STS Association

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Standard Transfer Specification- Entity Type H1 - SecurityModuleToPOSInterface adaptation layer protocol for POS devices supporting DKGA=04/EA=11, and DKGA=04/EA=07.

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STANDARD TRANSFER SPECIFICATION ASSOCIATION

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STANDARD TRANSFER SPECIFICATION –

Compliance Test Specification – Entity Type H1 - SecurityModuleToPOSInterface adaptation layer protocol for POS devices supporting DKGA=04/EA=11, and DKGA=04/EA=07.

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Standard Transfer Specification STS 531-10-04 has been prepared by working group 8.

The text of this standard is based on the following documents:

FDS	Report on voting
STS531-10-04/CD	see note1

Note1: due to the large number of documents in the test set, member voting is not performed prior to publication. However, corrections will be made to the document set if errors are reported.

This publication has been drafted in accordance with STSA Directive STS 2100-1 with the exception of Note1

Revision History

Revision	Clause	Date	Change details from previous Edition
1.8		Feb 2017	initial revision of this document. Revision number set to match the document suite
1.8.1	general	Sept 2017	Added VEK classifications to all tests.
	CTSA20-23, CTSA27		Added note regarding maximum transfer amount for currency and limitations of transfer channel
	general		Standardized on all 'Note' entries to normal text
1.8.2	General	Jan 2018	Only Edition number changed from 1.8.1 to 1.8.2 to match the document suite
1.9	general	May 2018	Compliance to Ed3,
	CTSA11		Added Ed3 control field values to these tests
	CTSA16		Added keychange test to an expired KEN and from an expired to a non-expired KEN
	CTSA28		Added extended token tests as defined in STS202-5
1.9.1	CTSA28	March 2019	Corrected token set
	general		Updated document – included foreword, updated annexures,
1.9.2	Title	July 2019	Changed title to remove “optionally” for DKGA04 support
	CTSA24-26		Removed first paragraph
1.9.3	4.1	Jan 2020	VSM version number changed to V4 and above.
	CTSA11		Added description to each test
	CTSA20-23 CTSA27		Changed note – removed ‘technical constraint of communications channel’, removed reference to STS202-1.
1.9.4	CTSA10	Jan 2020	Removed transfer amount limits note
	Foreword		Added note on voting
1.9.5	CTSA20	April 2022	Changed note in currency range testing
	CTSA16		Steps 3,4 – updated the decription of the tests. Changed tokens in Step 4 to use already defined keys in VSM
	CTSA14		Added register to clear for water, gas, time in step 1
	CTSA26 Step4		Added note on system time
1.9.6	CTSA01	April 2023	Changed IDRecord to include all steps
			Various editorial changes

1 Scope

1.1 General

This document provides the compliance criteria and test descriptions for prepayment meters designed to accept tokens that comply with the STS and POS systems designed to produce STS-compliant tokens.

2 Normative references

2.1 General

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62051 – *ELECTRICITY METERING – Glossary of terms*

IEC 62055-41 – *ELECTRICITY METERING – PAYMENT SYSTEMS – Part 41: Standard Transfer Specification – Application layer protocol for one-way token carrier systems*

STS531-0 *Compliance Test Specification – Quality plan*

STS202-1 - Addendum to IEC62055-41: ELECTRICITY METERING PAYMENT SYSTEMS – Currency Token

3 Terms and definitions

3.1 Definitions

For the purposes of this test specification, the definitions given in the normative references identified in paragraph 2 apply.

3.2 Terms

For the purposes of this test specification, the terms given in the normative references identified in paragraph 2 apply.

4 Test requirements and specifications

4.1 General

Each test comprises a number of steps with associated recordings and expected results. Any deviation from these shall be interpreted as non-compliance and a failure recorded against that step.

Note: every effort has been made to ensure that compliance with the IEC62055-41 standard will be met if all tests in this document are performed successfully. It is however not possible to test all combinations of tokens – it is therefore the manufacturer's responsibility to ensure that the UUT meets all the requirements of IEC62055-41.

Note: All tokens that make use of the random number bits in the 66 bit token field have been generated using an RND value of 5 in this specification.

Note: Virtual Security Module (VSM) Version 4 and above must be used with this specification, with the option to fix RND=5 selected.

Note: Vending classifications V = vending, E = Engineering, and K = Keychange have been added to each test, according to the classifications noted in IEC62055-41 Annex C.3 and specified in STS202-6. Systems may be certified according to whatever combination the manufacturer specifies that his system supports.

Note: dates and times are expressed in the following format in this specification: yyyy/mm/dd HH:mm:ss where HH is in 24 hour format.

4.1.1 Equipment to be submitted

The following equipment is required for certification:

1. Equipment to be certified that has:
    a. The VUDK's as specified in this document
    b. The capability of generating tokens based on the keys specified in item a above.
    c. The equipment to be certified must be set up to allow the vending of tokens when dates are moved forward and backwards in time from previous tokens. This is to allow for the testing of the different base dates allowed with DKGA=04.

4.1.2 Information to be submitted

Annexure A.1 must be completed by the manufacturer.

4.1.3 CTSA01 – TransferCredit

APDU information to be used for this test:

MeterPAN	600727000000000009, 000001000000000082
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1,4 (steps 9-12),5 (steps 13-16)
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01) (steps 1-4)	600727000000000009===0111123457011
IDRecord (TCT=02) (steps 1-4)	600727000000000009===0211123457011
IDRecord (TCT=01) (steps 5-8)	000001000000000082===0111123457011
IDRecord (TCT=02) (steps 5-8)	000001000000000082===0211123457011
IDRecord (TCT=01) (steps 9-12)	600727000000000009===0111123457014
IDRecord (TCT=02) (steps 9-12)	600727000000000009===0211123457014
IDRecord (TCT=01) (steps 13-16)	600727000000000009===0111123457015
IDRecord (TCT=02) (steps 13-16)	600727000000000009===0211123457015
Transfer Amount	0.1 kWh (elect), 0.1kl (water), 0.1m^3 (gas), 0.1 min, 100 currency units
TokenIssueDate	2004-03-01 13:00
Vending Key VUDK	$ABABABABABABABAB94949494949494940123456_{716}$
Classification	V

Overview: This test verifies general compliance with respect to the generation of a TransferCredit token.

