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Email of secretary: chris.starr@ukpayments.org.uk

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Identification cards — Contactless integrated circuit cards — Proximity cards — Part 2: Radio frequency power and signal interface

AMENDMENT 4
Additional PICC classes

Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact — Cartes de proximité — Partie 2: Interface radio fréquence

AMENDEMENT 4
Classes de PICC additionnelles

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Foreword

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Amendment 4 to ISO/IEC 14443-2:2010 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

Identification cards — Contactless integrated circuit cards — Proximity cards — Part 2: Radio frequency power and signal interface

AMENDMENT 4:
Additional PICC classes

Page 3 of ISO/IEC 14443-2:2010, Clause 4

Add the following symbol definitions:

$V_{LMA, PCD}$ Maximum load modulation amplitude for PCD reception

$V_{LMA, PICC}$ Minimum load modulation amplitude for PICC transmission

Page 4 of ISO/IEC 14443-2:2010, Clause 6

Replace 6.2 by the following subclause:

6.2 Operating field

The PCD shall generate a field strength of at least H_{min} and not exceeding H_{max} at manufacturer specified positions (operating volume) under unmodulated conditions.

The PCD

— shall support PICCs of "Class 1", "Class 2" and "Class 3";

— may optionally support PICCs of "Class 4";

— may optionally support PICCs of "Class 5";

— and may optionally support PICCs of "Class 6".

PCD requirements measured with Reference PICCs 1, 2 and 3 are mandatory for all PCDs.

PCD requirements measured with Reference PICC 4 are only mandatory for PCDs supporting operation with "Class 4" PICCs.

PCD requirements measured with Reference PICC 5 are only mandatory for PCDs supporting operation with "Class 5" PICCs.

PCD requirements measured with Reference PICC 6 are only mandatory for PCDs supporting operation with "Class 6" PICCs.

Table 1 — PCD field strength

	PCD	
	H_{min}	H_{max}
Measured with Reference PICC 1	1,5 A/m (rms)	7,5 A/m (rms)
Measured with Reference PICC 2	1,5 A/m (rms)	8,5 A/m (rms)
Measured with Reference PICC 3	1,5 A/m (rms)	8,5 A/m (rms)
Measured with Reference PICC 4 (optional)	2,0 A/m (rms)	12 A/m (rms)
Measured with Reference PICC 5 (optional)	2,5 A/m (rms)	14 A/m (rms)
Measured with Reference PICC 6 (optional)	4,5 A/m (rms)	18 A/m (rms)

The PCD shall not generate a field strength higher than the value specified in ISO/IEC 14443-1:2008, 4.4 (alternating magnetic field) in any possible PICC position and orientation, measured with Reference PICC 1.

Test methods for the PCD operating field are defined in ISO/IEC 10373-6 and use a dedicated Reference PICC for each class.

NOTE 1 Although field measurements with some Reference PICCs may show values higher than 7,5 A/m (rms), the new H_{max} limits specified in Table 1 do not allow PCDs to produce higher field strength than with first edition of ISO/IEC 14443-2. This is because PCD field distribution is usually not homogenous within the operating volume and References PICCs have different measurement areas.

If the PICC meets the requirements of one particular class as specified in ISO/IEC 14443-1:2008/AMD1, then the PICC shall operate as intended continuously between H_{min} and H_{max} defined for its class; this includes all PICC requirements defined in this standard and processing of the manufacturer specified set of commands.

If the PICC does not claim to meet the requirements of one particular class as specified in ISO/IEC 14443-1:2008/AMD1, then:

— if the PICC antenna fits within the external rectangle defined in "Class 2" as specified in ISO/IEC 14443-1:2008/AMD1, the electrical requirements and test methods for "Class 1" or "Class 2" shall apply;

— if the PICC antenna fits within the external rectangle or external circle defined in "Class 3" as specified in ISO/IEC 14443-1:2008/AMD1, the electrical requirements and test methods for "Class 1" or "Class 3" shall apply;

— if the PICC antenna does not claim to fit within the external rectangle or external circle defined in "Class 2" or "Class 3" as specified in ISO/IEC 14443-1:2008/AMD1, the electrical requirements and test methods for "Class 1" shall apply.

Table 2 — PICC operating field strength

	PICC	
	H_{min}	H_{max}
"Class 1" PICC	1,5 A/m (rms)	7,5 A/m (rms)
"Class 2" PICC	1,5 A/m (rms)	8,5 A/m (rms)
"Class 3" PICC	1,5 A/m (rms)	8,5 A/m (rms)
"Class 4" PICC	2,0 A/m (rms)	12 A/m (rms)
"Class 5" PICC	2,5 A/m (rms)	14 A/m (rms)
"Class 6" PICC	4,5 A/m (rms)	18 A/m (rms)

NOTE 2 Margins are effectively included by the test methods as specified in ISO/IEC 10373-6.

Page 15 of ISO/IEC 14443-2:2010, 8.2

Replace 8.2.2 by the following subclause and renumber all subsequent tables:

8.2.2 Load modulation

The PICC shall be capable of communication to the PCD via an inductive coupling area where the carrier frequency is loaded to generate a subcarrier with frequency *fs*. The subcarrier shall be generated by switching a load in the PICC.

If the PICC meets the requirements of one particular class as specified in ISO/IEC 14443-1:2008/AMD1, then the load modulation amplitude V_{LMA} of the PICC shall be at least $V_{LMA,\ PICC}$ specified for its class when measured as described in ISO/IEC 10373-6, using the test PCD assembly defined for its class, where *H* is the (rms) value of magnetic field strength in A/m.

