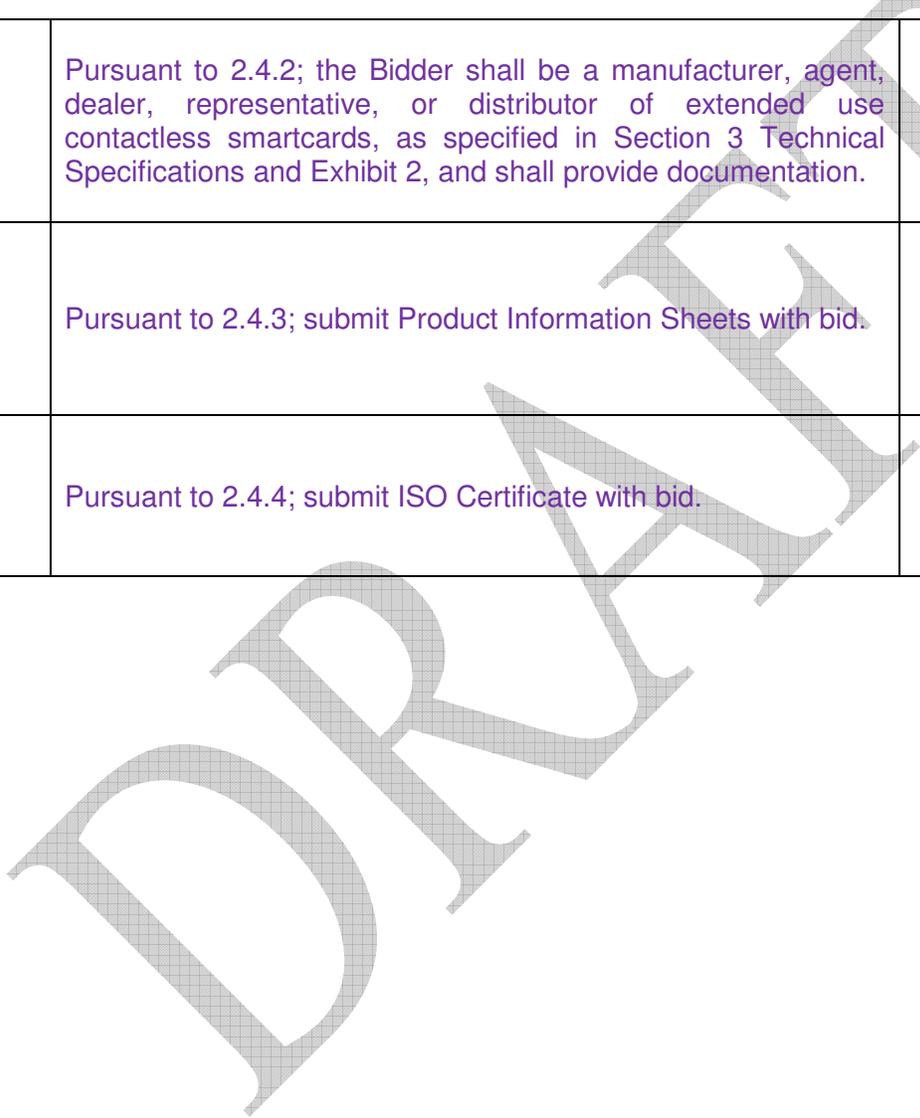
GROUP 2: Limited Use Contactless Smart Cards (EASY Tickets)

Item No.	Fare Media	Product Manufacturer's Name:	Estimated Quantity (initial two year term)	Unit Price
1	Limited Use Proximity Integrated Circuit Card (EASY Tickets) – Serialized with graphics on Both Sides – Roll Stock		9,500,000 Ea.	\$ _____

SECTION 4
 BID SUBMITTAL FOR:

FIRM NAME: _____

2	Limited Use Proximity Integrated Circuit Card (EASY Tickets) – Serialized with graphics on Both Sides – Pre-Cut		2,000,000 Ea.	\$ _____
*Quantities listed are two-year estimates only and are <u>not</u> guaranteed.				
	Pursuant to 2.4.2; the Bidder shall be a manufacturer, agent, dealer, representative, or distributor of extended use contactless smartcards, as specified in Section 3 Technical Specifications and Exhibit 2, and shall provide documentation.		X: _____ (Initial here to indicate document(s) submitted)	
	Pursuant to 2.4.3; submit Product Information Sheets with bid.		X: _____ (Initial here to indicate document(s) submitted)	
	Pursuant to 2.4.4; submit ISO Certificate with bid.		X: _____ (Initial here to indicate document(s) submitted)	



SECTION 4
BID SUBMITTAL FOR:

ACKNOWLEDGEMENT OF ADDENDA

INSTRUCTIONS: COMPLETE PART I OR PART II, WHICHEVER APPLIES

PART I:

LIST BELOW THE DATES OF ISSUE FOR EACH ADDENDUM RECEIVED IN CONNECTION WITH THIS BID

Addendum #1, Dated _____

Addendum #2, Dated _____

Addendum #3, Dated _____

Addendum #4, Dated _____

Addendum #5, Dated _____

Addendum #6, Dated _____

Addendum #7, Dated _____

Addendum #8, Dated _____

PART II:

NO ADDENDUM WAS RECEIVED IN CONNECTION WITH THIS BID

FIRM NAME: _____

AUTHORIZED SIGNATURE: _____

DATE: _____

TITLE OF OFFICER: _____



Bid Title: Extended and Limited Use Contactless Smartcards

By signing this Bid Submittal Form the Bidder certifies that it satisfies all legal requirements (as an entity) to do business with the County, including all Conflict of Interest and Code of Ethics provisions in Section 2-11 of the Miami-Dade County Code. Any County employee or member of his or her immediate family seeking to contract with the County shall seek a conflict of interest opinion from the Miami-Dade County Ethics Commission prior to submittal of a Bid response or application of any type to contract with the County by the employee or his or her immediate family and file a copy of that request for opinion and any opinion or waiver from the Board of County Commissioners with the Clerk of the Board. The affected employee shall file with the Clerk of the Board a statement in a form satisfactory to the Clerk disclosing the employee's interest or the interest of his or her immediate family in the proposed contract and the nature of the intended contract at the same time as or before submitting a Bid, response, or application of any type to contract with the County. Also a copy of the request for a conflict of interest opinion from the Ethics Commission and any corresponding opinion, or any waiver issued by the Board of County Commissioners, must be submitted with the response to the solicitation.

In accordance with Sec. 2-11.1(s) of the County Code as amended, prior to conducting any lobbying **regarding this solicitation, the Bidder must file the appropriate form with the Clerk of the Board stating that a particular lobbyist is authorized to represent the Bidder.** Failure to file the appropriate form in relation to each solicitation may be considered as evidence that the Bidder is not a responsible contractor.

The Bidder confirms that this Bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a Bid for the same goods and/or services and in all respects is without collusion, and that the Bidder will accept any resultant award. Further, the undersigned acknowledges that award of a contract is contingent upon vendor registration. Failure to register as a vendor within the specified time may result in your firm not being considered for award.

Pursuant to Miami-Dade County Ordinance 94-34, any individual, corporation, partnership, joint venture or other legal entity having an officer, director, or executive who has been convicted of a felony during the past ten (10) years shall disclose this information at the time of bid or proposal submission.

Place a check mark here only if bidder has such conviction to disclose.

By executing this proposal through a duly authorized representative, the proposer certifies that the proposer is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, as those terms are used and defined in sections 287.135 and 215.473 of the Florida Statutes. In the event that the proposer is unable to provide such certification but still seeks to be considered for award of this solicitation, the proposer shall execute the proposal through a duly authorized representative and shall also initial this space: _____. In such event, the proposer shall furnish together with its proposal a duly executed written explanation of the facts supporting any exception to the requirement for certification that it claims under Section 287.135 of the Florida Statutes. The proposer agrees to cooperate fully with the County in any investigation undertaken by the County to determine whether the claimed exception would be applicable. The County shall have the right to terminate any contract resulting from this solicitation for default if the proposer is found to have submitted a false certification or to have been placed on the Scrutinized Companies for Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List.

LOCAL PREFERENCE CERTIFICATION: For the purpose of this certification, a "local business" is a business located within the limits of Miami-Dade County (or Broward County in accordance with the Interlocal Agreement between the two counties) that conforms with the provisions of Section 1.10 of the General Terms and Conditions of this solicitation and contributes to the economic development of the community in a verifiable and measurable way. This may include, but not be limited to, the retention and expansion of employment opportunities and the support and increase to the County's tax base.

Place a check mark here only if affirming bidder meets requirements for Local Preference. Failure to complete this certification at this time (by checking the box above) may render the vendor ineligible for Local Preference.

LOCALLY-HEADQUARTERED BUSINESS CERTIFICATION: For the purpose of this certification, a "locally-headquartered business" is a Local Business whose "principal place of business" is in Miami-Dade County, as defined in Section 1.10 of the General Terms and Conditions of this solicitation.

Place a check mark here only if affirming bidder meets requirements for the Locally-Headquartered Preference (LHP). Failure to complete this certification at this time (by checking the box above) may render the vendor ineligible for the LHP. The address of the locally-headquartered office is _____.

LOCAL CERTIFIED SERVICE-DISABLED VETERAN BUSINESS ENTERPRISE CERTIFICATION: A Local Certified Service-Disabled Veteran Business Enterprise is a firm that is (a) a local business pursuant to Section 2-8.5 of the Code of Miami-Dade County and (b) prior to



bid submission is certified by the State of Florida Department of Management Services as a service-disabled veteran business enterprise pursuant to Section 295.187 of the Florida Statutes.

Place a check mark here only if affirming bidder is a Local Certified Service-Disabled Veteran Business Enterprise. A copy of the certification must be submitted with this proposal.

COUNTY USER ACCESS PROGRAM (UAP): Joint purchase and entity revenue sharing program

For the County's information, the bidder is requested to indicate, at 'A' and 'B' below, its general interest in participating in the Joint Purchase Program of the County User Access Program (UAP) described in Section 1.35 of this contract solicitation, if that section is present in this solicitation document. Bidder participation in the Joint Purchase portion of the UAP is voluntary, and the bidder's expression of general interest at 'A' and 'B' below is for the County's information only and shall not be binding on the bidder.

A. If awarded this County contract, would you be interest in participating in the Joint Purchase portion of the UAP with respect to other governmental, quasi-governmental or not-for-profit entities located within the geographical boundaries of Miami-Dade County?

Yes _____ No _____

B. If awarded this County contract, would you be interested in participating in the Joint Purchase portion of the UAP with respect to other governmental, quasi-governmental or not-for-profit entities located outside the geographical boundaries of Miami-Dade County?

Yes _____ No _____

Firm Name: _____

Street Address: _____

Mailing Address (if different): _____

Telephone No.: _____ Fax No.: _____

Email Address: _____ FEIN No. _/_-_/_/_/_/_/_/

Prompt Payment Terms: ___% ___ days net ___ days (Please see paragraph 1.2 H of General Terms and Conditions)

Signature: _____ (Signature of authorized agent)

By signing this document the bidder agrees to all Terms and Conditions of this Solicitation and the resulting Contract.

Print Name: _____ Title: _____

THE EXECUTION OF THIS FORM CONSTITUTES THE UNEQUIVOCAL OFFER OF PROPOSER TO BE BOUND BY THE TERMS OF ITS PROPOSAL. FAILURE TO SIGN THIS SOLICITATION WHERE INDICATED ABOVE BY AN AUTHORIZED REPRESENTATIVE SHALL RENDER THE PROPOSAL NON-RESPONSIVE. THE COUNTY MAY, HOWEVER, IN ITS SOLE DISCRETION, ACCEPT ANY PROPOSAL THAT INCLUDES AN EXECUTED DOCUMENT WHICH UNEQUIVOCALLY BINDS THE PROPOSER TO THE TERMS OF ITS OFFER.



APPENDIX

AFFIDAVITS FORMAL BIDS



Miami-Dade County
Internal Services Department
Procurement Management Division
Affirmation of Vendor Affidavits

In accordance with Ordinance 07-143 amending Section 2-8.1 of the Code of Miami-Dade County, effective June 1, 2008, vendors are required to complete a new Vendor Registration Package, including a Uniform Affidavit Packet (Vendor Affidavits Form), before being awarded a new contract. The undersigned affirms that the Vendor Affidavits Form submitted with the Vendor Registration Package is current, complete and accurate for each affidavit listed below.