Electricity Payment Meters – do steps 1,5,9,13
Water Payment Meters – do steps 2,6,10,14
Gas Payment Meters – do steps 3,7,11,15
Time Payment Meters – do steps 4,8,12,16

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a 0.1kWhTransferCredit token using the information in the APDU above and a TokenIssueDate of 2004-03-01 13:00:00.	**5938 6323 4721 3742 6967**
2	Generate a 0.1kl TransferCredit token using the information in the APDU above and a TokenIssueDate of 2004-03-01 13:05:00.	**4718 6281 2079 5515 5808**
3	Generate a 0.1m^3 TransferCredit token using the information in the APDU above with a TokenIssueDate of 2004-03-01 13:10:00.	**5205 9556 2537 8209 1701**
4	Generate a 0.1min TransferCredit token using the information in the APDU above with a TokenIssueDate of 2004-03-01 13:15:00.	**0281 8876 4383 8852 1673**
5	Change the MeterPAN to 000001000000000082 and the TokenIssueDate to 2004-03-01 13:20, then generate a 0.1 kWhTransferCredit token.	**2545 3597 4942 5013 8964**
6	Change the MeterPAN to 000001000000000082 and the TokenIssueDate to 2004-03-01 13:25:00. Generate a 0.1 kl TransferCredit token.	**4113 6669 3150 5481 8626**
7	Change the MeterPAN to 000001000000000082 and the TokenIssueDate to 2004-03-01 13:30:00. Generate a 0.1 m^3 TransferCredit token.	**2273 5221 9877 4875 8248**
8	Change the MeterPAN to 000001000000000082 and the TokenIssueDate to 2004-03-01 13:35:00. Generate a 0.1min TransferCredit token.	**6959 9394 3567 8494 9160**
9	Generate a 0.1kWhTransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009 , but with a base date of 2014, a KRN of 4, and a TokenIssueDate of 01/01/2014 08:00:00.	**1344 4522 5375 1707 6834**
10	Generate a 0.1kl TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009, but with a base date of 2014, a KRN of 4, and a TokenIssueDate of 01/01/2014 08:05:00.	**0347 7912 4905 9669 5895**
11	Generate a 0.1m^3 TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009, but with a base date of 2014, a KRN of 4, and a TokenIssueDate of 01/01/2014 08:10:00.	**0609 4571 0694 1307 5467**
12	Generate a 0.1min TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009, but with a base date of 2014, a KRN of 4, and a TokenIssueDate of 01/01/2014 08:15:00	**0725 6373 2167 4825 3738**

Step	Instruction	Token data to be transferred to the TCDU
13	Generate a 0.1kWhTransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009 , but with a base date of 2035, a KRN of 5, and a TokenIssueDate of 01/01/2035 08:00:00.	**1190 7826 9477 5321 3480**
14	Generate a 0.1kl TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009 , but with a base date of 2035, a KRN of 5, and a TokenIssueDate of 01/01/2035 08:05:00.	**1964 0099 9493 4643 1996**
15	Generate a 0.1m^3 TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009 , but with a base date of 2035, a KRN of 5, and a TokenIssueDate of 01/01/2035 08:10:00.	**1174 1155 0923 3033 7876**
16	Generate a 0.1min TransferCredit token using the information in the APDU above with a meter PAN of 600727000000000009 , but with a base date of 2035, a KRN of 5, and a TokenIssueDate of 01/01/2035 08:15:00	**7304 2649 0764 5400 7799**

4.1.4 CTSA02 – InitiateMeterTest/Display

Overview: This test verifies compliance with respect to the generation of an InitiateMeterTest/Display token (Test 0).

APDU information to be used for this test:

MeterPAN	See test steps
TCT	01, 02
DKGA	<Not specified>
EA	<Not specified>
SGC	<Not specified>
TI	<Not specified>
KRN	<Not specified>
KT	<Not specified>
KeyExpiryNumber	<Not specified>
IDRecord	<Not specified>
Control Field	0xFFFF (65535 decimal)
Classification	E

Step	Instruction	Token data to be transferred to the TCDU
1	Generate an InitiateMeterTest/Display token using a MeterPAN = 600727000000000009. (11 digit Decoder Reference Number)	**5649 3153 7254 5031 3471**
2	Generate an InitiateMeterTest/Display token using a MeterPAN = 000001000000000082. (13 digit Decoder Reference Number)	**0230 5843 0050 5295 1967**

4.1.5 CTSA03 – SetMaximumPowerLimit

Overview: This test verifies general compliance with respect to the generation of a SetMaximumPowerLimit token.
This test need only be done for electricity Payment Meters.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Transfer Amount	1 kW
Token Date/Time	2004-03-28 09:01
Vending Key VUDK	$ABABABABABABABAB94949494949494949401234567_{16}$
Classification	E

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a SetMaximumPowerLimit token using the information in the APDU above.	**2652 1936 7510 5550 2278**

4.1.6 CTSA04 – ClearCredit

Overview: This test verifies general compliance with respect to the generation of a ClearCredit token.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01) (step 1)	600727000000000009===0111123457011
IDRecord (TCT=02) (step 1)	600727000000000009===0211123457011
IDRecord (TCT=01) (step 2)	000001000000000082===0111123457011
IDRecord (TCT=02) (step 2)	000001000000000082===0211123457011
RegisterToClear Val	0XFFFF
Token Date/Time	2004-03-28 09:15
Vending Key VUDK	$ABABABABABABABAB94949494949494949401234567_{16}$
Classification	E

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a ClearCredit token using the information in the APDU above.	**5972 5289 1386 3952 9749**
2	Change the MeterPAN to 000001000000000082 and leaving all the other APDU information as in Step1	**4391 7986 2747 1648 2997**

	above, but with a TokenIssueDate of 28/03/2004 09:16:00, generate a ClearCredit token.	

4.1.7 CTSA05 – Set1stSectionDecoderKey, Set2ndSectionDecoderKey, Set3rdSectionDecoderKey, Set4thSectionDecoderKey

Overview: This test verifies general compliance with respect to the generation of a Keychange token set.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
EA	11
Initial BaseDate	1993
Initial DKGA	04
Initial SGC	123457
Initial TI	01
Initial KRN	1
Initial KT	2
Initial KeyExpiryNumber	255
Initial Rollover Bit	0
Initial IDRecord (TCT=01) (step 1, 2)	600727000000000009===0111123457011
Initial IDRecord (TCT=02) (step 1, 2)	600727000000000009===0211123457011
Initial IDRecord (TCT=02) (step 3)	000001000000000082===0211123457011
New Base Date	1993
New DKGA	04
New SGC	123457
New TI	02
New KRN	1 (Step1,3),4 (Step2)
New KT	2
New KeyExpiryNumber	255
New Rollover Bit	0
New IDRecord (TCT=01) (step 1, 2)	600727000000000009===0111123457021
New IDRecord (TCT=02) (step 1, 2)	600727000000000009===0211123457021
New IDRecord (TCT=02) (step 3)	000001000000000082===0211123457021
Classification	K

Vending Key	VUDK No	SGC	KRN	KT	KEN
ABABABABABABABAB9494949494949401234567$_{16}$	$VUDK_1$	123457	1	2	255
ABABABABABABABAB9494949494949401234567$_{16}$	$VUDK_2$	123457	4	2	255

Step	Instruction	Tokens to be transferred to the TCDU
1	Generate the Keychange token set using the information in the APDU above with $VUDK_1$.	**3481 2744 9152 1113 3004 (1stKCT)** **4690 3925 2085 2367 4737 (2ndKCT)** **7146 4563 8470 8861 0152 (3rdKCT)** **6790 4239 4026 1764 3990 (4thKCT)**
2	Generate the Keychange token set using the information in the APDU above but change the new base date to 2014, and the rollover bit =1 (with $VUDK_2$). New KRN = 4, new SGC = 123457, New TI = 2	**5649 3341 8612 4243 7581 (1stKCT)** **5175 7380 3611 9157 8258 (2ndKCT)** **2444 9874 7994 7453 6920 (3rdKCT)** **2645 7813 6431 7209 5162 (4thKCT)**

3	Change the Meter PAN to 000001000000000082, then generate the Keychange token set using the information in the APDU above (as per Step 1).	**2959 4465 5246 9950 5864 (1stKCT)** **0950 6536 0678 1415 6547 (2ndKCT)** **0670 2839 5976 5928 4417 (3rdKCT)** **1137 8292 8698 9904 4282 (4thKCT)**