If the PICC does not claim to meet the requirements of one particular class as specified in ISO/IEC 14443-1:2008/AMD1, then the load modulation amplitude V_{LMA} of the PICC shall be at least $V_{LMA,\ PICC}$ specified for "Class 1" when measured as described in ISO/IEC 10373-6, using the test PCD assembly defined for "Class 1", where *H* is the (rms) value of magnetic field strength in A/m.

Table 8 specifies for each PICC class both the load modulation amplitude limit $V_{LMA,\ PICC}$ and the relevant test PCD assembly to measure the PICC load modulation amplitude V_{LMA}.

Table 8 — PICC load modulation amplitude limit

	PICC	
	$V_{LMA,\ PICC}$	**Test PCD assembly**
"Class 1" PICC	$22/H^{0,5}$ [mV (peak)]	Test PCD assembly 1
"Class 2" PICC	$22/H^{0,5}$ [mV (peak)]	Test PCD assembly 1
"Class 3" PICC	$\text{Min}(9 ; 22/H^{0,5})$ [mV (peak)]	Test PCD assembly 1
"Class 4" PICC	$\text{Min}(18 ; 44/H^{0,5})$ [mV (peak)]	Test PCD assembly 2
"Class 5" PICC	$\text{Min}(18 ; 44/H^{0,5})$ [mV (peak)]	Test PCD assembly 2
"Class 6" PICC	8 mV (peak)]	Test PCD assembly 2

The PCD shall be able to receive a V_{LMA} of at least $V_{LMA, PCD}$ when measured as described in ISO/IEC 10373-6, using test PCD assembly 1, with Reference PICCs 1, 2 and 3, where *H* is the (rms) value of magnetic field strength in A/m.

If the PCD supports operation with "Class 4" PICCs, it shall be able to receive a V_{LMA} of at least $V_{LMA, PCD}$ when measured as described in ISO/IEC 10373-6, using test PCD assembly 2, with Reference PICC 4, where *H* is the (rms) value of magnetic field strength in A/m.

If the PCD supports operation with "Class 5" PICCs, it shall be able to receive a V_{LMA} of at least $V_{LMA, PCD}$ when measured as described in ISO/IEC 10373-6, using test PCD assembly 2, with Reference PICC 5, where *H* is the (rms) value of magnetic field strength in A/m.

If the PCD supports operation with "Class 6" PICCs, it shall be able to receive a V_{LMA} of at least $V_{LMA, PCD}$ when measured as described in ISO/IEC 10373-6, using test PCD assembly 2, with Reference PICC 6, where *H* is the (rms) value of magnetic field strength in A/m.

Table 9 specifies for each Reference PICC both the load modulation reception limit $V_{LMA, PCD}$ and the test PCD assembly to use to measure the PCD sensitivity.

Table 9 — PCD load modulation reception limit

	PCD	
	$V_{LMA, PICC}$	Test PCD assembly
Measured with Reference PICC 1	$18/H^{0,5}$ [mV (peak)]	Test PCD assembly 1
Measured with Reference PICC 2	$18/H^{0,5}$ [mV (peak)]	Test PCD assembly 1
Measured with Reference PICC 3	Min(8 ; $18/H^{0,5}$) [mV (peak)]	Test PCD assembly 1
Measured with Reference PICC 4 (optional)	Min(16 ; $36/H^{0,5}$) [mV (peak)]	Test PCD assembly 2
Measured with Reference PICC 5 (optional)	Min(16 ; $36/H^{0,5}$) [mV (peak)]	Test PCD assembly 2
Measured with Reference PICC 6 (optional)	7 mV (peak)]	Test PCD assembly 2

Figure 11 is an illustration of the PCD and PICC load modulation amplitude limits for each class.

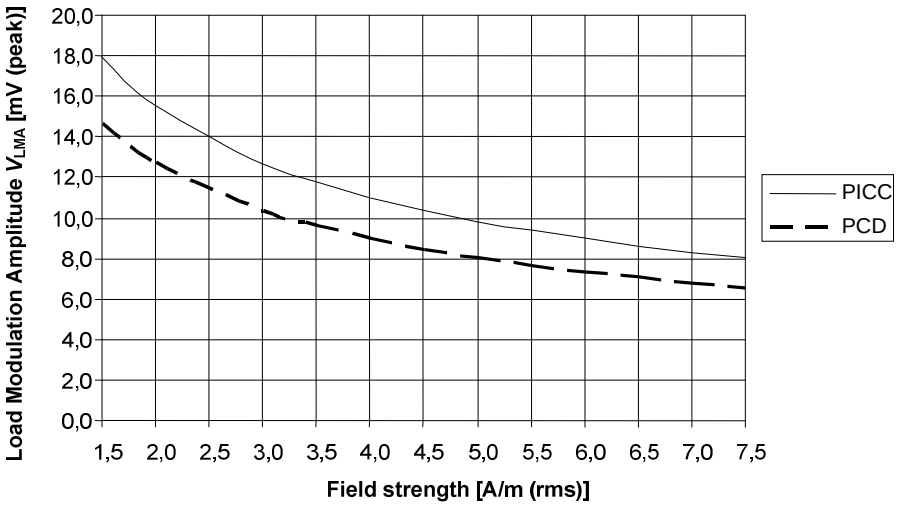

Figure 11 — Load modulation amplitude

Editor's note: Figure 11 to be updated in FPDAM ballot with the PCD and PICC limits for each class

NOTE The PICC load modulation amplitude limits of classes 3 to 6 are less strict than the previous PICC limit in ISO/IEC 14443-2:2010.