Contract No. : _____ Federal Employer Identification Number (FEIN): _____

Contract Title: _____

Affidavits and Legislation/ Governing Body

<p>1. Miami-Dade County Ownership Disclosure Sec. 2-8.1 of the County Code</p>	<p>6. Miami-Dade County Vendor Obligation to County Section 2-8.1 of the County Code</p>
<p>2. Miami-Dade County Employment Disclosure County Ordinance No. 90-133, amending Section 2-8-1(d)(2) of the County Code</p>	<p>7. Miami-Dade County Code of Business Ethics Article 1, Section 2-8.1(f) and 2-11(b)(1), of the County Code through (d) and (9) of the County Code and County Ordinance No 00-1 amending Section 2-11.1(c) of the County Code</p>
<p>3. Miami-Dade County Employment Drug-free Workplace Certification Section 2-8.1.2(b) f the County Code</p>	<p>8. Miami-Dade County Family Leave Article V of Chapter 11 of the County Code</p>
<p>4. Miami-Dade County Disability Non-Discrimination Article 1, Section 2-8.1.5 Resolution R182-00 amending R-385-95</p>	<p>9. Miami-Dade County Living Wage Section 2-8.9 of the County Code</p>
<p>5. Miami-Dade County Debarment Disclosure Section 10.38 of the County Code</p>	<p>10. Miami-Dade County Domestic Leave and Reporting Article 8, Section 11A-60 11A-67 of the County Code</p>

Printed Name of Affiant	Printed Title of Affiant	Signature of Affiant
Name of Firm	Date	
Address of Firm	State	Zip Code

Notary Public Information

Notary Public – State of _____ County of _____

Subscribed and sworn to (or affirmed) before me this _____ day of, _____ 20 _____

by _____ He or she is personally known to me or has produced identification

Type of identification produced _____

Signature of Notary Public _____ Serial Number _____

Print or Stamp of Notary Public _____ Expiration Date _____ Notary Public Seal _____

FAIR SUBCONTRACTING PRACTICES
(Ordinance 97-35)

In compliance with Miami-Dade County Ordinance 97-35, the Bidder shall submit with the bid proposal a detailed statement of its policies and procedures (use separate sheet if necessary) for awarding subcontractors in accordance with Section 1, Paragraph 1.15

NO SUBCONTRACTORS WILL BE UTILIZED FOR THIS CONTRACT

_____ Signature

_____ Date

SUBCONTRACTOR/SUPPLIER LISTING
(Miami-Dade County Code Sections 2-8.1, 2-8.8 and 10-34)

Name of Proposer: _____ FEIN No. _____

In accordance with Sections 2-8.1, 2-8.8 and 10.34 of the Miami-Dade County Code, this form must be submitted as a condition of award by all Proposers on County contracts for purchase of supplies, materials or services, including professional services which involve expenditures of \$100,000 or more, and all Proposers on County or Public Health Trust construction contracts which involve expenditures of \$100,000 or more. The Proposers who are awarded this contract shall not change or substitute first tier subcontractors or direct suppliers or the portions of the contract work to be performed or materials to be supplied from those identified, except upon written approval of the County. The Proposers should enter the word "NONE" under the appropriate heading of this form if no subcontractors or suppliers will be used on the contract and sign the form below.

In accordance with Ordinance No. 11-90, an entity contracting with the County shall report the race, gender and ethnic origin of the owners and employees of all first tier subcontractors/suppliers. In the event that the recommended Proposer demonstrates to the County prior to award that the race, gender, and ethnic information is not reasonably available at that time, the Proposer shall be obligated to exercise diligent efforts to obtain that information and provide the same to the County not later than ten (10) days after it becomes available and, in any event, prior to final payment under the contract.

(Please duplicate this form if additional space is needed.)

Business Name and Address of First Tier Subcontractor/ Subconsultant	Principal Owner	Scope of Work to be Performed by Subcontractor/ Subconsultant	Principal Owner (Enter the number of male and female owners by race/ethnicity)							Employee(s) (Enter the number of male and female employees and the number of employees by race/ethnicity)							
			Gender		Race/Ethnicity					Gender		Race/Ethnicity					
			M	F	White	Black	Hispanic	Asian/Pacific Islander	Native American/ Native Alaskan	Other	M	F	White	Black	Hispanic	Asian/Pacific Islander	Native American/ Native Alaskan
Business Name and Address of First Tier Direct Supplier	Principal Owner	Supplies/Material s/Services to be Provided by Supplier	Principal Owner (Enter the number of male and female owners by race/ethnicity)							Employee(s) (Enter the number of male and female employees and the number of employees by race/ethnicity)							
			Gender		Race/Ethnicity					Gender		Race/Ethnicity					
			M	F	White	Black	Hispanic	Asian/Pacific Islander	Native American/ Native Alaskan	Other	M	F	White	Black	Hispanic	Asian/Pacific Islander	Native American/ Native Alaskan

Mark here if race, gender and ethnicity information is not available and will be provided at a later date. This data may be submitted to contracting department or on-line to the Small Business Development of the Department of Regulatory and Economic Resources at <http://www.miamidade.gov/business/business-development-contracts.asp>. As a condition of final payment, Proposer shall provide subcontractor information on the Subcontractor Payment Report Sub 200 form which can be found at <http://www.miamidade.gov/business/library/forms/subcontractors-payment.pdf>.

I certify that the representations contained in this Subcontractor/Supplier listing are to the best of my knowledge true and accurate.