4.1.8 CTSA06 – ClearTamperCondition

Overview: This test verifies general compliance with respect to the generation of a ClearTamperCondition token.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Token Date/Time	2004-03-28 10:00
Vending Key VUDK	ABABABABABABABAB94949494949494949401234567$_{16}$
Classification	E

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a ClearTamperCondition token using the information in the APDU above.	**0245 5019 1965 1404 7304**

4.1.9 CTSA07 – SetMaximumPhasePowerUnbalanceLimit

Overview: This test verifies general compliance with respect to the generation of a SetMaximumPhasePowerUnbalanceLimit token.
This test need only be done for Electricity Payment Meters.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Token Date/Time	2004-03-28 10:20
MaximumPhasePowerUnbalanceLimit	10 Watts
Vending Key VUDK	ABABABABABABABAB94949494949494949401234567$_{16}$
Classification	E

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a SetMaximumPhasePowerUnbalanceLimit token using the information in the APDU above.	**1613 5127 1469 8883 0614**

4.1.10 CTSA08 – RND : RandomNumber

This test has been removed since the vending system has no control over the generation of the random bits. It is included in the compliance test spec for the Security Module.

4.1.11 CTSA09 – TID : TokenIdentifier

Overview: This test verifies general compliance with respect to the TID field, this includes testing for the SpecialReservedTokenIdentifier and multiple tokens generated in the same minute.

This test is not required for this entity type.

4.1.12 CTSA10 – Amount : TransferAmount

Overview: This test verifies general compliance with respect to the calculation of the TransferAmount field.

Note: if a full set of test steps have been performed for any payment meter type (electricity, water, gas or time), it is not necessary to repeat the test steps in any of the other payment meter types.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Vending Key VUDK	ABABABABABABABAB94949494949494949401234567$_{16}$
Classification	V

Notes:

- The dates and times together with the TransferAmounts to be used are specified in the table blelow.

Table 1 - Transfer Amount Table

Test Number	TokenIssueDate	TransferAmount
1	2004-04-01 00:30	25.6 kWh, kl, m3, min
2	2004-04-01 00:35	1638.3 kWh, kl, m^3, min
3	2004-04-01 00:40	1638.4 kWh, kl, m^3, min
4	2004-04-01 00:45	2000.0 kWh, kl, m^3, min
5	2004-04-01 00:50	18022.3 kWh, kl, m^3, min
6	2004-04-01 00:55	18022.4 kWh, kl, m^3, min
7	2004-04-01 01:44	181862.3 kWh, kl, m^3, min
8	2004-04-01 01:49	181862.4 kWh, kl, m^3, min
9	2004-04-01 01:54	1820162.4 kWh, kl, m^3, min

Step	Instruction	Token data to be transferred to the TCDU
1	Generate a TransferCredit token using the information given in Table 1 above for test number 1 if steps 10-18 for water or Steps 19-27 for gas or steps 28-36 for time have not been done.	**6363 8916 3341 2455 0935**
2	As above for test number 2.	**0673 6163 1749 4459 5611**
3	As above for test number 3.	**4579 8100 5197 4598 3712**
4	As above for test number 4.	**0836 2487 4349 3211 6862**
5	As above for test number 5.	**3393 3484 6565 3980 3471**
6	As above for test number 6.	**4007 5282 6586 5525 6325**
7	As above for test number 7.	**0038 3912 2037 4057 5049**
8	As above for test number 8.	**3227 2089 7912 5097 8565**
9	As above for test number 9.	**4496 4671 9353 6137 7806**
10	Perform test steps 10-18 for water TransferCredit tokens if Steps 1-9 for electricity or Steps 19-27 for gas or steps 28-36 for time have not been done As above for test number 1.	**0884 4040 9677 5816 1989**
11	As above for test number 2.	**4170 7569 0654 8703 4639**
12	As above for test number 3.	**6182 6851 5898 5009 9670**
13	As above for test number 4.	**7247 8269 6279 4295 4182**
14	As above for test number 5.	**1231 1110 3655 3115 5223**
15	As above for test number 6.	**6897 9561 7915 0083 1417**
16	As above for test number 7.	**3613 0214 0688 6691 2790**
17	As above for test number 8.	**4956 0207 5249 5552 3897**
18	As above for test number 9.	**4757 5512 8278 8881 7714**
19	Perform test steps 19-27 for gas TransferCredit tokens if Steps 1-9 for electricity or Steps 10-18 for wateror steps 28-36 for time have not been done. As above for test number 1.	**3467 2027 6391 8336 5663**
20	As above for test number 2.	**7008 7969 9351 6513 8265**
21	As above for test number 3.	**6087 5440 6640 2096 1982**
22	As above for test number 4.	**1660 5563 1562 4394 2378**
23	As above for test number 5.	**1661 4677 1567 9890 4170**
24	As above for test number 6.	**4920 8263 7279 9329 4856**
25	As above for test number 7.	**3837 4198 8405 7836 7339**
26	As above for test number 8.	**3438 4673 0095 0600 6509**
27	As above for test number 9.	**4033 2503 8207 4781 3730**

Step	Instruction	Token data to be transferred to the TCDU
28	Perform test steps 28-36 for time TransferCredit tokens if Steps 1-9 for electricity or Steps 10-18 for water or steps 19-27 for gas have not been done. As above for test number 1.	**4860 2551 8781 9372 5481**
29	As above for test number 2.	**4280 0745 3594 1725 6872**
30	As above for test number 3.	**6442 9613 2978 3392 7825**
31	As above for test number 4.	**5428 0108 6819 9087 3145**
32	As above for test number 5.	**6718 5692 5903 9871 4815**
33	As above for test number 6.	**0974 9100 0465 1335 6410**
34	As above for test number 7.	**5463 9108 0357 3787 8204**
35	As above for test number 8.	**3150 4138 9360 9979 8924**
36	As above for test number 9.	**5829 0600 0039 7238 6107**

4.1.13 CTSA11 – Control : InitiateMeterTest/DisplayControlField

Overview: This test verifies compliance with respect to the generation of an InitiateMeterTest/Display token, the InitiateMeterTest/DisplayControlField with respect to its calculation and bit position in the token is also verified.

APDU information to be used for this test:

MeterPAN	<Not specified>
TCT	01,02
DKGA	<Not specified>
EA	<Not specified>
SGC	<Not specified>
TI	<Not specified>
KRN	<Not specified>
KT	<Not specified>
KeyExpiryNumber	<Not specified>
IDRecord	<Not specified>
Classification	E

Note: the first token shown in each step below is for 2 digit manufacturer codes, and the second token shown is for 4 digit manufacturer codes.

