ISO Standards, iCLASS Compatibility and Market Position

What is ISO, and why are their standards important for smart cards?

The International Organization for Standardization (www.iso.org) creates standards for a wide variety of industries and technologies, ranging from medical implants to textiles to smart cards. Each standard is developed by a committee whose members typically include vendors, service providers, academics and government officials.

It's important to note that a widely used technology isn't the same as a standard. For example, although MIFARE® is used in many contactless smart cards, it is not a standard.

Standards cover a wide variety of aspects, including physical attributes, security and data formats. In any industry, standards are important because they create predictability. For example, enterprises, banks and government agencies can mix and match equipment from different vendors, with the confidence that because they're all based on the same standard, they'll work with one another.

Nevertheless, standards have some drawbacks. For example, although a contactless smart card and a reader might adhere to the same standard, their compatibility could range from none to complete read and write capability. You will see below that reading and writing are based on which part(s) of the standard they are compatible with (Parts 1-4).

There are other standards besides ISO, and their role depends on factors such as the application. For example, Federal Information Processing Standards (FIPS) 201 covers Personal Identity Verification and is necessary for smart cards sold to the U.S. government. This is one example of how support for standards determines the markets into which a particular solution can be sold.

What are the major contactless smart card standards?

ISO 14443 defines "proximity-coupled" contactless smart cards, which are designed for use in close proximity reads of under ten centimeters. That short distance makes them an excellent fit for financial transactions, where large amounts of data are transfered.

ISO 15693 covers "vicinity-coupled" contactless smart cards, which have a longer range, up to three feet (one meter). That range makes them a good fit for applications such as access control where users prefer longer read ranges. It's inconvenient for users to open their car door or roll down a window just to get a smart card close enough to the reader to read.

Another difference is data speeds: ISO 15693 can transfer data over a longer distance with a throughput of 26.6 kbps which is about one-quarter the speed of ISO 14443's rate at 106 kbps. However, access control cards usually transfer small amounts of data, so throughput isn't necessarily a deciding or noticeable factor.

ISO Standards Defined

Each of these standards has four parts that define the contactless smart card's features. The more parts that a smart card solution is compatible with, the greater the ability to interface with other ISO compatible solutions.

> **Part 1 - Physical Characteristics:** This includes the smart card's thickness and width and has virtually no effect on compatibility and interoperability.

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Part 2 - Radio Frequency Characteristics: This encompasses the frequency and methods used to transfer data, as well as how the card and the reader establish and maintain communications. One analogy: Just as a person knows to turn the TV to a certain channel to get a particular program, this part of the standard means those compliant smart cards and readers all know to use the same frequency and data format in order to exchange information.

Part 3 - Initialization and Anti-Collision Characteristics: This defines the way that a reader can pick out a particular contactless smart card when there are multiple other ones within range. This ability is a major advantage in applications such as transit systems, where it's common to have several persons passing through a line of turnstiles, all at once and all holding smart cards. Without anti-collision features, each turnstile's reader wouldn't be able to ignore the other nearby cards and wouldn't be able to lock onto the one held by person who's try to pass through.

Part 4 - Transmission protocols: This determines how the card and reader communicate. One analogy: Two multilingual persons agree that they'll always use English when e-mailing each other. If a reader is compatible with Part 4, you may be able to read and write to an ISO card if there are no additional proprietary algorithms that restrict these routines. Many card chip manufacturers require licensing agreements for reading and writing. One example of an open smart card that does not require a license is DESFire™.

What is not covered by ISO 14443 and 15693 standards?
These standards do not specify how memory should be allocated in contactless smart cards. More importantly, they provide no mechanisms for security and authentication.

How does HID's iCLASS solution differ from either standard?
iCLASS technology is 100% compatible with both standards. In addition, iCLASS is compatible with DESFire™ and more compatibilities are planned in the future. The key differentiator is to making sure that each card is completely compatible with our iCLASS readers.

Can an iCLASS reader read the Card Serial Number (CSN) on another manufacturer's card?
Yes. Although iCLASS uses a non-standard anti-collision scheme (Part 3) with ISO standards 15693 and 14443B, they are compatible with 14443A and can read Philips DESFire™ card CSNs. With iCLASS FIPS 201 readers we have added ISO 15693 CSN compatibility, with the ability to read Philips I Code, TI Tag-It and Infineon MyD card CSNs.

Is there a difference between being able to read a CSN and being able to read/write within the card?
Yes. While CSN reading only requires compatibility with Part 3, to read and write to a smart card requires compatibility with Part 4, and possibly other proprietary knowledge which will require licensing with the card chip manufacturer.

Can an iCLASS reader read and write to another manufacturer's card?
Yes, in addition to iCLASS cards, iCLASS reader/writer technology can read and write to Philips DESFire™ smart cards using our FIPS 201 readers.

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iCLASS Compatibility Chart

	Card Compatibility	R10, R30, R40, RK40	RW300, RW400, RWK400, RWKL550, RWKB575	FIPS 201	R10A Transit
ISO 15693	Card CSN Read	2K & 16K	2K & 16K	Infineon MyD™, TI Tag-It, Philips I Code®	Infineon MyD™, TI Tag-It, Philips I Code®
	Card Read	2K & 16K	2K & 16K	2K & 16K	2K & 16K
	Card Write	NONE	2K & 16K	2K & 16K	NONE
ISO 14443A	Card CSN Read	Philips MIFARE, UltraLight, DESFire™	Philips MIFARE, UltraLight, DESFire™	NONE	NONE
	Card Read	NONE	NONE	DESFire™	NONE
	Card Write	NONE	NONE	DESFire™	NONE
ISO 14443B	Card CSN Read	2K & 16K	2K & 16K	2K & 16K	2K & 16K
	Card Read	2K & 16K	2K & 16K	2K & 16K	2K & 16K
	Card Write	NONE	NONE	NONE	NONE

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