Signature of Proposer _____

Print Name _____

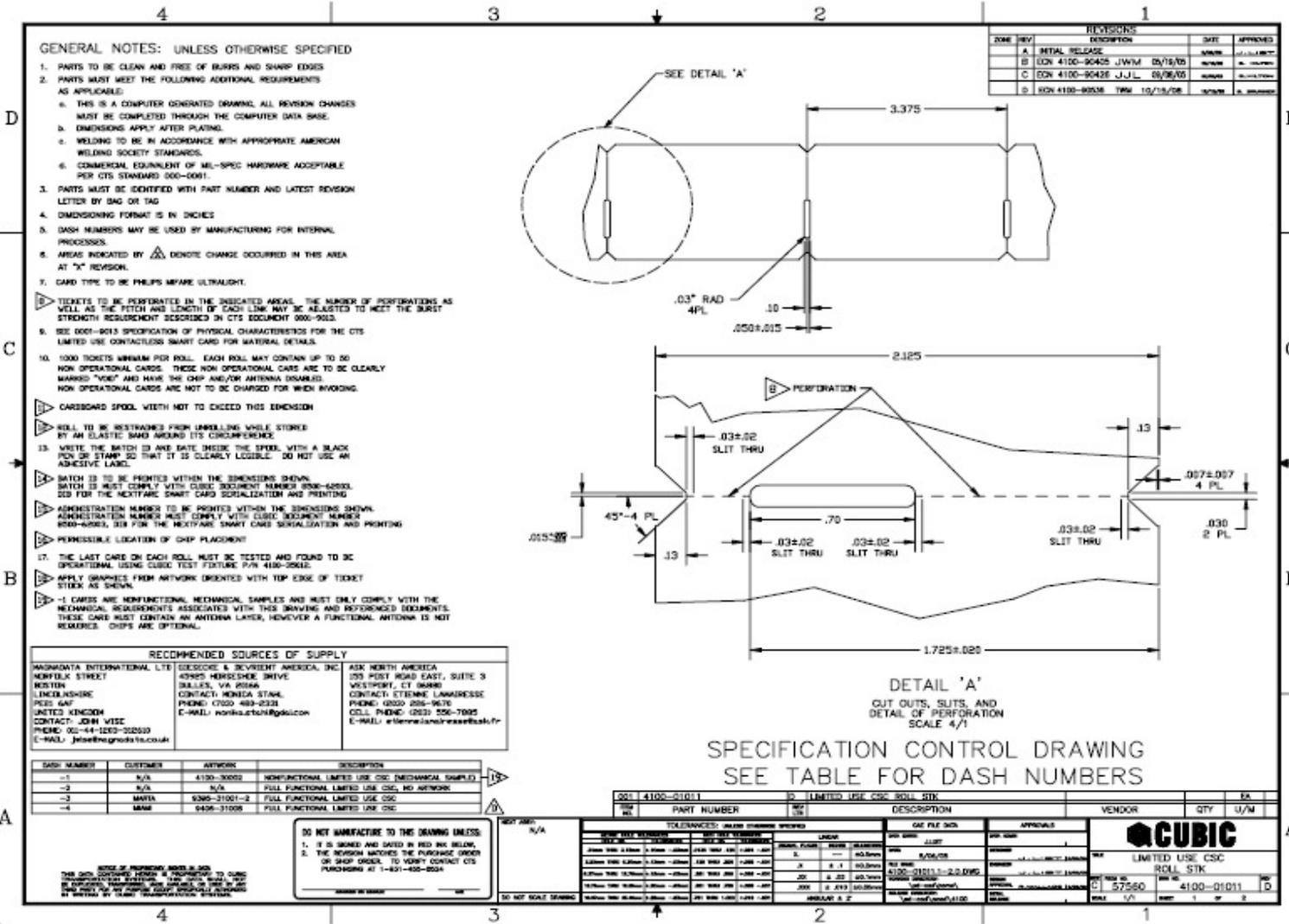
Print Title _____

Date _____

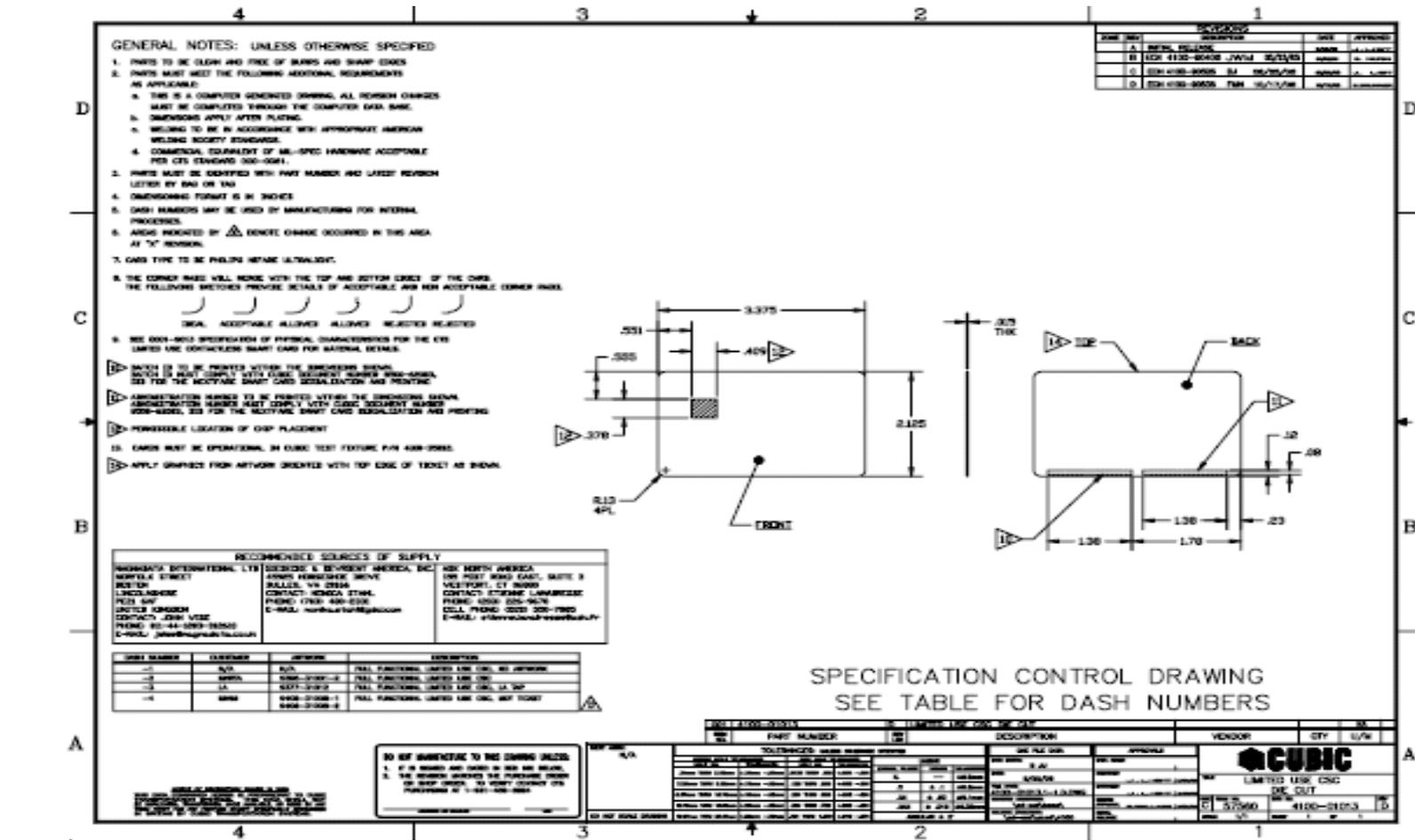
APPENDIX A

TECHNICAL DRAWINGS

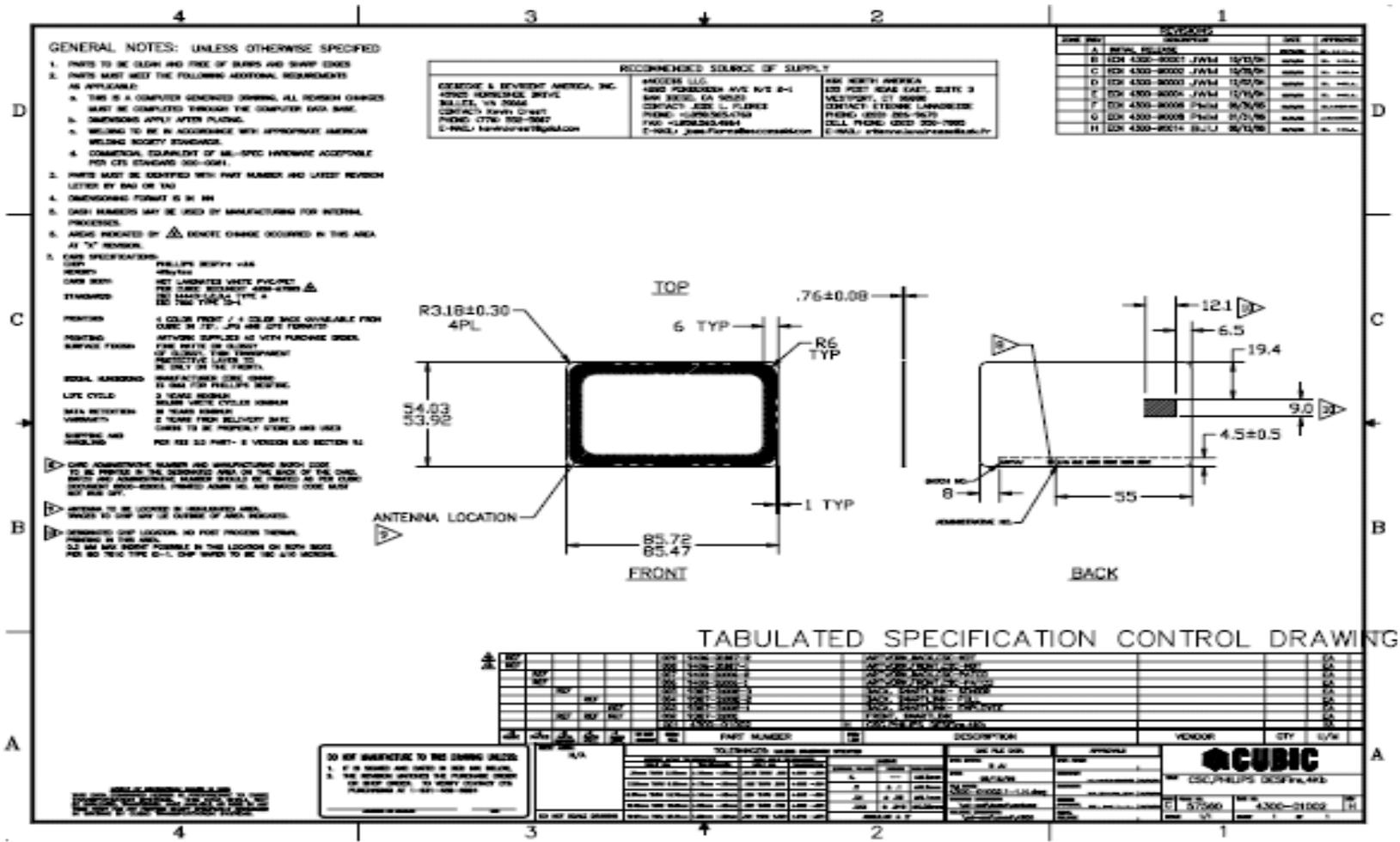
LIMITED USE CONTACTLESS SMART CARD ROLL STOCK



LIMITED USE CONTACTLESS SMARTCARD DIE CUT

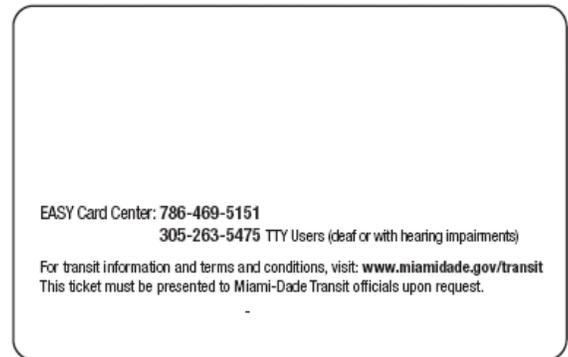
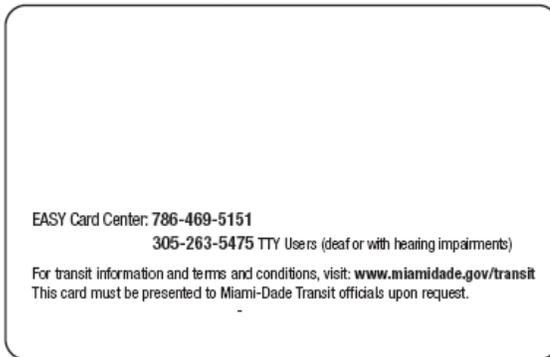


CONTACTLESS SMARTCARD, PHILIPS DESFire, 4Kb



APPENDIX B

SAMPLE ARTWORK



BACK-OF-CARD DESIGN October 15, 2008

Black imprint indicates text to be printed by Cubic

THIS FILE PRODUCED ON THE CARD TEMPLATE SUBMITTED BY CUBIC 9/18/08.

Miami-Dade Transit Easy Card Specifications

Pantone Matching System Colors:

Background: PMS 376 C

Dots: PMS 300 C

"EASY": Black

Jumping line and "easy come, easy go" slogan: White

Fonts:

Easy: Myriad Regular

"easy come, easy go": Myriad Regular

TRANSIT: Optima Bold

Miami-Dade County Logo:

PMS 300, PMS 576 C, Black, White

BACK-OF-TICKET DESIGN October 15, 2008

Black imprint indicates text to be printed by Cubic

THIS FILE PRODUCED ON THE CARD TEMPLATE SUBMITTED BY CUBIC 9/18/08.

Miami-Dade Transit Easy Ticket Specifications

Pantone Matching System Colors:

Background: PMS 300

Dots: PMS 376 C

"EASY": White

Jumping line and "easy come, easy go" slogan: White

Fonts:

Easy: Myriad Regular

"easy come, easy go": Myriad Regular

TRANSIT: Optima Bold

Miami-Dade County Logo: White

EXHIBIT 1

SPECIFICATIONS FOR EXTENDED USE SMARTCARDS *(EASY CARDS, with mifare DESFire 4kb Technology)

Specification
for the
Cubic Transportation Systems
Characteristics of the Standard
Proximity Integrated Circuit Card

Document Number: 4200-67003

Revision: A.00

Date: February 12, 2007

Proprietary Notice

The information disclosed herein contains proprietary rights of Cubic Transportation Systems, Inc. (Cubic). Neither this document nor the information disclosed herein shall be reproduced or transferred to other documents. Nor shall the information be used or disclosed to others for manufacturing or any other purposes except as specifically authorized in writing by Cubic.

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Cubic Transportation Systems, Inc.
5650 Kearny Mesa Road
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REVISION STATUS

Revision	Date	Description
A.00	12 Feb 07	Initial release

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Director of Mechanical Engineering **Date**
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INTRODUCTION

This specification defines the characteristics for the standard use Proximity Integrated Circuit Cards (PICC). The cards shall conform to this specification and the external standards required by this document. This document does not provide examples of graphics. Actual graphics artwork and final printed text, if applicable, will be specified and/or provided with the purchase order and/or other documents.

PURPOSE AND SCOPE

This specification is for PICC cards for automated processing in automated fare collection (AFC) equipment, e.g., vending machines, bulk encoders and validation devices.

DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

The following definitions, acronyms, and abbreviations apply to this document.

μ	micro
$^{\circ}\text{C}$	degrees Celsius
$^{\circ}\text{F}$	degrees Fahrenheit
μm	micrometer
AFC	automated fare collection
AQL	Acceptance Quality Level (MIL-STD-105[E])
ASIC	Application-specific Integrated Circuit
ASTM	American Society for Testing and Materials
cm	centimeter
CSC	contactless smart card
Cubic	Cubic Transportation Systems, Inc.
g/cm	gram per centimeter
g/cm ²	gram per square centimeter
gm	gram
HMIS	Hazardous Materials Identification System
IC	integrated circuit
IEC	International Electrotechnical Commission
in	inch
in ²	square inch
ISO	International Organization for Standardization
kg	kilogram
lb/in	pound per inch
lb/in ²	pound per square inch
mm	millimeter
MSDS	Material Data Safety Sheets

PICC	Proximity Integrated Circuit Card
R/W	read/write
RH	relative humidity

DOCUMENTS, DRAWINGS AND STANDARDS



NOTE

In the event of a conflict between the requirements of this document and the references cited herein, this document takes precedence. However, this document does not supersede any applicable laws and regulations unless a specific exemption has been obtained.

referenced DOCUMENTS

- [1] *Design Information for the Nextfare[®] Smart Card Serialization and Printing*, Cubic document number 8500-62003
- [2] Identification cards—Test Methods, ISO/IEC 10373-1:1998(E)
- [3] *Test Specification for the Cubic Contactless Smart Card*, Cubic document number 8500-71012
- [4] *Design Information Bulletin for the New York City Transit AFC Faremedia Specification*, Cubic document number 952-9000
- [5] Identification cards—Physical Characteristics, ISO/IEC 7810:2003(E)
- [6] Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting, ASTM D1894

applicable DOCUMENTS

- ISO 3274, Geometrical Product Specifications—Surface texture: Profile method—Nominal characteristics of contact (stylus) instruments
- ISO 4287, Geometrical Product Specifications —Surface texture: Profile method—Terms, definitions and surface texture parameters
- ISO 9773, Plastics—Determination of burning behavior of thin flexible vertical specimens in contact with a small-flame ignition source
- ASTM D1894-95, Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting

MANUFACTURING REQUIREMENTS

QUALITY STANDARDS CONTROL

All suppliers must be ISO 9000-2000 compliant unless otherwise approved by Cubic procurement and quality.

SECURITY CONTROL

The card supplier shall keep certificates of compliance for all materials used in the production of the cards. The cards shall be manufactured in a secure area accessible only to personnel who are involved in the manufacture and handling of the cards. Administration numbers (see reference [1]) of all deliverable and scrap cards shall be kept at all times during production, packaging, and delivery in compliance with Section 0. The card supplier shall furnish a certified record of the total number of the cards produced in a specific manufacturing batch. The cards shall be packed and retained in a secure location before shipment. A batch number as defined on the specification control drawing will be traceable to manufacturing records for any particular batch.

Designation, Control and Storage of Reference (Golden) Cards

Prior to the first production run, the card supplier shall submit reference cards to Cubic for evaluation. The reference cards shall consist of two sets of 10 cards each, of the same batch. Once these cards are qualified in accordance to all tests identified in this document, one set of 10 cards will be sent back to the supplier and one retained by Cubic. The reference cards will be used as a standard for all future cards of the same part number and revision. These cards shall be kept in a secure limited access locked location by respective quality departments when not in use.

DISPOSAL OF SURPLUS MATERIALS, SCRAP AND REJECTED CARDS

All surplus cards, rejected cards, and scrap card materials shall be disposed of in a manner that renders the fare media unusable. All artwork, special tools, dies, and related material used in the manufacture of customer cards shall be surrendered to Cubic on demand. For preadministration numbers, production yield shall be 80 percent or better and records of this production yield shall be provided to Cubic on each delivered shipment. Additionally, disposition of administration numbers of all deliverable and scrap cards shall be kept by the supplier for a duration of 3 years and provided to Cubic on each delivered shipment.

CERTIFICATION

Upon request, the card supplier shall provide material safety data sheets for the materials included in the cards. These data sheets will include a description of the material and all other printing materials applied to the card surface. The card supplier shall test the material used in the

fabrication of the cards and certify that the material meets all requirements of this specification. The purchaser reserves the right to review the supplier's test data and supporting documentation and to conduct independent tests on delivered cards prior to acceptance. The same rights shall apply to the security control requirements as described in Section 0 of this specification.

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ENVIRONMENT

USAGE

The cards shall meet the read/write and normal use performance requirements of this specification while exposed to any combination of the conditions shown in **Error! Reference source not found.** for a minimum duration of 1 hour. Post printing lamination excluded. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Any temperature and humidity control environmental chamber

Table 0-1. Usage Environment

Environment	Condition
Temperature	-31 °F to +140 °F (-35 °C to +60 °C)
Relative Humidity (RH)	15% to 95%

NORMAL USE—means normal usage of the card in the environment of public transport with storage, distribution, validation, and reloading of cards, excluding IMPROPER USE.

IMPROPER USE—means any usage for which the card has not been designed for, including excessive handling or mechanical stresses—mishandling, and wilful damage to the PICC.

IMPROPER USE is:

1. Any following occurrence:
 - a. Excessive physical stress such as:
 - 1) Bending the PICC beyond conditions described in this document.
 - 2) Folding the PICC.
 - 3) Punching holes, or cutting the PICC.
 - 4) Any other physical damage to the PICC, for example, scraping, or delaminating attempt, etc.
 - b. Excessive electrical stresses:
 - 1) Write/erase cycles beyond those described in the chip specification and this document.
 - 2) Excessive current, voltage or radio wave discharged exposure beyond those described in the chip specification.
 - 3) Any storage or use in conditions beyond those described in this document.
 - 4) Any use with the PICC in any equipment, which is not approved by Cubic.

STORAGE

The cards shall be suitable for storage for up to 3 years under the conditions shown in **Error! Reference source not found.** The following is the inspection schedule and equipment to be used:

- Reference card level test.
- Any temperature and humidity controlled environmental chamber.

Table 0-2. Storage Environment

Environment	Condition
Temperature	32 °F to 140 °F (0 °C to 60 °C)
Relative Humidity (RH)	30% to 65% (noncondensing)

post printing

Where specified by the specification control drawing, the card shall be suitable for post printing processes that subject the card the conditions shown in Table 0-3.

Table 0-3. Post Printing Environment

Environment	Condition	Duration
Temperature	338°F (170 °C)	3 seconds

The following is the inspection schedule:

- Reference card level test.

PHYSICAL and ELECTRICAL CHARACTERISTICS

CARD REQUIREMENTS

The cards shall meet all the requirements stated in this specification, when conditioned for 24 hours at 74 °F \pm 4 °F (23 °C \pm 2 °C) and 50 percent \pm 5 percent RH.