Step	Instruction	Token to be transferred to the TCDU
1	Generate an InitiateMeterTest/Display token using the information given above and an InitiateMeterTest/DisplayControlField value of 000000001_{16}. (load switch)	**0000 0000 0001 5099 7584** **0115 2921 5090 3605 4672**
2	As above, with a DisplayControlField value of 000000002_{16}. (display)	**0000 0000 0001 6777 4880** **0115 2921 5133 3104 2448**

Step	Instruction	Token to be transferred to the TCDU
3	As above, with a DisplayControlField value of $00000000_{4_{16}}$. (cumulative consumption)	**0000 0000 0002 0132 8896** **0115 2921 5219 2095 2465**
4	As above, with a DisplayControlField value of $00000000_{8_{16}}$. (KRN/KT)	**1844 6744 0738 4377 2416** **0115 2921 5391 0083 8034**
5	As above, with a DisplayControlField value of $00000001_{0_{16}}$. (tariff index)	**3689 3488 1475 5332 2496** **0115 2921 5734 6054 3637**
6	As above, with a DisplayControlField value of $00000002_{0_{16}}$. (token reader)	**0000 0000 0006 7109 3248** **0115 2921 6421 8002 0378**
7	As above, with a DisplayControlField value of $00000004_{0_{16}}$. (max power limit)	**0000 0000 0012 0797 4400** **0115 2921 7796 1897 3828**
8	As above, with a DisplayControlField value of $00000008_{0_{16}}$. (tamper status)	**0000 0000 0022 8172 8512** **0115 2922 0544 9688 0824**
9	As above, with a DisplayControlField value of $00000010_{0_{16}}$. (power consumption)	**0000 0000 0044 2920 8064** **0115 2922 6042 5269 4700**
10	As above, with a DisplayControlField value of $00000020_{0_{16}}$. (software version)	**0000 0000 0087 2419 5840** **0115 2923 7037 6432 2536**
11	As above, with a DisplayControlField value of $00000040_{0_{16}}$. (phase power imbalance)	**0000 0000 0173 1410 5857** **0115 2925 9027 8757 7952**
12	As above, with a DisplayControlField value of $00000200_{0_{16}}$. (EA number)	**0000 0000 1375 7317 3770** **0115 2956 6891 1315 4192**
13	As above, with a DisplayControlField value of $00000400_{0_{16}}$. (no. of KCT)	**0000 0000 2750 1212 7252** **0115 2991 8734 8524 9680**
14	As above, with a DisplayControlField value of $00000800_{0_{16}}$. (display SGC value)	**0000 0000 5498 9003 4216** **0115 3062 2422 2942 8368**
15	As above, with a DisplayControlField value of $00001000_{0_{16}}$. (display KEN value)	**0000 0001 0996 4584 8124** **0115 3202 9797 1778 8816**
16	As above, with a DisplayControlField value of $00002000_{0_{16}}$. (display DRN value)	**0000 0002 1991 5747 5960** **0115 3484 4546 9451 4832**

4.1.14 CTSA12 – MPL : MaximumPowerLimit

Overview: This test verifies general compliance with respect to the calculation of the MaximumPowerLimit field.

Note: This test is to be done to whatever maximum power limit token value the manufacturer has stated in Annexure A.

Note: this test only required if the payment meter is an electricity payment meter.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Vending Key VUDK	$ABABABABABABABAB94949494949494940123456{7}_{16}$
Classification	E

Notes:

- The dates and times together with the MaximumPowerLimit values to be used are specified in the table below.

Step Number	TokenIssueDate	MaximumPowerLimit
1	2004-04-01 07:00	256 watts
2	2004-04-01 07:05	16383 watts
3	2004-04-01 07:10	16384 watts
4	2004-04-01 07:15	20000 watts
5	2004-04-01 07:20	180223 watts
6	2004-04-01 07:25	180224 watts
7	2004-04-01 07:30	1818623 watts
8	2004-04-01 07:35	1818624 watts
9	2004-04-01 07:40	18201624 watts

Step	Instruction	Token to be transferred to the TCDU
1	Generate a SetMaximumPowerLimit token using the information given above for step number 1.	**5860 1433 8269 4546 3485**
2	As above for step number 2.	**1399 7395 4794 1502 6219**
3	As above for step number 3.	**1803 7738 0852 6329 4820**
4	As above for step number 4.	**0673 8975 0746 3874 5925**
5	As above for step number 5.	**6635 4091 5679 4256 9601**
6	As above for step number 6.	**6285 3351 5210 1785 9877**
7	As above for step number 7.	**4098 4149 9059 0033 2649**
8	As above for step number 8.	**2688 2838 6545 8090 1052**
9	As above for step number 9.	**2925 5956 4591 2236 1629**

4.1.15 CTSA13 – MPUL : MaximumPhasePowerUnbalanceLimit

Overview: This test verifies general compliance with respect to the calculation of the MaximumPhasePowerUnbalanceLimit field.

Note: This test is to be done to whatever maximum phase power unbalance limit token value the manufacturer has stated in Annexure A.

Note: this test only required if the payment meter is an electricity payment meter.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Vending Key VUDK	ABABABABABABABAB94949494949494401234567$_{16}$
Classification	E

Notes:

- The dates and times together with the MaximumPhasePowerUnbalanceLimit values to be used are specified in the table below.

Step Number	TokenIssueDate	MaximumPhasePowerUnbalanceLimit
1	2004-04-01 08:00	256 watts
2	2004-04-01 08:05	16383 watts
3	2004-04-01 08:10	16384 watts
4	2004-04-01 08:15	20000 watts
5	2004-04-01 08:20	180223 watts
6	2004-04-01 08:25	180224 watts
7	2004-04-01 08:30	1818623 watts
8	2004-04-01 08:35	1818624 watts
9	2004-04-01 08:40	18201624 watts

Step	Instruction	Token to be transferred to the TCDU
1	Generate a SetMaximumPhasePowerUnbalanceLimit token using the information given above for step number 1.	**2350 9767 2155 5923 0954**
2	As above for step number 2.	**7024 7784 5678 9948 4178**
3	As above for step number 3.	**3630 4916 0735 4554 2570**
4	As above for step number 4.	**1106 6406 4038 5330 2811**
5	As above for step number 5.	**2551 2033 3560 3695 3640**
6	As above for step number 6.	**1378 5431 6825 4235 8258**
7	As above for step number 7.	**0688 9958 6800 0406 3872**
8	As above for step number 8.	**2741 0125 0846 0866 3818**
9	As above for step number 9.	**6078 6080 2307 2448 5517**

4.1.16 CTSA14 – Register : RegisterToClear

Overview: This test verifies general compliance with respect to the calculation of the RegisterToClear field.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0111123457011
IDRecord (TCT=02)	600727000000000009===0211123457011
Vending Key VUDK	ABABABABABABABAB94949494949494940123456$7_{16}$
Classification	E

Notes:

- The dates and times together with the RegisterToClear values to be used are specified in the table blelow.
- Steps 3 to 6 need only be done if the UUT supports the generation of CurrencyTokens as specified in STS202-1.

Step Number	TokenIssueDate	RegisterToClear
1	2004-04-01 09:00, 09:01, 09:02, 09:03	0000_{16} - 0003_{16}
2	2004-04-01 09:05	$FFFF_{16}$
3	2004-04-01 09:10	0004_{16}
4	2004-04-01 09:15	0005_{16}
5	2004-04-01 09:20	0006_{16}
6	2004-04-01 09:25	0007_{16}

Step	Instruction	Token to be transferred to the TCDU
1	Generate a ClearCredit token using the information given above for step number 1.	**0676 8431 1340 3125 7922 (Elect)** **5492 2735 8554 2831 5382 (Water)** **5527 2911 5430 8680 9108 (Gas)** **0815 0614 7683 9702 5486 (Time)**
2	As above for step number 2.	**5933 8638 6002 0770 7879**
3	As above for step number 3. See note above.	**4887 2720 0079 5940 8665**
4	As above for step number 4. See note above.	**5181 0809 0875 5012 5677**
5	As above for step number 5. See note above.	**1384 8051 3168 4817 7124**
6	As above for step number 6. See note above.	**6350 6294 5642 4710 5352**

4.1.17 CTSA15 – NKHO : NewKeyHighOrder, NKLO : NewKeyLowOrder, NKMO1: NewKeyMidOrder1, NKMO2: NewKeyMidOrder2,KENHO : KeyExpiryNumberHighOrder, KENLO : KeyExpiryNumberLowOrder, SGCLO: SGCLowOrder, SGCHO: SGCHighOrder, RO : RolloverKeyChange

Overview: This test verifies general compliance with respect to the generation of a Set1stSectionDecoderKey token and a Set2ndSectionDecoderKey token.

APDU information to be used for this test:

MeterPAN	600727111111111153
TCT	02
EA	11
Initial VUDK	9494949494949401234567ABABABABABABABAB$_{16}$

Initial DKGA	04
Initial Base Date	1993
Initial SGC	123457
Initial TI	01
Initial KRN	3
Initial KT	2
Initial KeyExpiryNumber	255
Initial IDRecord (TCT=01)	60072711111111153===0111123457011
Initial IDRecord (TCT=02)	60072711111111153===0211123457011
New VUDK	ABABABABABABABAB9494949494949401234567$_{16}$
New Base Date	2014
New DKGA	04
New SGC	123457
New TI	02
New KRN	4
New KT	2
New KeyExpiryNumber	255
New IDRecord (TCT=01)	60072711111111153===0111123457021
New IDRecord (TCT=02)	60072711111111153===0211123457021
Classification	K

Step	Instruction	Tokens to be transferred to the TCDU
1	Generate the Keychange token set using the information in the APDU above.	**5999 5086 1251 3842 8221 (1stKCT)** **4925 7933 8374 8456 1517 (2ndKCT)** **2518 7863 5960 5832 3905 (3rdKCT)** **3472 1385 3945 0212 0627 (4thKCT)**

4.1.18 CTSA16 – KeyExpiryNumber

Overview: This test verifies general compliance with respect to the generation of a Credit token where the vending Key has expired

APDU information to be used for this test:

MeterPAN	600727111111111153
TCT	01, 02
EA	11
VUDK	ABABABABABABABAB9494949494949401234567$_{16}$
DKGA	04
SGC	123460
TI	01
KRN	1
KT	2
Base Date	1993
KeyExpiryNumber	85
IDRecord (TCT=01)	60072711111111153===0111123457011
IDRecord (TCT=02)	60072711111111153===0211123457011
Token Date/Time	2010-04-01 09:30
Classification	V, E, K
Transfer amount	1kWh (elect), 1m^3 (water), 1m^3 (gas), 1min (time) 1credit unit (currency)

For classification V, do step 1 only
For classification E, do step 2 only
For classification K, do steps 3 and 4 only

Step	Instruction	Expected Result
1	Generate a Transfer Credit Token using the information in the APDU above.	The POS should indicate a key expiry error as indicated in Table 2. No token should be generated.

2	Generate a ClearAllCredit Token using the information in the APDU above.	The POS should indicate a key expiry error as indicated in Table 2. No token should be generated.
3	Generate the Keychange token set using the information in the APDU above. Initial SGC = 123460 Initial KEN = 85 Initial KRN = 1 Initial TI = 01 New SGC = 123460 New KEN = 85 New KRN = 1 New TI = 02	The POS should indicate a key expiry error as indicated in Table 2. No tokens should be generated.
4	Generate the Keychange token set using the information in the APDU above. Initial SGC = 123460 Initial KEN = 85 Initial KRN = 1 Initial TI = 01 New SGC = 123461 New KEN = 255 New KRN = 1 New TI = 01.	**7066 2201 9658 6966 3379 (1stKCT)** **4694 4728 2418 3846 8519 (2ndKCT)** **2995 2110 0761 5022 3120 (3rdKCT)** **3646 7776 9835 3221 5915 (4thKCT)**

4.1.19 CTSA17 – DRN Check Digit

Overview: This test verifies general compliance with respect to the verification of the Check Digit in the DRN.

Step	Instruction	Expected Result
1	Enter the following DRNs (Meter Numbers) into the POS **12345678904** **11111111113**	The POS should indicate a Luhn digit error in the DRN number in both cases.

Classification V, E, K.

4.1.20 CTSA18 – DateOfExpiry

Overview: This test verifies general compliance with respect to the verification of a meter ID card that implements date of expiry. This test is only valid for POS devices that support this feature.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	02
EA	11
SGC	123457
TI	01
KRN	1
DOE	06/2004
IDRecord (TCT=01)	6007270000000000009=0406=0111123457011
IDRecord (TCT=02)	6007270000000000009=0406=0211123457011
Classification	V,E,K

Step	Instruction	Expected Result
1	Generate a meter ID card with the IDRecord as shown above.	
2	Read the meter Id card with the POS device whose date is set at any date after 01/07/2004.	The POS device should indicate that the ID card has expired.

4.1.21 CTSA19 – Automatic generation of Set1stSectionDecoderKey, Set2ndSectionDecoderKey, Set3rdSectionDecoderKey, Set4thSectionDecoderKey

Overview: This test verifies general compliance with respect to the automatic generation of a Set1stSectionDecoderKey token, a Set2ndSectionDecoderKey, a Set3rdSectionDecoderKey, and a Set4thSectionDecoderKey token.

This test is not required for this entity type.

Note:
CTSA20- CTSA23 - In the case where the system cannot resolve the transfer amount to the range of the transfer amount as specified in IEC62055-41, then test to the range that the system is able to resolve, as specified in the submitted documentation, subject to the approval of the STS Association having been given to perform tests to a limited range of the transfer amount.

4.1.22 CTSA20 – Currency Token (Electricity Credit)

This test shall only be performed if the manufacturer has indicated that the UUT supports the generation of Electricity TransferCredit (Currency) tokens as specified in STS202-1, otherwise this test may be omitted.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
Vending Key VUDK	$ABABABABABABABAB9494949494949494012345671_{16}$
Classification	V

Step Number	TokenIssueDate	TransferAmount
1	2004-04-21 10:01:00	1
2	2004-04-21 10:02:00	16383
3	2005-04-21 10:03:00	16384
4	2005-04-22 10:04:00	180224
5	2005-05-01 11:00:00	1818624
6	2005-05-11 11:01:00	18202624
7	2005-05-21 11:02:00	182042624
8	2005-05-21 11:03:00	1820442624
9	2005-05-21 11:04:00	18204442624
10	2005-05-21 11:05:00	1.82044E+14
11	2005-05-21 11:10:00	1.82044E+20
12	2005-05-21 11:11:00	1.82044E+29

13	2005-05-21 11:12:00	-1
14	2005-05-21 11:14:00	-180224
15	2005-05-21 11:15:00	-1.82044E+14

Overview: This test verifies general compliance with respect to the generation of a TransferCurrency token, and tests exponent value calculation.