Dimensions

The physical dimensions of the cards shall be in accordance with reference [5] for ID-1 cards. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—AQL (Acceptance Quality Level) Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow graph unit—manual or programmable

Thickness

The thickness of the cards shall be in accordance with reference [5] for ID-1 cards. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Standard micrometer

Quality

The card corners and edges shall be in accordance with reference [5] for ID-1 cards. In addition, the cards shall be free of all defects that impair the in-service use, printing performance or general appearance of the cards.

The card manufacturer shall provide samples of all types of cards for approval prior to commencing the production run. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow graph unit—manual or programmable

Material

Card Material

The material for all cards shall perform to the standards as noted in this specification. Card laminate material shall be 60 percent polyvinyl chloride (PVC) and 40 percent polyethylene terephthalate (PET), unless otherwise specified by the ERA or purchase order.

Antenna Material

Materials used for the construction of the antenna must be consistent with the required electrical and physical stress specifications of this document; these materials in addition must meet the minimum matching electrical specification of the integrated circuit to which it is connected.

Suggested antenna materials:

- Silver
- Aluminum
- Aluminum-alloy
- Conductive composites
- Copper-alloy



NOTE

The antenna should provide the PICC read/write distance per the requirements set forth in this specification.

Bending Stiffness

The bending stiffness of the cards shall be in accordance with reference [5]. The following is the inspection schedule:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01

Flammability

The cards shall be of a flame class rating of UL94 V-0 or better. The following is the inspection schedule and equipment to be used:

- Reference card level test
- Material Safety Data Sheets (MSDS)

Toxicity

The toxicity of the cards shall be in accordance with reference [5]. In addition, the outer surfaces of the card shall contain no material with a Hazardous Material Identification System (HMIS) value greater than shown in Table 0-1. The following is the inspection schedule and equipment to be used:

- Reference card level test
- Material Safety Data Sheets (MSDS) comparison to Table 0-1.

Table 0-1. Toxicity

HMIS Symbol	Level of Hazard
Health	0
Flammability	1
Physical Hazards	0
Personal Protection	N/A

Static Electricity

The cards shall have no adverse effects when exposed to static electricity in accordance with reference [2]. Upon completion of this test, the cards shall meet all requirements of this specification. The following is the inspection schedule and equipment to be used:

- Reference card level test
- Independent lab test

Exposure to X-Ray Radiation

The cards shall continue to operate as intended after exposure of either face to medium X-radiation, with energy in the range of 70 keV to 140 keV, of a cumulative dose of 0.1 Gy per year. The following is the inspection schedule:

- Reference card level test

Exposure to Irradiation

The cards shall continue to operate as intended after testing in accordance with the application test methods described in reference [2], when first exposed to an irradiation beam with one of the dosage exposures selected from Table 0-2.

Table 0-2. Irradiation

Exposure Class	Irradiated Dosage	Exposure(s)	Card Packaging Visual Impact
Class 1	56kGy	1.0	No visual packaging distortion or printing discoloration shall occur.
Class 2	56kGy	2.0	No visual packaging distortion or printing discoloration shall occur.

Durability

The cards shall have no more than five cracks total when viewed at 5X magnification and no more than three cracks greater than .002 inches wide by .010 inches long after having been exposed to the usage environment specified in Section 0 for a minimum duration of 1 hour and having undergone the following bending and torsion tests. The following is the inspection schedule:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01

Bending

The bending durability of the cards shall be in accordance with reference [2]. The total number of bending cycles shall be 5000. Curvature of the width of the card along axis B is defined by a H_W value of 1.00 inch (25.4 millimeter). Curvature of the height of the card along axis A is defined by a H_W value of .375 inches (9.5 millimeter).

Torsion

The torsion durability of the cards shall be in accordance with reference [2], The total number of torsion cycles shall be 5000.

Opacity

The card opacity shall be in accordance with reference [5] for ID-1 cards. The following is the inspection schedule and equipment to be used:

- Reference card level test
- Cubic specification method, see reference [4]
- IL 1400A Radiometer with SEL 033 probe or independent lab

Delamination

The delamination characteristics of the cards shall be in accordance with reference [5] and tested in accordance with reference [2]. In addition, the card shall not delaminate while exposed to specified usage and storage environments or during any specified testing.

Card Dimensional Stability and Warpage with Temperature and Humidity

The card dimensional stability and warpage with temperature and humidity shall be in accordance with reference [5]. The following is the inspection schedule:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01

Ultraviolet light

The cards and their preprinted graphics shall have no adverse effects when exposed to ultraviolet light in accordance with reference [2]. Upon completion of this test, the cards shall meet all requirements of this specification. Some yellowing is permissible. The following is the inspection schedule:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01

Curl

The curl of the card shall not exceed the values shown in Table 0-3. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow Graph Unit—manual or programmable

Table 0-3. Card Curl Requirements

Media Curl	Value
Parallel to long dimension (overall flatness)	The maximum perpendicular distance, measured from any point on the concave surface to the plane defined by any three corners, shall be 0.039 inch (1.00 mm).
Parallel to short dimension	The maximum perpendicular distance, measured from any point

(transverse curl)

on either of the concave short edges to a line defined by the two adjacent corners, shall be 0.020 inch (0.5 mm).

Adhesion

The adhesion characteristics of the cards shall be in accordance with reference [5]. In addition, Ten cards, complete with graphics and serial numbers, shall not adhere to each other when stacked on a flat surface for 24 hours at 140 °F (60 °C) and 90 percent to 95 percent (noncondensing) RH with an applied normal pressure on the card of 1 lb/in² (70.5 g/cm²). It may be necessary to apply anti-blocking coatings to the card in order to meet this requirement. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—One set per first articles submitted
- Batch Test—One set per batch
- The card shall not adhere in any way. If there is any adhesion it shows that these cards are on the boundary of the failed condition and are not useable.
- The proposed method is to design a five-point pick-up stylus with replaceable points. The points would be coated with superglue. Then the stylus would be adhered to the top card. When the top card is picked up, the next card shall not adhere or move. Repeat the test for each card in the stack.

For pickup points, see Figure 0-1.

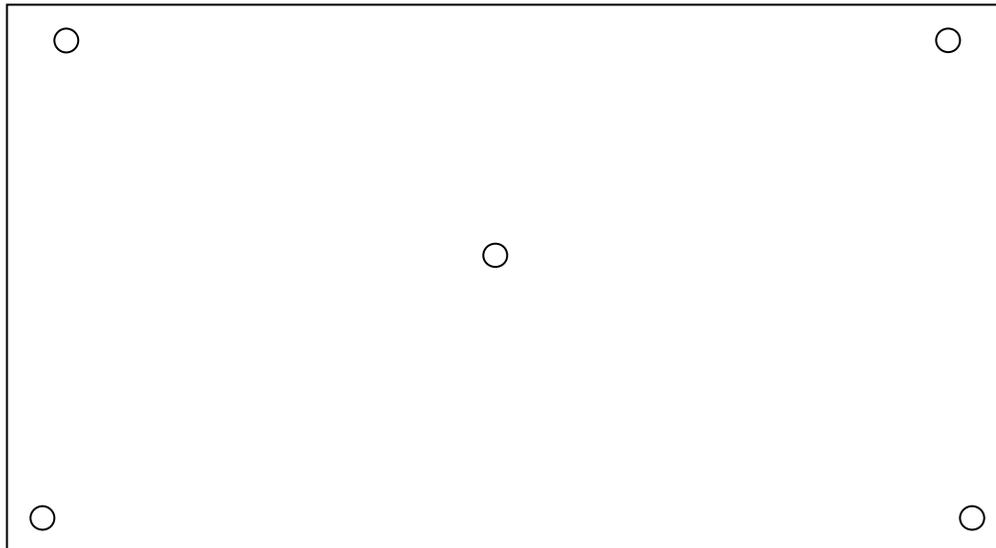


Figure 0-1. Drawing of Pickup Points

Coefficient of Friction

The cards shall be measured for friction in accordance with ASTM D1894, reference [6]. The cards shall be measured in the direction of the long axis and oriented in the same way, such that edges are coincident. The measured value for the inter-card static coefficient of friction shall fall within the specified range of 0.12 to 0.28. The following is the inspection schedule and equipment to be used:

- Reference card level test
- First Article Test—One set per first articles submitted
- Qualitest™ D1055 Certified to ASTM D1894. (not Cubic-owned)

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PRINTING

The following requirements for the printing of the cards apply:

- The cards shall be delivered with printed graphics as specified on the applicable Cubic specification control drawing.
- The colors and graphics of the cards shall conform to the artwork specified on the applicable Cubic specification control drawing.
- The ink shall not be conductive, abrasive, or magnetic.
- Printing shall not smear or transfer during normal handling or processing through an encoding transport.
- The encoding transport consists of pinch rollers and drive belts that are in contact with the cards.

The following is the inspection schedule and equipment to be used:

- Reference card level test.
- First Article Test—AQL Level II Sample Size 0.01.
- Batch Test—AQL Level II Sample Size 0.01.
- Color-matching color spectrometer calibrated to CIE-LAB specification.
- Graphics compared to customer-approved artwork.

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SERIALIZATION

Cards are to be serialized in accordance with the specification control drawing and 8500 62003. The following is the inspection schedule:

- Reference card level test

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SIGNATURE PANEL (IF REQUIRED)

For program-specific cards, the signature panel may be required. When applicable, this information will be provided on applicable Cubic specification control drawings.

The signature panel, when required, shall be provided in the location shown on the applicable specification control drawings. The signature panel shall accept characters from an inkjet printer and signatures from commonly available pens. The signature panel material shall absorb sufficient ink to provide adequate protection against erasure during normal patron usage and processing by card handling equipment.

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LOCATION OF Integrated Circuit Chip

The location of the IC chip and the zones where thickness variation is acceptable are defined on applicable Cubic specification control drawings. The intent of defining these zones is to position the card electronic components in such manner as to avoid the transport rollers and feeder separators in the Cubic-automated AFC equipment. The following is the inspection schedule and equipment to be used:

- Reference card level test
- Caliper

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CARD PRE-ENCODING

Where applicable (e.g. memory logic cards), the cards shall be encoded with transport keys prior to delivery unless otherwise specified. Any encoding used to check the integrity of the card during the manufacturing process should be erased prior to delivery.

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READ/WRITE PERFORMANCE

The following requirements for read/write (R/W) performance shall apply:

- Read/write distance of 0–50 millimeters as specified in the test specification for the Cubic contactless smart card (see reference [3]), or as specified by the contract requirements, whichever is greater.
- Not less than 100,000 R/W cycles.

The following is the inspection schedule and equipment to be used:

- Reference card level test.
- First Article Test—AQL Level II Sample Size 0.01.
- Batch Test—AQL Level II Sample Size 0.01.
- Cubic-designed functional test equipment or ISO-specified functional test equipment.

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PACKAGING AND DELIVERY

PACKAGING and LABELING

The cards shall be packaged in such a manner as to inhibit pilferage, prevent damage during shipment, and facilitate storage in order to be acceptable to the purchaser. The cards shall be packaged in the quantities specified on the specification control drawing.

Packaging

In general, precut cards shall be packed as follows:

- The cards shall be packed in boxes.
- There shall be a maximum total of 400 cards per box.
- The boxes shall be packed in cartons.
- There shall be nine boxes of cards per carton.
- Cartons shall be of sufficient strength to permit stacking six cartons high, without damage to the cards or the cartons, for a storage period of 3 years.

The cards shall be oriented in such manner as to assure that 400 cards can be stacked without leaning or tipping; the TOP card in a stack of 400 cards shall not have a pitch or roll of more than 6 degrees from the horizontal plane. (The cards are packaged sufficiently tight to prevent card-to-card movement that may damage the printed surfaces.) The following is the inspection schedule and equipment to be used:

- Reference card level test
- Batch Test—AQL Level II Sample Size 0.01
- Inspect for vacuum packaging

Labeling

The outside of the cartons shall be labeled with the name of the manufacturer, the purchase order number, and the production run number, and will be clearly marked to indicate storage requirements are 50 °F to 85 °F, 25 to 50 percent RH noncondensing.

The label format shall be as shown in Figure 0-1.

Figure 0-1. Label Format

Manufacturer: XXXXX Cubic Part Number: XXXXX Cubic Purchase Order: GXXXXX XXX Production number: XXXX Storage Requirements: 50 °F to 85 °F 25% to 50% RH noncondensing

DELIVERY ADDRESS

All production cards shall be delivered as specified in the purchase order.

TEST methods—quick reference guide

This section lists test methods.