Step	Instruction	Expected Result
1 - 15	Generate TransferCurrency tokens with the information in the APDU above, and for each of the steps indicated above.	The token for each step must be identical to the token corresponding to the step number specified in the token table below.

Token Table	
Step	**Token Decimal Digits**
1	**3401 4974 3392 2634 8300**
2	**6280 4009 9046 9873 2402**
3	**5793 4654 2972 9765 1275**
4	**1976 8627 3332 3965 6831**
5	**5837 3372 1321 2128 3544**
6	**2392 2326 2330 1721 4102**
7	**4448 6642 8441 4677 1527**
8	**6517 7973 9808 9142 7945**
9	**5055 2361 3726 9181 6492**
10	**4498 7251 5382 8874 4552**
11	**7024 6707 8488 9942 9808**
12	**1806 3374 0490 0353 3066**
13	**2364 5166 7792 1336 9659**
14	**3786 1261 7889 9605 6272**
15	**6912 7415 4346 0781 7177**

4.1.23 CTSA21 – Currency Token (Water Credit)

This test shall only be performed if the manufacturer has indicated that the UUT supports the generation of Water TransferCredit (Currency) tokens as specified in STS202-1, otherwise this test may be omitted.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	02
DKGA	04
BaseDate	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
Vending Key VUDK	$ABABABABABABABAB9494949494949401234567_{16}$
Classification	V

Step Number	TokenIssueDate	TransferAmount
1	2005-05-22 10:01:00	1
2	2005-05-22 10:02:00	16383
3	2006-04-21 10:03:00	16384
4	2006-04-22 10:04:00	180224
5	2006-05-11 11:00:00	1818624
6	2006-05-21 11:01:00	18202624
7	2006-05-21 11:02:00	182042624
8	2006-05-21 11:03:00	1820442624
9	2006-05-21 11:04:00	18204442624
10	2006-05-21 11:05:00	1.82044E+14
11	2006-05-21 11:10:00	1.82044E+20
12	2006-05-21 11:11:00	1.82044E+29
13	2006-05-21 11:12:00	-1
14	2006-05-21 11:14:00	-180224
15	2006-05-21 11:15:00	-1.82044E+14

Overview: This test verifies general compliance with respect to the generation of a TransferCurrency token, and tests exponent value calculation.

Step	Instruction	Expected Result
1 - 15	Generate TransferCurrency tokens with the information in the APDU above, and for each of the steps indicated above.	The token for each step must be identical to the token corresponding to the step number specified in the token table below.

Token Table	
Step	**Token Decimal Digits**
1	**0267 2699 9902 5772 9753**
2	**2754 5845 5697 9872 0520**
3	**2492 4176 6458 9488 1791**
4	**4162 8462 9635 8787 6701**
5	**5584 2171 0141 3897 6491**
6	**5232 1215 6139 3595 4814**
7	**0245 1481 9561 8766 2958**
8	**0134 6692 9560 5721 9797**
9	**0570 2874 9504 3957 9690**
10	**2824 6707 3037 5470 5357**
11	**7270 3744 1141 3340 9763**
12	**6718 1367 0649 0583 7844**
13	**7281 2498 9352 8308 6046**
14	**2065 2627 2119 5886 5680**
15	**2235 5664 4712 1605 8843**

4.1.24 CTSA22 – Currency Token (Gas Credit)

This test shall only be performed if the manufacturer has indicated that the UUT supports the generation of Gas TransferCredit (Currency) tokens as specified in STS202-1, otherwise this test may be omitted.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
Vending Key VUDK	ABABABABABABABAB94949494949494940123456716
Classification	V

Step Number	TokenIssueDate	TransferAmount
1	2006-05-22 10:01:00	1
2	2006-05-22 10:02:00	16383
3	2007-04-21 10:03:00	16384
4	2007-05-11 10:04:00	180224
5	2007-05-21 11:00:00	1818624
6	2007-05-21 11:01:00	18202624
7	2007-05-21 11:02:00	182042624
8	2007-05-21 11:03:00	1820442624
9	2007-05-21 11:04:00	18204442624
10	2007-05-21 11:05:00	1.82044E+14
11	2007-05-21 11:10:00	1.82044E+20
12	2007-05-21 11:11:00	1.82044E+29
13	2007-05-21 11:12:00	-1
14	2007-05-21 11:14:00	-180224
15	2007-05-21 11:15:00	-1.82044E+14

Overview: This test verifies general compliance with respect to the generation of a TransferCurrency token, and tests exponent value calculation.

Step	Instruction	Expected Result
1 - 15	Generate TransferCurrency tokens with the information in the APDU above, and for each of the steps indicated above.	The token for each step must be identical to the token corresponding to the step number specified in the token table below.

Token Table	
Step	**Token Decimal Digits**
1	**5697 9183 4595 2492 1104**
2	**1528 2180 5731 4036 2281**
3	**0421 2664 7941 0728 1344**
4	**4960 4137 4301 4093 7452**
5	**6173 8226 5605 1802 4200**
6	**5120 1664 8160 7076 9081**
7	**4208 7263 2559 0514 7323**
8	**5256 2960 8734 8352 5356**
9	**4797 0829 1909 0067 1535**
10	**5717 2710 6937 1637 0446**
11	**6767 2833 6549 4944 4191**
12	**6868 7883 8586 3714 4866**
13	**4770 1456 5043 7379 8475**
14	**1671 9096 1687 3348 9754**
15	**0642 4334 9464 5360 4334**

4.1.25 CTSA23 – Currency Token (Time Credit)

This test shall only be performed if the manufacturer has indicated that the UUT supports the generation of Time TransferCredit (Currency) tokens as specified in STS202-1, otherwise this test may be omitted.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	02
DKGA	04
Base Date	1993
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
Vending Key VUDK	ABABABABABABABAB94949494949494940123456716
Classification	V

Step Number	TokenIssueDate	TransferAmount
1	2007-05-22 10:01:00	1
2	2007-05-22 10:02:00	16383
3	2008-04-21 10:03:00	16384
4	2008-05-11 10:04:00	180224
5	2008-05-21 11:00:00	1818624
6	2008-05-21 11:01:00	18202624
7	2008-05-21 11:02:00	182042624
8	2008-05-21 11:03:00	1820442624
9	2008-05-21 11:04:00	18204442624
10	2008-05-21 11:05:00	1.82044E+14
11	2008-05-21 11:10:00	1.82044E+20
12	2008-05-21 11:11:00	1.82044E+29
13	2008-05-21 11:12:00	-1
14	2008-05-21 11:14:00	-180224
15	2008-05-21 11:15:00	-1.82044E+14

Overview: This test verifies general compliance with respect to the generation of a TransferCurrency token, and tests exponent value calculation.

Step	Instruction	Expected Result
1 - 15	Generate TransferCurrency tokens with the information in the APDU above, and for each of the steps indicated above.	The token for each step must be identical to the token corresponding to the step number specified in token table 1 below.

Token Table 1	
Step	**Token Decimal Digits**
1	**1459 8221 2013 1827 2624**
2	**4702 3088 8531 7594 1047**

3	**2060 4508 8829 7155 8930**
4	**0481 0750 1515 8821 0027**
5	**1031 6407 8241 4585 6327**
6	**2055 8286 9646 0387 1769**
7	**3527 9595 7841 2286 4493**
8	**7195 3443 7256 3997 3220**
9	**7170 8834 6287 1704 0381**
10	**6283 7334 4613 3277 2265**
11	**4099 3169 5801 3339 3719**
12	**1553 8242 4290 3157 5445**
13	**1415 3658 9274 2241 4134**
14	**3545 3600 2519 8850 7433**
15	**0741 0742 5634 7868 4326**

4.1.26 CTSA24 – DKGA04 with EA=07 ClearCredit

Note: since the TCDU information for token generation is used to generate the tokens in all previous tests, only one test per base date is required in order to test the generation of the DecoderKey and correct selection of EA.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
EA	07
TI	01
KT	2
KeyExpiryNumber	255
RegisterToClear Val	0XFFFF
IDRecord (TCT=01)	600727000000000009===0107123456011
IDRecord (TCT=02)	600727000000000009===0207123456011
Classification	E

Vending Key	VUDK No	SGC	KRN	Base Date
$ABABABABABABABAB9494949494949401234567_{16}$	$VUDK_1$	123457	1	1993
$ABABABABABABABAB9494949494949401234567_{16}$	$VUDK_2$	123457	4	2014
$ABABABABABABABAB9494949494949401234567_{16}$	$VUDK_3$	123457	5	2035

Step	Instruction	Token to be transferred to the TCDU
1	Generate a ClearCredit token with the information in the APDU above, using a base date of 1993, a token issue date of 2008-05-22 10:00, and $VUDK_1$	**1591 1490 4343 6794 6000**
2	Change the base date to 2014 ($VUDK_2$), and the TokenIssueDate to 2014-04-01 10:00, then generate a ClearCredit token	**7182 9107 3158 9630 4009**
3	Change the base date to 2035 ($VUDK_3$), and the TokenIssueDate to 2035-04-01 10:00, then generate a ClearCredit token	**7278 1954 3345 1483 4135**

4.1.27 CTSA25 – DKGA04 with EA=07 – TransferCredit

Overview: This test verifies general compliance with respect to the generation of a TransferCredit token.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
EA	07
Base Date	1993
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01) (steps 1,3,5)	600727000000000009===0107123456011
IDRecord (TCT=02) (steps 1,3,5)	600727000000000009===0207123456011
Transfer Amount	0.1 kWh (elect), 0.1kl (water), 0.1m^3 (gas), 0.1 min (time)
Token Date/Time	2008-05-23 11:00:00
Vending Key VK	ABABABABABABABAB94949494949494949401234567$_{16}$
Classification	V

Step	Instruction	Token data to be transferred to the TCDU
1	If the system supports the generation of electricity credit tokens, generate a 0.1kWhTransferCredit token using the information in the APDU above.	**1948 0627 4744 4259 1527**
2	If the system supports the generation of water credit tokens,change the Token Date/Time to 2008-05-23 11:01:00 and generate a 0.1kl TransferCredit token using the information in the APDU above.	**0258 1633 3256 7388 7637**
3	If the system supports the generation of gas credit tokens, change the Token Date/Time to 2008-05-23 11:02:00 and generate a 0.1m^3 TransferCredit token using the information in the APDU above.	**2458 2083 2755 7358 5437**
4	If the system supports the generation of time credit tokens, change the Token Date/Time to 2008-05-23 11:03:00 and generate a 0.1min TransferCredit token using the information in the APDU above.	**5388 5707 8814 2282 6020**

4.1.28 CTSA26 – DKGA04 with EA=07 – KeyChange

If the manufacturer has indicated that the three keychange set is not supported, Step 4 may be omitted.

Overview: This test verifies general compliance with respect to the generation of a Set1stSectionDecoderKey token and a Set2ndSectionDecoderKey token.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
EA	07
Initial VUDK	ABABABABABABABAB9494949494949401234567$_{16}$
Initial DKGA	04
Initial BaseDate	1993
Initial SGC	123457
Initial TI	01
Initial KRN	1
Initial KT	2
Initial KeyExpiryNumber	255
Initial IDRecord (TCT=01) (step 1, 2)	600727000000000009===0107123456011
Initial IDRecord (TCT=02) (step 1, 2)	600727000000000009===0207123456011
Initial IDRecord (TCT=02) (step 3)	000001000000000082===0207123456011
New VUDK	ABABABABABABABAB9494949494949401234567$_{16}$
New DKGA	04
New BaseDate	1993
New SGC	123457
New TI	02
New KRN	1
New KT	2
New KeyExpiryNumber	255
New IDRecord (TCT=01) (step 1, 2)	600727000000000009===0107123456021
New IDRecord (TCT=02) (step 1, 2)	600727000000000009===0207123456021
New IDRecord (TCT=02) (step 3)	000001000000000082===0207123456021
New VUDK (Step 4)	ABABABABABABABAB9494949494949401234567$_{16}$
New SGC (Step 4)	123460
New KRN (Step 4)	1
New KEN (Step 4) Note1	85 (set system date/time to 2004/08/05 08:00)
New base Date (Step 4)	1993
New TI (Step 4)	01
Classification	K

Note1: the system date and time must be set to a time after the KEN value of 85 (2003/08/05 10:40) before generating the tokens in Step 4 otherwise the system may reject the keychange due to a key expiry.

Step	Instruction	Token data to be transferred to the TCDU
1	Generate the Set1stSectionDecoderKey and Set2ndSectionDecoderKey token pair using the information in the APDU above.	**0566 9214 3557 6199 8679 (1stKCT)** **4513 5175 8746 6477 6707 (2ndKCT)**
2	Generate the Set1stSectionDecoderKey and Set2ndSectionDecoderKey token pair using the information in the APDU above but swapping the New and Initial TI around.	**4638 6402 2641 4348 4781 (1stKCT)** **3550 9251 0174 6669 0370 (2ndKCT)**
3	Change the Meter PAN to 000001000000000082, then generate the Set1stSectionDecoderKey and Set2ndSectionDecoderKey token pair using the information in the APDU above.	**6726 5749 9466 7323 7568 (1stKCT)** **3262 2981 1339 0211 0896 (2ndKCT)**
4	Generate the Set1stSectionDecoderKey, Set2ndSectionDecoderKey, and Set3rdSectionDecoderKey token set using the information in the APDU above with a meter PAN of 60072700000000009, but with a new SGC value of 123460.	**0032 1132 3250 5584 9945 (1stKCT)** **4198 3674 5076 9734 0004 (2ndKCT)** **5588 6869 5154 0728 5669 (3rdKCT)**

4.1.29 CTSA27 – DKGA04 with EA=07 – Currency

This test shall only be performed if the manufacturer has indicated that the UUT supports the generation of TransferCredit (Currency) tokens, otherwise this test may be omitted.

Note: Only tests for the supported utilities need be performed (i.e. Electricity, Water, Gas, or Time).

Note:
In the case where the system cannot resolve the transfer amount to the maximum value of the token space due to technical constraints, then test to the maximum amount that the system is able to resolve. This will be noted in the test report.