1. Section 2.2.1 Security Control of Reference Cards
 - Reference card level test

2. Section 3.1 Usage
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Any temperature and humidity controlled environmental chamber

3. Section 3.2 Storage
 - Reference card level test
 - Any temperature and humidity controlled environmental chamber

4. Section 4.1.1 Dimensions
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Shadow Graph Unit—manual or programmable

5. Section 4.1.2 Thickness
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Standard Micrometer

6. Section 4.1.3 Finished Edges
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Shadow graph unit—manual or programmable

-
7. Section 4.1.5 Stiffness
 - Reference card level test.
 - First Article Test—AQL Level II Sample Size 0.01.
 - Batch Test—AQL Level II Sample Size 0.01
 - Taber V-5 Model 150-B (not Cubic-owned)
 - The clamping technique will be to make the top of the card flush to the clamping device

 8. Section 4.1.6 Toxicity
 - Reference card level test
 - MSDS comparison to Table 0-1.

 9. Section 4.1.7 Static Electricity
 - Reference card level test
 - Independent lab test

 10. Section 4.1.8.1 X-Rays
 - Reference card level test

 11. Section 4.1.9 Durability
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Cubic-designed functional test equipment

 12. Section 4.1.10 Torsional Bending
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01

 13. Section 4.1.11 Opacity
 - Reference card level test
 - Cubic specification 952-9000 method
 - IL 1400A Radiometer with SEL 033 probe or independent lab

 14. Section 4.2.1 Curl
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Shadow Graph Unit—manual or programmable

15. Section 4.2.2 Adhesion

- Reference card level test
- First Article Test—One set per first articles submitted
- Batch Test—One set per batch
- The card shall not adhere in any way. If there is any adhesion it shows that these cards are on the boundary of the failed condition and are not useable.
- The proposed method is to design a five-point pick-up stylus with replaceable points. The points would be coated with superglue. Then the stylus would be adhered to the top card. When the top card is picked up, the next card shall not adhere or move. Repeat the test for each card in the stack.
- The drawing of pickup points is shown below in Figure 0-1.

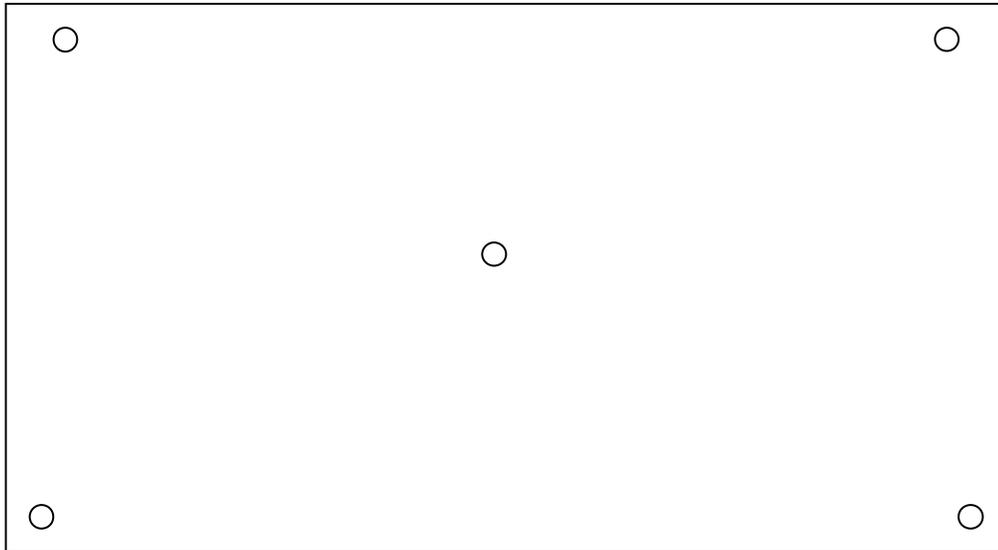


Figure 0-1. Pickup Points

16. Section 4.2.3 Coefficient of Friction

- Reference card level test
- First Article Test—One set per first articles submitted
- Qualitest D1055 Certified to ASTM D1894. (not Cubic owned)

17. Section 5 Printing

- The cards shall be delivered with printed graphics as specified on the applicable Cubic specification control drawing.
- The colors and graphics of the cards shall conform to the artwork specified on the applicable Cubic specification control drawing.

-
- The ink shall not be conductive, abrasive, or magnetic.
 - Printing shall not smear or transfer during normal handling or processing through an encoding transport.
 - The encoding transport consists of pinch rollers and drive belts that are in contact with the cards.
 - Post printing is only permitted outside of the “keep out” region designated on the specification control drawing for the card. If unspecified, the “keep out” region shall be 2 mm from any part of the IC chip and antenna.
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Color-matching color spectrometer calibrated to CIE-LAB specification
 - Graphics compared to customer-approved artwork

18. Section 6 Serialization Administration Number

- Reference card level test
- Cubic-designed functional test equipment

19. Section 8 Location of IC chip

- Reference card level test
- Caliper

20. Section 9 Read/Write Performance

- Test Specification for the Cubic Contactless Smart Card, (see reference [3])
- Not less than 10,000 R/W cycles.
- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Cubic-designed functional test equipment or ISO-specified functional test equipment

General Notes:

1. AQL Level II Sample Size 0.01 is the sample size used for a new supplier with a new part. After multiple receipts of a particular part from a supplier the QC database will automatically increase or decrease the sample size based on the previous lots accepted or rejected.
2. Supplier’s equipment modules may be different from the designated equipment listed. This will be accepted if the calibration of the equipment to be used can be traced back to the same set of standards.
3. Qualification, first articles, and batch-level testing may change due to performance by a supplier.

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EXHIBIT 2

SPECIFICATIONS FOR LIMITED USE SMARTCARDS *(EASY Tickets)

***Cubic Transportation Systems
Specification for the
Characteristics of the Limited Use
Proximity Integrated Circuit Card***

Document Number: 0001-9013

Revision: D.00

Date: July 23, 2007

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REVISION STATUS

Revision	Date	Description
A.00	25 Sep 02	Initial release
B.00	28 Apr 05	Title change: Replaced "Thin" with "Limited Use Contactless" for the Smart Card; deleted "CTS". Deleted drawing 0001-0190; added drawing reference 4100-01013. Changed environmental conditions for storage. Added specifications for roll stock and packing instructions for pre-cut stock.
C.00	07 Oct 05	Updated to incorporate ANSI requirements. Identify test requirements to verify quality of tickets.
D.00	23 July 07	Added section 4.3.4 Ticket Splicing Modified section 4.2.2 Adhesion; change temp from 144 deg F to 122 deg F and RH from 95% to 85% and to use the Cubic tool 4100-35014. Modified section 4.1.9 Durability: removed requirement to use a new ticket for each test, the same one is to be used. Modified section 10.1.2. Packaging to allow for improved and smaller cartons. Changed perforation strength 4.3.1 from 18lbs +/- 5lbs to 21 +/- 8 lbs. Changed 10.1.1.2 Labeling to be consistent with storage conditions in table 3-2. Appendix A replaced section 4.2.2 with Cubic test tool to be consistent with text.

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INTRODUCTION

This specification defines the characteristics for the Limited Use Proximity Integrated Circuit Card (LU-PICC). The cards shall conform to this specification and the external standards required by this document. This document does not provide examples of graphics. Actual graphics artwork and final printed text, if applicable, will be specified and/or provided with the purchase order and/or other documents.

PURPOSE AND SCOPE

This specification is for LU-PICC cards for automated processing in automated fare collection (AFC) equipment, e.g., vending machines, bulk encoders and validation devices.

This is a physical specification for the limited use PICC with similar electronic characteristics of an ID-1 PICC, such as those specified within ISO/IEC 14443 Part-2 and 3, but in thinner card body formats, as defined within the selected card thickness of ISO/IEC 15457 and ANSI 410-2005 (reference [5]) for thin flexible cards. Construction attributes, pertaining to the materials, functionality and environmental requirements and targeted use are also specified. This type of PICC is to be classified as a Limited Use Proximity Integrated Circuit Card.

This specification is for LU-PICC cards that are designed to satisfy the need for a minimal cost contactless smart card, or the PICC as a form of electronic media. These LU-PICCs have limited features and lifecycle expectations while providing core electronic interface technology compatible to the established ISO/IEC 14443 standard PICCs designed to accommodate other application requirements. Further, this LU-PICC specification is not intended for applications where card life cycle requirements are significant (greater than 6 months, under normal circumstances or where extensive and high-security applications are required or intended). This class of PICC may be applied to private and public transit systems requiring electronic ticketing, building security access systems as well as many other applications such as retail that are not provided for through the international standards forum.

DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

The following definitions, acronyms, and abbreviations apply to this document.

μ	micro
°C	degrees Celsius
°F	degrees Fahrenheit
μm	micrometer
AFC	automated fare collection
ANSI	American National Standards Institute
AQL	Acceptance Quality Level (MIL-STD-105[E])
ASIC	Application-Specific Integrated Circuit
ASTM	American Society for Testing and Materials

cm	centimeter
CSC	contactless smart card
Cubic	Cubic Transportation Systems, Inc.
g/cm	gram per centimeter
g/cm ²	gram per square centimeter
gm	gram
HMIS	Hazardous Materials Identification System
IC	integrated circuit
IEC	International Electrotechnical Commission
in	inch
in ²	square inch
ISO	International Organization for Standardization
kg	kilogram
lb/in	pound per inch
lb/in ²	pound per square inch
LU-PICC	Limited Use Proximity Integrated Circuit Card
mm	millimeter
MSDS	Material Data Safety Sheets
PICC	Proximity Integrated Circuit Card
R/W	read/write
RH	relative humidity

DOCUMENTS, DRAWINGS AND STANDARDS



NOTE

In the event of a conflict between the requirements of this document and the references cited herein, this document takes precedence. However, this document does not supersede any applicable laws and regulations unless a specific exemption has been obtained.

referenced DOCUMENTS

- [1] *Design Information for the Nextfare® Smart Card Serialization and Printing*, Cubic document number 8500-62003
- [2] *Identification cards—Test Methods*, ISO/IEC 10373:1998
- [3] *Test Specification for the Cubic Contactless Smart Card*, Cubic document number 8500-71012

-
- [4] *Design Information Bulletin for the NYCT AFC Fare Media Specification*, Cubic document number 952-9000
- [5] ANSI 410-2005, Identification Cards—Limited Use (LU), Proximity Integrated Circuit Card (PICC)

applicable DOCUMENTS

- Limited Use CSC Die Cut, Cubic specification control drawing number 4100-01013
- Limited Use CSC Roll Stk, Cubic specification control drawing number 4100-01011
- LUCSC Test Fixture, Cubic specification control drawing number 4100-35012
- ISO 3274, Geometrical Product Specifications—Surface texture: Profile method—Nominal characteristics of contact (stylus) instruments
- ISO 4287, Geometrical Product Specifications —Surface texture: Profile method—Terms, definitions and surface texture parameters
- ISO 7810, Identification cards—Physical characteristics
- ISO 9773, Plastics—Determination of burning behavior of thin flexible vertical specimens in contact with a small-flame ignition source
- ASTM D1894-95, Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting

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MANUFACTURING REQUIREMENTS

QUALITY STANDARDS CONTROL

All suppliers must be ISO 9000-2000 compliant unless otherwise approved by Cubic procurement and quality.

SECURITY CONTROL

The card supplier shall keep certificates of compliance for all materials used in the production of the cards. The cards shall be manufactured in a secure area accessible only to personnel who are involved in the manufacture and handling of the cards. Administration numbers (see reference [1]) of all deliverable and scrap cards shall be kept at all times during production, packaging, and delivery in compliance with Section 0. The card supplier shall furnish a certified record of the total number of the cards produced in a specific manufacturing batch. The cards shall be packed and retained in a secure location before shipment. A batch number as defined on the specification control drawing will be traceable to manufacturing records for any particular batch.

Designation, Control and Storage of Reference (Golden) Cards

Prior to the first production run, the card supplier shall submit reference cards to Cubic for evaluation. The reference cards shall consist of two sets of 10 cards each, of the same batch. Once these cards are qualified in accordance to all tests identified in this document, one set of 10 cards will be sent back to the supplier and one retained by Cubic. The reference cards will be used as a standard for all future cards of the same part number and revision. These cards shall be kept in a secure limited access locked location by respective quality departments when not in use.

- Reference card level test

DISPOSAL OF SURPLUS MATERIALS, SCRAP AND REJECTED CARDS

All surplus cards, rejected cards, and scrap card materials shall be disposed of in a manner that renders the fare media unusable. All artwork, special tools, dies, and related material used in the manufacture of customer cards shall be surrendered to Cubic on demand. For pre-administration numbers, production yield shall be 80 percent or better and records of this production yield shall be provided to Cubic on each delivered shipment. Additionally, disposition of administration numbers of all deliverable and scrap cards shall be kept by the supplier for a duration of 3 years and provided to Cubic on each delivered shipment.

CERTIFICATION

Upon request, the card supplier shall provide material safety data sheets for the materials included in the cards. These data sheets will include a description of the material and all other

printing materials applied to the card surface. The card supplier shall test the material used in the fabrication of the cards and certify that the material meets all requirements of this specification. The purchaser reserves the right to review the supplier's test data and supporting documentation and to conduct independent tests on delivered cards prior to acceptance. The same rights shall apply to the security control requirements as described in Section 0 of this specification.

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ENVIRONMENT

USAGE

The cards shall meet the read/write and normal use performance requirements of this specification while exposed to the conditions shown in **Error! Reference source not found.** for a minimum duration of 1 hour.

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Any temperature and humidity control environmental chamber

Table 0-1. Usage Environment

Environment	Condition
Temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Relative Humidity (RH)	15% to 95% (noncondensing)

NORMAL USE—means normal usage of the ticket in the environment of public transport with storage, distribution, validation, and reloading of tickets, excluding IMPROPER USE.

IMPROPER USE—means any usage for which the ticket has not been designed for, including excessive handling or mechanical stresses—mishandling, and wilful damage to the LU-PICC.

More precisely:

IMPROPER USE is:

1. Any following occurrence:
 - a. Excessive physical stress such as:
 - 1) Bending the LU-PICC beyond conditions described in this document.
 - 2) Folding the LU-PICC.
 - 3) Tearing, punching holes, or cutting the LU-PICC.
 - 4) Any other physical damage to the LU-PICC, for example, scraping, or delaminating attempt, etc.
 - a. Excessive electrical stresses:
 - 1) Write/erase cycles beyond those described in the chip specification and this document.
 - 2) Excessive current, voltage or radio wave discharged exposure beyond those described in the chip specification.
 - 3) Any storage or use in conditions beyond those described in this document.
 - 4) Any use with the LU-PICC in any equipment, which is not approved by Cubic.

STORAGE

The cards shall be suitable for storage for up to 3 years under the conditions shown in **Error! Reference source not found.**

- Reference card level test
- Any temperature and humidity controlled environmental chamber.

Table 0-2. Storage Environment

Environment	Condition
Temperature	32 °F to 140 °F (0 °C to 60 °C)
Relative Humidity (RH)	30% to 65% (noncondensing)

PHYSICAL and ELECTRICAL CHARACTERISTICS

CARD REQUIREMENTS—PRECUT AND ROLL STOCK

The cards shall meet all the requirements stated in this specification, when conditioned for 24 hours at 74 °F \pm 4 °F (23 °C \pm 2 °C) and 50 percent \pm 5 percent RH.

Dimensions

The physical dimensions of the cards shall be in accordance with that specification control drawing for the card.

- Reference card level test
- First Article Test—AQL (Acceptance Quality Level) Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow graph unit—manual or programmable

Thickness

The overall thickness of the card, including the Application-Specific Integrated Circuit (ASIC), must be 400 micrometer (μm) \pm 60 μm for precut cards and 400 μm \pm 80/ \pm 60 μm for roll stock cards, unless otherwise specified on the specification control drawing for the card.

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Standard micrometer

Finished Edges

Per reference [5]:

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow graph unit—manual or programmable

Material

Card Material

The material for all cards shall perform to the standards as noted in this specification. The use of paper and polyester is acceptable. The exact composition is to be defined by the card vendor to meet these requirements of this specification, or as specified by the specification control drawing.

Suggested Card Body Surface Materials:

- Triplex: paper/poly/paper
- Paper with poly protective coating
- Poly on poly
- Paper

Notes:

- Poly could be either Polyvinyl Chloride (PVC) or Polyethylene Terephthalate (PET) material composition.
- Paper should be 100 percent chemical pulp, containing no ground wood.
- This reference is provided as a nonexhausted guide for materials that should be considered in the construction of Limited Use PICCs.

Antenna Material

Materials used for the construction of the antenna must be consistent with the required electrical and physical stress specifications of this document; these materials in addition must meet the minimum matching electrical specification of the integrated circuit with an antenna that consumes the allocated ID-1 format area while preserving the restricted area.

Suggested Limited Use Antenna materials:

- Silver
- Aluminum
- Aluminum-alloy
- Conductive composites
- Copper-alloy



NOTE

The antenna should provide the PICC read/write distance per the requirements set forth in this specification.

Stiffness (for 0.015-Inch Thick Material)

Using the Taber method, the stiffness shall conform to the following values:

1. The Taber test will be performed using the Taber V-5 model 150-B test machine measured with a 15° angle and standard nonweighted pendulum.
2. When measured parallel to the grain, a specimen cut from a credit card-size ticket will be between 45 and 80 gm/cm Taber stiffness units.
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Taber V-5 Model 150-B (not Cubic-owned)
 - The clamping technique will be to make the top of the card flush to the clamping device.

Toxicity

The toxicity of the cards shall be in accordance with ISO/IEC 7810:2003(E). In addition, the outer surfaces of the card shall contain no material with a Hazardous Material Identification System (HMIS) value greater than shown in Table 0-1.

- Reference card level test
- Material Safety Data Sheets (MSDS) comparison to Table 0-1

Table 0-1. Toxicity

HMIS Symbol	Level of Hazard
Health	0
Flammability	1
Physical Hazards	0
Personal Protection	N/A

Static Electricity

The cards shall have no adverse effects when exposed to static electricity in accordance with reference [2].

-
- Reference card level test
 - Independent lab test
 - Static magnetic fields per ANSI 410-2005 (reference [5])
 - Alternating electric and magnetic fields per ANSI 410-2005 (reference [5])

Exposure to Radiation

X-Rays

Per ANSI 410-2005 (reference [5]):

- Reference card level test

Irradiation

Per ANSI 410-2005 (reference [5]):

- Reference card level test

Durability

Wrapping the card completely around a 1-inch diameter cylinder, and then removing it, will not cause any damage to the functionality of the card. This test must be performed on each surface of the ticket, with the cylindrical axis parallel to the short edge.

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Cubic-designed functional test equipment

Torsional Bending

Per ANSI 410-2005 (reference [5]):

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01

Opacity

The card opacity shall be in accordance with reference [4]:

- Reference card level test
- Cubic specification method, see reference [4]
- IL 1400A Radiometer with SEL 033 probe or independent lab

Delamination

The card stock shall not delaminate while used within ANSI 410-2005 (reference [5]) operating limit use life cycle, or after being subjected to test requirement in the durability and torsional bending test.

Thermal Coating (If required by Cubic)

When required by the specification control drawing for the card, a thermal coating must be such that it will produce clear printing by an Axiohm™ Type CMDG printer (or equivalent) with a printing speed of 1.6 inch/second (40 mm/second) at 77 °F (25 °C) and 203 dots/inch (8 dots/mm). The side to be thermal coated is defined in the applicable specification control drawings. Variations in thickness due to the internal electronic parts of the ticket must not affect the thermal printing in the areas outside the permissible chip locations.

- Reference level test

CARD REQUIREMENTS—PRECUT ONLY

Curl (Not Applicable to Roll Stock)

The curl of the ticket shall not exceed the values shown in Table 0-2.

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Shadow Graph Unit—manual or programmable

Table 0-2. Ticket Curl Requirements

Media Curl	Value
Parallel to long dimension (overall flatness)	The maximum perpendicular distance, measured from any point on the concave surface to the plane defined by any three corners, shall be 0.079 inch (2.00 mm).
Parallel to short dimension (transverse curl)	The maximum perpendicular distance, measured from any point on either of the concave short edges to a line defined by the two adjacent corners, shall be 0.039 inch (1.0 mm).

Adhesion (Not Applicable to Roll Stock)

Ten precut tickets, complete with graphics and serial number, shall not adhere to each other when stacked on a flat surface for 24 hours at 122 °F (50 °C) and 85 percent RH (noncondensing), with an applied normal pressure on the tickets of 1 lb/in² (70.5 g/cm²).

Alternatively Cubic test equipment tool 4100-35014 must be used to determine the adhesion. Using this tool, all tested tickets must have a value of less than 55 angular degrees. The test procedure is as follows:

1. Two tickets are placed into the tester, one in the base platen and the other into the top plate. The two platens are then placed on top of one another with the front edge rear of the top platen aligned with the front edge of the side block on the bottom platen.
2. The assembly is then inserted into the environmental chamber at the settings noted above for 24 hours.
3. The assembly is then removed from the chamber and the handle on the tester is wound manually and slowly until the top platen slides down to touch the stop in the bottom platen.
4. When this happens, stop winding the handle and measure on the scale by lining up the platen edge with the scale and note at what angle this occurred.

Coefficient of Friction (Not Applicable to Roll Stock)

Per ANSI 410-2005 (reference [5]):

- Reference card level test
- First Article Test—One set per first articles submitted
- Qualitest™ D1055 Certified to ASTM D1894. (not Cubic-owned)

CARD REQUIREMENTS—ROLL STOCK ONLY

Perforation Strength (Roll Stock Only)

The cards will be mechanically burst from the roll stock. The material composition must allow the cards to be burst from the roll stock by a tensile pull force applied along the longitudinal axis of the stock at right angles to the perforations. When a pull force of 21 lbs ± 8 lbs is applied, the perforation will separate without damaging the adjacent card material.

- Reference card level test
- First Article Test—AQL Level II Sample Size .01—Number of Rolls
- Batch Test—AQL Level II Sample Size .01—Number of Rolls
- Chatillon® TCD2000

Attachment of Last Card to Cardboard Spool (Roll Stock Only)

The last card on the roll that contacts the cardboard spool must be complete and not partial and must not have any rips, cuts or tears.

The card material must freely separate from the cardboard spool. There must not be any glue, adhesive tape or staples remaining on the card stock or on any of the card material that was removed. The card material may be retained onto the spool by using double adhesive tape. Cubic recommends use of Scotch® ATG tape 928. This tape will have two adhesive strengths: between the spool and the tape, the adhesion will be high; between the tape and the card stock, the adhesion will be low. This difference in adhesion will allow the card stock to easily peel away from the spool, leaving both the tape and its adhesives remaining on the spool.

- Reference card level test
- Issue from a representative transport and inspect last ticket



NOTE

Any alternate method of attachment to those noted above is permissible only with written authorization from the Cubic Program Office.

Tightness of Wind Test (Roll Stock Only)

Per ANSI 410-2005 (reference [5]):

- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01—Number of Rolls
- Batch Test—AQL Level II Sample Size 0.01—Number of Rolls
- Currently calibrated with a 0.125-inch feeler gage

Ticket Splicing

In a continuous roll of ticket stock it is permissible to have two tickets that are spliced together anywhere in the roll. The spliced tickets contribute to the amount of allowable nonworking tickets on a roll. The spliced ticket must conform to sections 0, 0, 0, 0 through 0, 0, and 0 of this specification with the exception of the following:

- The ticket length tolerance is increased to: 1.25 mm (+/- .05 inches) (85.7 mm (3.375 inch) nominal).
- Total thickness (over tape) must not exceed .700 mm (.027 inch).
- Tape width must not exceed 50.8 mm (2 inches).
- Longitudinal ticket edges to align within .75 mm (.030 inch).
- Spliced ticket edges must butt together and not overlap.
- The widest gap where light can pass through between butted ends of ticket portions must not exceed: .5 mm (.019 inch).
- Adhesive tape material to be 2-inch wide red splicing tape PN: ST655-200, available from Lynn Flexo Supply Inc., 18140 State Highway 177, PO box 364, Jackson, MO 63755, or a Cubic-approved equivalent.
- Neither of the ticket portions to be cut to less than 25.4 mm (1 inch) in length.
- The splice cut can be diagonal.
- The edges of any part of the adhesive tape must be at least 10 mm (.4 inches) from the perforated ends of the ticket.
- Adhesive tape must withstand the long term and short storage requirements without peeling off or the adhesive losing strength. In addition, the tape cannot become tacky and leave deposits on adjacent tickets in the roll.

-
- The splice joint must withstand a tensile pull value that is the addition of the maximum specified perforation burst strength plus 2.5 kg (5.5 lbs).
 - Two sample spliced tickets to confirm the above values are to be provided by the ticket supplier separate from the roll stock with each shipment of tickets.

PRINTING

The following requirements for the printing of the cards apply:

- The cards shall be delivered with printed graphics as specified on the applicable Cubic specification control drawing.
- The colors and graphics of the cards shall conform to the artwork specified on the applicable Cubic specification control drawing.
- The ink shall not be conductive, abrasive, or magnetic.
- Printing shall not smear or transfer during normal handling or processing through an encoding transport.
 - The encoding transport consists of pinch rollers and drive belts that are in contact with the cards.
- Post printing is only permitted outside of the “keep out” region designated on the specification control drawing for the card. If unspecified, the “keep out” region shall be 2 mm from any part of the integrated circuit (IC) chip and antenna.
- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Color-matching color spectrometer calibrated to CIE-LAB specification
- Graphics compared to customer-approved artwork

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SERIALIZATION ADMINISTRATION NUMBER

Cards are to be serialized with the administration number in accordance with the applicable Cubic specification control drawing.

- Reference card level test
- Cubic-designed functional test equipment

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SIGNATURE PANEL (IF REQUIRED)

For program-specific cards, the signature panel may be required. When applicable, this information will be provided on applicable Cubic specification control drawings.

The signature panel, when required, shall be provided in the location shown on the applicable specification control drawings. The signature panel shall accept characters from an inkjet printer and signatures from commonly available pens. The signature panel material shall absorb sufficient ink to provide adequate protection against erasure during normal patron usage and processing by card handling equipment.

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LOCATION OF Integrated Circuit Chip

The location of the IC chip and the zones where thickness variation is acceptable are defined on applicable Cubic specification control drawings in all other cases, the IC chip placement will be per reference [5]. The intent of defining these zones is to position the card electronic components in such manner as to avoid the transport rollers and feeder separators in the Cubic AFC equipment.

- Reference card level test
- Caliper

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READ/WRITE PERFORMANCE

The following requirements for read/write (R/W) performance shall apply:

- Test Specification for the Cubic contactless smart card, (see reference [3])
- Not less than 10,000 R/W cycles
- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Cubic-designed functional test equipment or ISO-specified functional test equipment

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PACKAGING AND DELIVERY

PACKAGING and LABELING

The cards shall be packaged in such a manner as to inhibit pilferage, prevent damage during shipment, and facilitate storage in order to be acceptable to the purchaser. The cards shall be packaged in the quantities specified on the specification control drawing.