Overview: This test verifies general compliance with respect to the generation of a TransferCurrency token, and tests exponent value calculation.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	02
DKGA	04
BaseDate	1993
EA	07
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
Vending Key VUDK	$ABABABABABABABAB94949494949494940123456_{16}$
Classification	V

Step Number	TokenIssueDate	TransferAmount
1	2009-04-21 10:01:00	1
2	2009-04-21 10:02:00	16384
3	2009-04-21 10:03:00	1.82044E+20
4	2009-04-21 10:04:00	-1
5	2009-04-21 10:05:00	-1.82044E+14

Step	Instruction	Expected Result
1 - 5	Generate TransferCurrency tokens with the information in the APDU above, and for each of the steps indicated above. Note: repeat the tests for each of the supported utility types but add one month to the TokenIssueDate for Water, Gas, and Time tests. i.e. water tokens will have a month value of 05, Gas will have a month value of 06, and Time will have a month value of 07. The times remain the same as in the Step table above	The token for each step must be identical to the token corresponding to the step number specified in the token tables below.

Token Table – Electricity Currency	
Step	**Token Decimal Digits**
1	**1567 3736 4661 8755 7806**
2	**2478 1857 8364 6475 5991**
3	**6558 4870 2725 8701 4408**
4	**2486 6977 0091 8156 9098**
5	**6053 6279 0560 1351 1869**

Token Table – Water Currency	
Step	**Token Decimal Digits**
1	**6940 3819 9650 8978 5851**
2	**3527 5659 5974 8366 6474**
3	**2206 2977 7249 8134 3375**
4	**2867 9082 6858 1428 1634**
5	**7200 5066 8681 6187 6443**

Token Table – Gas Currency	
Step	**Token Decimal Digits**
1	**5840 3269 4639 3743 3273**
2	**5355 6702 2528 4917 7216**
3	**4048 4912 3877 9332 4578**
4	**3918 8715 0390 2408 8388**
5	**3692 2879 7383 1613 5680**

Token Table – Time Currency	
Step	**Token Decimal Digits**
1	**5450 7539 2739 3885 3634**
2	**7278 0204 6901 0271 4388**
3	**5723 1512 1525 8314 1819**
4	**6129 0170 4472 3155 9833**
5	**4202 6474 5888 3097 1728**

4.1.30 CTSA28 – Extended token set

These tests shall only be performed if the manufacturer has indicated that the UUT supports the generation of the extended token set in Class2 Subclass10 as specified in STS202-5. Otherwise these tests may be omitted.

APDU information to be used for this test:

MeterPAN	600727000000000009
TCT	01, 02
DKGA	04
EA	11
SGC	123457
TI	01
KRN	1
KT	2
KeyExpiryNumber	255
IDRecord (TCT=01)	600727000000000009===0107123456011
IDRecord (TCT=02)	600727000000000009===0207123456011
Token Issue Date	2004-03-01 13:55
Vending Key VUDK	ABABABABABABABAB94949494949494949401234567$_{16}$
Base Date	1993
Classification	E

Step	Instruction	Tokens to be transferred to the TCDU
1	Using the information in the APDU above withToken date/Time of 2009-01-01 09:00:00, generate a Class2 SubClass10 token. (Index = 63, FlagIndex = 0, FlagValue = 0)	**7147 6935 0144 6536 0247**
2	Using the information in the APDU above withToken date/Time of 2009-01-01 09:05:00 , generate a Class2 SubClass10 token. (Index = 63, FlagIndex = 0, FlagValue = 1)	**4693 1534 9698 7113 0446**
3	Using the information in the APDU above withToken date/Time of 2009-01-01 09:10:00, generate a Class2 SubClass10 token. (Index = 0, ControlValue = 0)	**5639 5644 7178 9972 1186**
4	Using the information in the APDU above withToken date/Time of 2009-01-01 09:15:00, generate a Class2 SubClass10 token. (Index = 0, ControlValue = 0123)	**6395 0950 4597 5509 2648**
5	Generate a Class1 Subclass 2 ReadControl token (control value = 0x0)	**0230 5843 0093 4791 4912**
6	Generate a Class1 Subclass 2 ReadFlag token (control value = 0xFC0000000)	**0344 0750 1154 4527 9822**

5 Annexure A – Compliance Verification Request

1.	Manufacturer:	
2.	Product Name/Model:	
3.	Product Software Version:	
4.	Manufacturer's Contact:	
5.	Date:	

Table 2 - Entity H1 Supplier Submitted Information

1.	TCTs supported	01	02	(Tick what is applicable)		
2.	DKGA Supported	02	04			
3.	EA Supported	07	11			
4.	Is Date Of Expiry Supported	Yes	No			
5.	Is STS202-5 supported	Yes	No			
6.	Is automatic generation of keychange tokens supported	Yes	No			
7.	Vending System Classification	V (vending)	E (Engineering)	K (Keychange)		
8.	Manufacturer confirms that Class2 reserved for proprietary use tokens are NOT available on the POS.	Signed:				
9.	Manufacturer confirms that the POS is enabled to generate tokens for all STS manufacturer numbers, and that there is no possibility of excluding any manufacturer number.	Signed:				
10.	State which Utility is Supported (if the system supports units based meters)	Electricity	Water	Gas	Time	
11.	State which Currency is Supported (if the system supports currency based meters)	Electricity	Water	Gas	Time	

6 Annexure B – Test Overviews

All tests test for the general token acceptance and PM display indicators, token bit values, amount calculations, CRC, and others, as well indirectly testing for the implementations indicated in the comments column.

Test No	Description	IEC62055-41 ED3 Applicable Clause	Other implementations tested
CTSA01	TransferCredit	6.2, 6.3, 6.4, 6.5	
CTSA02	InitiateMeterTest/Display	6.2, 6.3, 6.4	
CTSA03	SetMaximumPowerLimit	6.2, 6.3, 6.4, 6.5	
CTSA04	ClearCredit	6.2, 6.3, 6.4, 6.5	
CTSA05	Keychange	6.2, 6.3, 6.4, 6.5	
CTSA06	ClearTamperCondition	6.2, 6.3, 6.4, 6.5	
CTSA07	SetMaximumPhasePowerUnbalanceLimit	6.2, 6.3, 6.4, 6.5	
CTSA09	TID : TokenIdentifier	6.2, 6.3, 6.4, 6.5	
CTSA10	TransferAmount	6.2, 6.3, 6.4, 6.5	
CTSA11	InitiateMeterTest/DisplayControlField	6.2, 6.3, 6.4	
CTSA12	MaxiumumPowerLimit	6.2, 6.3, 6.4, 6.5	
CTSA13	MaxiumumPhasePowerUnbalanceLimit	6.2, 6.3, 6.4, 6.5	
CTSA14	RegisterToClear	6.2, 6.3, 6.4, 6.5	
CTSA16	KeyExpiryNumber	6.1, 6.3, 6.5	
CTSA17	DRN Check Digit	6.1.2.3.4	
CTSA18	DateOfExpiry	6.1.11	
CTSA19	Automatic generation of KCT	6.5.2.1	
CTSA20 - CTSA23	CurrencyToken	6.3.2.1, 6.3.2.2, 6.3.6.3, 6.3.22	
CTSA24	DKGA04 with EA=07 Clear Credit	6.5.3.6	
CTSA25	DKGA04 with EA=07 TransferCredit	6.5.3.6	
CTSA26	DKGA04 with EA=07 Keychange	6.5.3.6	
CTSA27	DKGA04 with EA=07 Keychange	6.3.2.1, 6.3.2.2, 6.3.6.3, 6.3.22	
CTSA28	Extended token set	STS202-5	