Precut Cards

Precut cards shall be packed as follows:

- The cards shall be packed in boxes.
- Each box will be vacuum packed.
- There shall be 750 cards per box.
- The boxes shall be packed in cartons.
- There shall be at least nine boxes of cards per carton.
- Cartons shall be of sufficient strength to permit stacking four cartons high, without damage to the cards or the cartons, for a storage period of up to 3 years in conditions as described in **Error! Reference source not found..**
- The cards shall be packaged sufficiently tight to prevent card-to-card movement that may damage the printed surfaces.
- The box of cards can be of mixed orientation so as to assure that 750 cards can be stacked without leaning or tipping; the TOP card in a stack of 750 cards shall not have a pitch or roll of more than 6 degrees from the horizontal plane.

Roll Stock Cards

Each roll may have up to 5 percent nonfunctioning cards. The quantity of nonfunctioning cards for each roll shall be indicated on a label that will accompany the roll.

Packing Roll Stock Cards

Roll stock cards shall be packed as follows:

- Rolls will be vacuum-sealed.
- Each roll is packed in a single box.
- The box should support the round profile of the roll, either utilizing an octagonal shape or filler pieces that fit into the corners to support the roll when the box is dropped or jarred during shipment.
- Boxes shall be packed in cartons, each carton containing a minimum of four boxes.

- Cartons shall be of sufficient strength to permit stacking four cartons high, without damage to the cards or the cartons, for a storage period of 3 years in an environment as noted in **Error! Reference source not found..**

Labeling Roll Stock and Precut Cards

Cards shall be labeled as follows:

- The outside of the cartons shall be labeled with the name of the manufacturer, the purchase order number, and the production run number, and will be clearly marked to indicate storage requirements as defined in **Error! Reference source not found..**
- Each roll may have up to 5 percent nonfunctioning cards. The quantity of nonfunctioning cards for each roll shall be indicated on a label that will accompany the roll.
- Cartons shall be of sufficient strength to permit stacking six cartons high, without damage to the cards or the cartons, for a storage period of 3 years.

The label format shall be as shown in Figure 0-1:

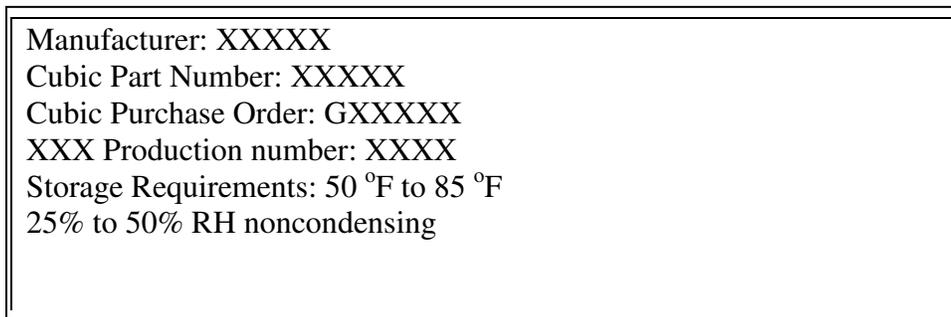


Figure 0-1. Label Format

DELIVERY ADDRESS

All production cards shall be delivered as specified in the purchase order.

TEST methods—quick reference guide

1. Section 2.2.1 Security Control of Reference Cards
 - Reference card level test

2. Section 3.1 Usage
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Any temperature and humidity controlled environmental chamber

3. Section 3.2 Storage
 - Reference card level test
 - Any temperature and humidity controlled environmental chamber

4. Section 4.1.1 Dimensions
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Shadow Graph Unit—manual or programmable

5. Section 4.1.2 Thickness
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Standard Micrometer

6. Section 4.1.3 Finished Edges
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Shadow graph unit—manual or programmable

-
7. Section 4.1.5 Stiffness
 - Reference card level test.
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Taber V-5 Model 150-B (not Cubic-owned)
 - The clamping technique will be to make the top of the card flush to the clamping device.

 8. Section 4.1.6 Toxicity
 - Reference card level test
 - MSDS comparison to Table 0-1.

 9. Section 4.1.7 Static Electricity
 - Reference card level test
 - Independent lab test
 - Static magnetic fields per ANSI 410-2005 (reference [5])
 - Alternating electric and magnetic fields per ANSI 410-2005 (reference [5])

 10. Section 4.1.8.1 X-Rays
 - Reference card level test

 11. Section 4.1.9 Durability
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01
 - Cubic-designed functional test equipment

 12. Section 4.1.10 Torsional Bending
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01

 13. Section 4.1.11 Opacity
 - Reference card level test
 - Cubic specification 952-9000 method
 - IL 1400A Radiometer with SEL 033 probe or independent lab

 14. Section 4.2.1 Curl
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01
 - Batch Test—AQL Level II Sample Size 0.01

-
- Shadow Graph Unit—manual or programmable
15. Section 4.2.2 Adhesion
 - Reference card level test
 - First Article Test—One set per first articles submitted
 - Batch Test—One set per batch
 - The ticket shall not adhere in any way. If there is any adhesion it shows that these tickets are on the boundary of the failed condition and are not useable.
 - Use Cubic test tool.
 16. Section 4.2.3 Coefficient of Friction
 - Reference card level test
 - First Article Test—One set per first articles submitted
 - Qualitest D1055 Certified to ASTM D1894. (not Cubic-owned)
 17. Section 4.3.1 Perforation Strength
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01—Number of Rolls
 - Batch Test—AQL Level II Sample Size 0.01—Number of Rolls
 - Chatillon TCD2000
 18. Section 4.3.2 Attachment of Last Card to Spool
 - Reference card level test
 - Issue from a representative transport and inspect last ticket
 19. Section 4.3.3 Tightness of Wind
 - Reference card level test
 - First Article Test—AQL Level II Sample Size 0.01—Number of Rolls
 - Batch Test—AQL Level II Sample Size 0.01—Number of Rolls
 - Currently calibrated with a 0.125-inch feeler gage.
 20. Section 5 Printing
 - The cards shall be delivered with printed graphics as specified on the applicable Cubic specification control drawing.
 - The colors and graphics of the cards shall conform to the artwork specified on the applicable Cubic specification control drawing.
 - The ink shall not be conductive, abrasive, or magnetic.
 - Printing shall not smear or transfer during normal handling or processing through an encoding transport.

- The encoding transport consists of pinch rollers and drive belts that are in contact with the cards.
- Post printing is only permitted outside of the “keep out” region designated on the specification control drawing for the card. If unspecified, the “keep out” region shall be 2 mm from any part of the IC chip and antenna.
- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Color-matching color spectrometer calibrated to CIE-LAB specification
- Graphics compared to customer-approved artwork

21. Section 6 Serialization Administration Number

- Reference card level test
- Cubic-designed functional test equipment

22. Section 8 Location of IC chip

- Reference card level test
- Caliper

23. Section 9 Read/Write Performance

- Test Specification for the Cubic Contactless Smart Card, (see reference [3])
- Not less than 10,000 R/W cycles.
- Reference card level test
- First Article Test—AQL Level II Sample Size 0.01
- Batch Test—AQL Level II Sample Size 0.01
- Cubic-designed functional test equipment or ISO-specified functional test equipment

General Notes:

1. AQL Level II Sample Size 0.01 is the sample size used for a new supplier with a new part. After multiple receipts of a particular part from a supplier the QC database will automatically increase or decrease the sample size based on the previous lots accepted or rejected.
2. Supplier’s equipment modules may be different from the designated equipment listed. This will be accepted if the calibration of the equipment to be used can be traced back to the same set of standards.
3. Qualification, first articles, and batch-level testing may change due to performance by a supplier.

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EXHIBIT 3

DESIGN INFORMATION FOR SMARTCARD SERIALIZATION AND PRINTING

Design Information Bulletin
For the
Nextfare[®]
Smart Card Serialization and Printing

Document Number: 8500-62003

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D.00	21 Jan 05	Included limited-use cards
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INTRODUCTION

This document describes the serialization, printing, and user display specification for transit smart cards. It specifically describes Nextfare[®] Central System (NCS) specifications for card serialization with respect to the:

- Administration number—a unique serial number assigned to identify the smart card and track its usage in the system and for customer service, autoload, fraud analysis, etc.
- Batch ID—an identification number assigned to the production batch that can, if required, be used to track the distribution of smart cards
- Sequentially generated soft serial number that may be used as supplemental to the batch ID number.

ACRONYMS AND ABBREVIATIONS

0x	hexadecimal notation
CSC	contactless smart card
CSV	comma-separated values
Cubic	Cubic Transportation Systems, Inc.
G&D	Giesecke & Devrient
HPEM	high-production encoding machine
ID	identification
ISO	International Organization for Standardization
NCS	Nextfare [®] Central System
OTI	On Track Innovations, Ltd.
UID	unique identity

SMART CARD SERIALIZATION

This section provides the specification for the administration number that will be used by the Nextfare Central System or the card issuer for smart card tracking.

ADMINISTRATION NUMBER (RECOMMENDED)

Currently, most smart card chip manufacturers encode smart cards with a 4-byte electronic serial number that is unique per chip manufacturer/licensee and is unalterable. For some card types, this will increase to a 6- or 7-byte number. Electronic serial numbers are NOT guaranteed to be sequential or unique across manufacturers. A 1-byte unique smart card chip code and the manufacturer's electronic serial number are used to make up a unique administration number that is used by the NCS or the card issuer to track the smart card. This number is used for autoloading, hot listing, and customer service activities and is 8 bytes long.

Because of its unique and unchangeable properties, it is recommended that the chip's electronic serial number unique identity (UID) be used in conjunction with the unique chip code to form the administration number which should be used wherever possible.

Soft Serial Number (Not Recommended)

Customers that desire smart card serial numbers to be sequential have the option to use a "soft" serial number. However, soft serial numbers are not recommended and are not normally applicable to limited-use cards. Where absolutely required by a customer, a soft serial number can be assigned and managed by the NCS. Soft serial numbers can be printed and electronically coded by the card manufacturer on request. The card manufacturer will electronically encode a 4-byte sequential soft serial number in an unused area of card memory per the following:

- NXP MIFARE[®] memory cards—A 4-byte serial number in File 0 Record 1
- Cubic **GO CARD**[®] —A 4-byte serial number in File 15 Record 7.

The NCS or card issuer will provide the beginning soft serial number. The manufacturer will also supply a comma-separated values (CSV) electronic file that lists the soft serial and administration number for the delivered smart cards.

Up to 4 bytes of space (0 to 4, 294, 967, 295) are potentially available in the regional transit application contactless smart card (CSC) issue record and the Regional Interface Specification Transit Application Profile Object to record the soft serial number. If a soft serial number is used, it should be copied to the serial number location specified in the released version of the data format specification on card initialization. Limited-use cards such as MIFARE UltraLight, Innovision Jewel[™], and Kovio cards do not support a soft serial number.

Batch ID Number

The batch identification number is assigned and controlled by the card manufacturer. It is assigned when the batch is produced and is used for tracking the card inventory by batches and card distribution from issuer to point-of-sale and other distribution outlets.

SMART CARD PRINT LAYOUT

This section provides a typical graphical layout and the printed numbering specifications for transit smart cards. It is recommended that the card issuer produce a detailed dimensioned drawing and artwork for the front and rear of the card to explicitly specify all of the card's details, graphics printing, and any other postproduction printing that may be required. It is also recommended that sample cards be produced and approved prior to commencement of full card production.

PRINTING ON SIDE 1

Figure 0-1 is an example of a typical print layout that may be required for a transit smart card on side 1, normally referred to as the front side. It indicates areas that may be restricted for printing due to the contactless and contact chip modules. The restricted areas are generally in accordance to ISO 14443, ISO 7810, and ISO 7816 standards where applicable, but may vary slightly depending on the card type and manufacturer. The exact details and graphics are subject to agreement between the card issuer and the card supplier. Contact module, signature panel, cardholder name, and user photograph are not normally applicable to limited-use cards.

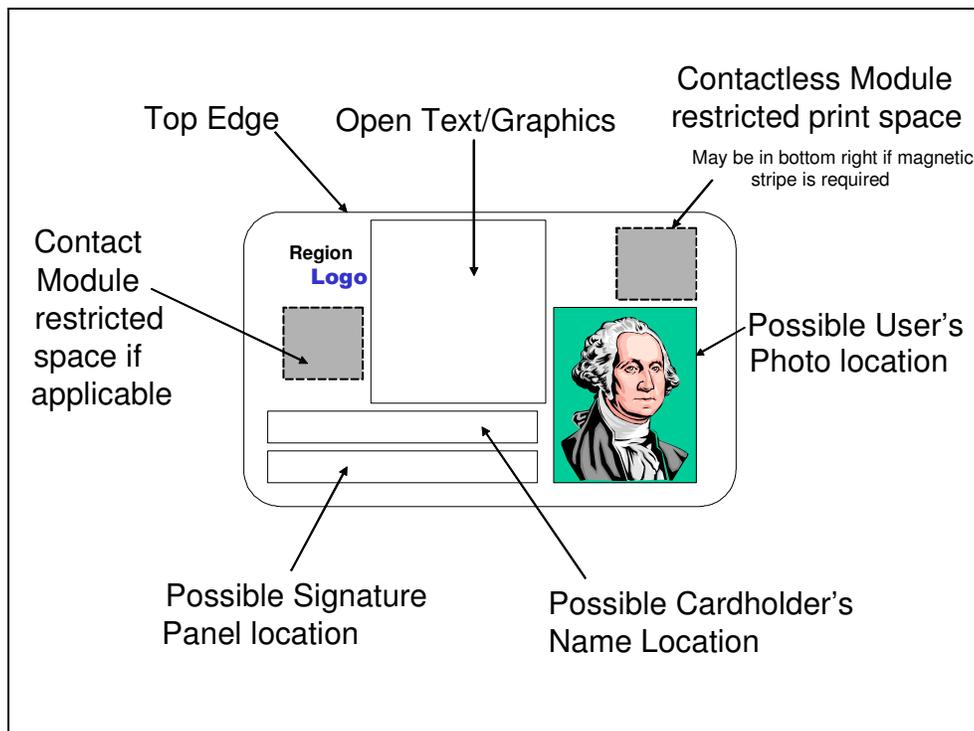


Figure 0-1. Smart Card Side 1 (Front) Printing Example

PRINTING ON SIDE 2

Figure 0-2 is an example of a typical print layout for a transit smart card on side 2, normally referred to as the back of the card. It indicates the area that may be restricted for printing due to the contactless chip module, which will vary depending on the card type and manufacturer. Exact details and graphics are subject to agreement between the card issuer and the card supplier. Soft serial number printing is not recommended and not normally applicable to limited-use cards.

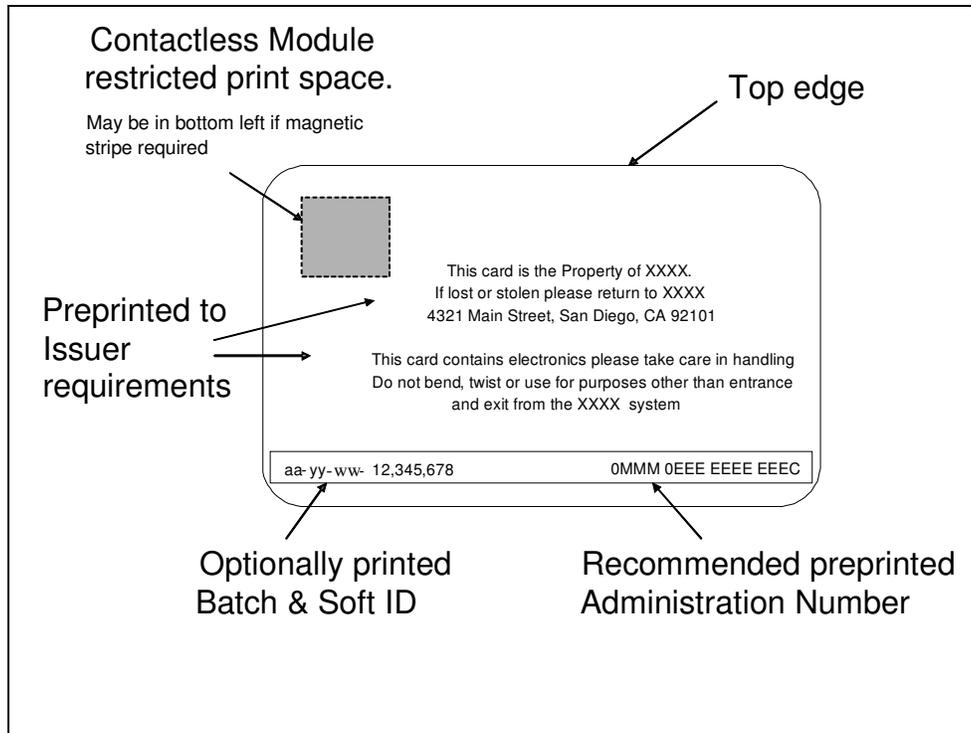


Figure 0-2. Smart Card Side 2 (Rear) Printing Example

The printing of the administration number and batch ID should be durable such that they will be readable after 3 years of normal use.

Printed and Displayed Administration Number

The administration number is printed by the card manufacturer in the bottom right-hand corner as shown in Figure 0-2. The format of the printed administration number is as follows:

- For 4 bytes, the serial number is: 0MMM 0EEE EEEE EEEEC
- For 6 or 7 bytes, the serial number is: 0MMM EEEE EEEE EEEE EEEEC

Where:

Range

- MMM: card chip type code 0 to 255

- EEEE: for a 4-byte serial number 0 to 4, 294, 967, 295
- EEEE: for a 6- or 7-byte serial number 0 to 281, 474, 976, 710, 655 (6 bytes)
- C: check digit 0 to 9, see Figure 0-3
- Zeros are used as padding to emulate the standard credit card printing format.

Printed and Displayed Administration Number Check Digit

To verify the correctness of the administration number on data entry or for customer service, a check digit is appended to the printed or displayed administration number. This section describes the process by which the check digit is calculated.

The card chip type code (MMM), electronic ID (EEEE) and any padding zeroes are multiplied by a series of weights (...2, 1, 2, 1, 2, 1) starting with the right-most digit as shown in Figure 0-3. The units and tens digits of each product are added together as single digits. The result must be divisible by 10 or the card administration printed number is invalid.

The calculation involves adding the units and tens digits of each resulting product without the check digits product value (while keeping its position for multiplier placement) and choosing a value that will take the result to the next multiple of ten. This is the same algorithm used for credit and debit card check digit calculation.

Printed Administration Number	0 M M M	E E E E	E E E E	E E E E	E E E C
Example	0 1 2 3	0 1 2 3	4 5 6 7	8 9 0 1	2 3 4 9
Multiplier	2 1 2 1	2 1 2 1	2 1 2 1	2 1 2 1	2 1 2 1
Result	0 1 4 3	0 1 4 3	8 5 12 7	16 9 0 1	4 3 8 9
Addition for Verification	0+1+4+3 +0+1+4+3 +8+5+1+2+7+1+6+9+0+1+4+3+8+9 = 80 = Valid				
Calculation:	71 + C = 80 (the next multiple of ten after 71), therefore C = 9				

Figure 0-3. Check Digit Calculation and Verification



NOTE

The printed administration number contains additional padding zeroes (0) and a check digit (C). The printed administration number is only used for print and display purposes. The 4-byte or 7-byte chip IDs, together with the manufacturer ID number as encoded on the smart card, forms an 8-byte system administration number that is used for autoload, hot lists and in transactions generated by the fare collection equipment. See Appendix A for examples of specific card chip types.

Chip and Card Manufacturer Type Codes

The manufacturer ID byte included in some manufacturers' 7-byte serial numbers (e.g. 04 in NXP DESFire[®] and MIFARE UltraLight unique IDs) is not required to be included in the printed administration number because it does not necessarily uniquely describe the card type and it can be replaced by the unique CSC card chip code (MMM) that is shown in Table 0-1.

Table 0-1. Smart Card Printing Codes

Card Chip Code (MMM)	Manufacturer and Type	Card Manufacturer Code (aa)
0	Reserved	
001	MIFARE UltraLight limited-use card (48 bytes)	Card manufacturer's aa code
002	MIFARE UltraLight 2 limited-use card	Card manufacturer's aa code
003	Innovision Jewel limited-use card	Card manufacturer's aa code
004-006	Reserved for other limited-use cards	
007	Kovio limited-use card	Card manufacturer's aa code
008-009	Spare	
010-019	ASK	AK
020	Cubic/CTS GO CARD 02	Card manufacturer's aa code
021-029	Cubic/CTS	CT
030-039	Spare	
040-049	Giesecke & Devrient (G&D)	GD
050-059	Spare	

Card Chip Code (MMM)	Manufacturer and Type	Card Manufacturer Code (aa)
060-069	Fujitsu	FJ
070-079	Spare	
080-089	Gemalto (formerly Gemplus)	GP
090-099	Spare	
100-109	Innovision	IV
110	Inside MicroPass®	Card manufacturer's aa code
111	Inside PicoPass®	Card manufacturer's aa code
112-119	Inside contactless	IN
120-129	Kovio	KV
130-139	Magnadata	MD
140	On Track Innovations, Ltd. (OTI) EYECON™	Card manufacturer's aa code
141-149	OTI	OT
150-159	Spare	
160	NXP MIFARE 1k (Classic)	Card manufacturer's aa code
161	NXP DESFire	Card manufacturer's aa code
162	NXP SmartMX	Card manufacturer's aa code
163-169	NXP	NX
170-179	Spare	
180-189	Gemalto (formerly Axalto)	AX
190-199	Spare	
200-209	Texas Instruments	TI
210-219	Spare	
220-229	Sony	SY
230-255	Spare	

Batch ID and Soft Serial Number Printing

If the card issuer also requires a printed batch and/or soft serial number, either or both may also be printed on applicable card types to the issuer's specification. The issuer should take precautions in specifying the CSC artwork and printing position and dimensions to make sure the two sets of printed numbers will not confuse the cardholder. The soft serial number can only be printed without the card administration number if this is supported by the specific version of Nextfare.

The issuer should be made aware that if they want the printed soft serial number linked to the administration number and also require it to be tracked by the NCS, these numbers must be:

- Generated and printed by a high-production encoding machine (HPEM) (if the issuer has an HPEM)
- Entered manually and printed by a point-of-issue device with risk of human error (not recommended)
- Entered manually at the NCS console with risk of human error (not recommended)
- Encoded and printed by the card manufacturer as specified in Section 0.



NOTE

Print smart card soft serial numbers after all quality control procedures have been completed to avoid missing soft sequence numbers.

Where applicable, the batch ID and/or the soft serial number may be printed by the card manufacturer in the bottom left-hand corner of the card as shown in Figure 0-2. If both are printed, the batch ID and the soft serial number will be formatted as:

aa-yy-ww-ssssssssssssss

Where:

- aa is the card manufacturer code as described in Table 0-1
- yy is year of the batch
- ww is week of the batch
- sssssssssssss is the soft serial number

As an example, for a Cubic manufactured **GO CARD** produced in the third week of January 2004, the formatted print data would be:

CT 04 03 4004004294967295

If the soft serial number is printed, it is recommended that it include a check digit and the year code as follows:

Soft Serial Number:

C 0 y y s s s s s s s s s s s

Example:

4 0 0 4 0 0 4 2 9 4 9 6 7 2 9 5

Multiplier:

1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2

Result:

4 0 0 8 0 0 4 4 9 8 9 12 7 4

9 10

Addition for Verification:

$4+0+0+8+0+0+4+4+9+8+9+1+2+7+4+9+1+0 = 70 = \text{Valid}$

Calculation:

$C + 66 = 70$ (the next multiple of ten after 66),

therefore $C = 4$

USER DISPLAYS AND RECEIPTS

This section provides the specification for:

- Displaying the administration number at information and customer service consoles
- Printing the administration number on receipts.

USER DISPLAYS

The administration number will be formatted and displayed as in Section 0. The format of the displayed administration number will be consistent with the administration number printed on the smart card.

When the administration number is retrieved from the NCS or device generated transactions, it will be an 8-byte number without the check digit. The retrieved serial number is formatted prior to display as follows:

- Strip out manufacturer IDs (most significant 2 bytes), leaving a 6-byte serial number.
- Format the serial number.
- Append 0MMM.
- Calculate check digit.
- Display in credit card format with spaces between each set of 4 digits, i.e. (0MMM 1234 1234 1234 123C).

RECEIPTS

For printing on receipts, the process described in Section 0 to format the administration will be followed. However, security considerations exist with a full print of the administration number such as:

- Registering anonymous CSCs using a printed number
- Hot listing CSCs via pranks or malicious intent

Therefore, following the determination of a formatted number, the print format for the administration number of receipts will be:

**** * 123C

The last 4 digits (three plus the check digit) are the only digits printed. This is consistent with the printing of credit card number receipts.

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Examples Of Specific Card Uids And Administration Numbers

Table 0-1. MIFARE Classic 1k

MIFARE Classic 1k Chip ID = 0xA0 = Decimal 160

Card UID Bytes ¹ (Hex) 3 2 1 0	System Administration No. (Hex)	Printed/Displayed Administration No. (Dec) 0mmm eeee eeee eec
00 35 11 49	A0 00 00 00 00 35 11 49	0160 0000 3477 8331
08 4B 12 4A	A0 00 00 00 08 4B 12 4A	0160 0013 9137 6104

Note:

1. As per MIFARE Data Sheet

Table 0-2. MIFARE DESFire

MIFARE DESFire Chip ID = 0xA1 = Decimal 161

Card UID Bytes ¹ (Hex) 0 1 2 3 4 5 6	System Administration No. (Hex)	Printed/Displayed Administration No. (Dec) 0mmm eeee eeee eeee eec
04 35 11 49 72 1B 80 ²	A1 04 35 11 49 72 1B 80	0161 0583 4836 2931 0721
04 4B 12 49 72 1B 80 ²	A1 04 4B 12 49 72 1B 80	0161 0825 4191 3709 4405

Notes:

1. As per DESFire Data Sheet
2. 04 is not included in Printed/Displayed Number calculation

Table 0-3. MIFARE UltraLight

MIFARE UltraLight Chip ID = 0x01 = Decimal 001

Card UID Bytes ¹ (Hex)							System Administration No. (Hex)	Printed/Displayed Administration No. (Dec)
0	1	2	3	4	5	6		0mmm eeee eeee eeee eeec
04	35	11	49	72	1B	80 ²	01 04 35 11 49 72 1B 80	0001 0583 4836 2931 0725
04	4B	12	49	72	1B	80 ²	01 04 4B 12 49 72 1B 80	0001 0825 4191 3709 4409

Notes:

1. As per UltraLight Data Sheet
2. 04 is not included in Printed/Displayed Number calculation