STS Association

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Standard Transfer Specification- Compliance Test Specification - Entity Type E - TokenCarriertoMeterInterface Application Layer Protocol for TCT = 01 and TCT=02

CONTENTS

Revision History

Edition	Clause	Date	Change details from previous Edition
1.1	General	22 Feb 2015	Updated Edition number from 1 to 1.1 to match document set
1.2		May 2015	Edition number changed from 1.1 to 1.2 to match document set
1.3	CTSE02, CTSE03	July 2015	Removed Anexures B and C since they are not used. Updated CTSE02 Steps 8 - 14 and CTSE03 Steps 5 and 6 to show Not Authentic for TCT=02 keychange tokens using DCTK. Added Edition column to this table.
1.3	CTSE01	July 2015	Corrected electricity currency token in step 11.
1.3	3.3.2	July 2015	Added key values
1.4	General	Oct 2015	DUTK1 for EA=11 incorrectly stated. Changed to ABABABABABABABABABABABABABABABAB. Amount for currency tokens incorrectly shown as 5000 units in CTSE04 Step15 instead of 1 unit. Currency tokens for CTSE04 Step 16 generated with incorrect date.
1.5	General	April 2016	Changed to new Logo

1.6	General	June 2016	Highlighted UUT number in each test set
1.7	General	Nov 2016	Only Edition number changed from 1.6 to 1.7 to match the document suite
1.8			Not published
1.8.1	General	Nov 2017	Only Edition number changed from 1.7 to 1.8.1 to match the document suite
1.8.2	CTSE04 Step 28	Jan 2018	Changed token date time for all tokens (advanced by 2 minutes to remove conflict with previous tokens). Updated Annexure A1
1.9	General	May 2018	ED3 compliant Reformatted tests for readability Changed test overviews to a table
1.9.1	General	March 2019	Added note to 3.3.2 regarding token combinations, changed submission label information. Added foreword
	technical		Removed table in 1.1
1.9.2	CTSE04	July 2019	Corrected TID values in Steps 13, 27, 28 (added 1 minute)
1.9.3	General	Jan 2020	Only Edition number changed to match the document suite
1.9.4	CTSA04	Jan 2021	Steps 32, 33 – changed DITK to DUTK
	Foreword		Added note on voting
1.9.5	General	Apr 2022	Only Edition number changed to match the document suite
1.9.6	CTSE02 Steps 6 and 7		Skip Step 7 if Step 6 token was rejected

STANDARD TRANSFER SPECIFICATION ASSOCIATION

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STANDARD TRANSFER SPECIFICATION –

Compliance Test Specification – Entity Type E - TokenCarriertoMeterInterface Application Layer Protocol for TCT = 01 and TCT=02

FOREWORD

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Standard Transfer Specification STS 531-5-0 has been prepared by working group 8.

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

FDS	Report on voting
STS531-xx/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

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 62055-41Ed3 - *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*

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.

3.3 Entity type E: Token Carrier to Meter Interface – Application layer protocol

3.3.1 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: Token results and readiness to accept a token are as described by the manufacturer in Annexure A1.

Note: during a keychange operation, some meters may reject a keychange token immediately, while others may only reject a token after the token set has been entered. Both are acceptable. The manufacturer should specify which process his meter follows in Annexure A1.

3.3.2 Equipment to be submitted

The following equipment is required for certification for meters supporting EA=07:

1. 3 Meters loaded with following DITK: $FFFFFFFFFFFFFFFF_{16}$. The meter's entire TID stack shall be preloaded with the TID $5A45A1_{16}$; this TID corresponds to the token issue date and time of 2004-04-01 09:05. The meters shall be referred to as UUT01, UUT02, and UUT03.
2. If the payment meter stores its manufacturing date in non-volatile RAM and uses this to determine the validity of a token, then the meters submitted must have this date set to 1st January 1993 00h00.
3. **The meters, labelled "Entity Type E - UUT01-07, UUT02-07, and UUT03-07" , shall have zero credit loaded.**

The following equipment is required for certification for meters supporting EA=11:

1. 3 Meters loaded with following DITK: $FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF_{16}$. The meter's entire TID stack shall be preloaded with the TID $5A45A1_{16}$; this TID corresponds to the token issue date and time of 2004-04-01 09:05. The meters shall be referred to as "**Entity Type E - UUT01-11, UUT02-11, and UUT03-11**".
2. **All meters shall have zero credit loaded.**

Note: This set of tests covers utility types – Electricity, Water, Gas, and Time for algorithms EA=07 and EA=11. Do only the tests required for the submitted meter type. This test specification also supports tests for Currency Based Payment Meters.

If a payment meter supports more than one utility type, the relevant tests in this specification must be repeated for each utility type supported.

Note: The tests in this document do not test all combinations of tokens. It is the manufacturer's responsibility to ensure that all the required tokens for the entity type, as specified in IEC62055-41, are supported.

The following keys are used for these tests:

For EA=07
$DITK_0$ = FFFFFFFFFFFFFFFF
$DITK_1$ = 1111111111111111
$DCTK_0$ = 7777777777777777
$DCTK_1$ = BBBBBBBBBBBBBBBB
$DDTK_0$ = 1234567890ABCDEF
$DDTK_1$ = FEDCBA0987654321
$DUTK_0$ = 4545454545454545
$DUTK_1$ = ABABABABABABABAB
$DUTK_2$ = 9494949494949494

For EA=11
$DITK_0$ = FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
$DITK_1$ = 11111111111111111111111111111111
$DCTK_0$ = 77777777777777777777777777777777
$DCTK_1$ = BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
$DDTK_0$ = 1234567890ABCDEF1234567890ABCDEF
$DDTK_1$ = FEDCBA0987654321FEDCBA0987654321
$DUTK_0$ = 45454545454545454545454545454545
$DUTK_1$ = ABABABABABABABABABABABABABABABAB
$DUTK_2$ = 9494949494949494ABABABABABABABAB

3.3.3 CTSE01 – TokenCarriertoMeterInterface (EA=07)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.
Note: $DITK_0$ -> $DITK_1$ test removed due to how KRN is handled in IEC62055-41.

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
1	**Power up UUT01 .**	The meter should indicate that it is ready to accept a token.
2	Insert the following token encoded using $DUTK_1$ electricity meters: 5 kWh credit token **5043 5902 3122 8961 0808** water meters: 5 kl credit token **0738 8358 8984 9523 2596** gas meters: 5 m^3 credit token **2251 8328 2083 4511 7111** time meters: 5 min credit token **4399 7761 8882 3970 8530** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **1029 0925 6021 9778 5369** For water currency meters: 5000 unit currency token **3392 6500 8716 8159 0241** For gas currency meters: 5000 unit currency token **3280 3576 4033 8173 2819** For time currency meters: 5000 unit currency token **0518 5745 1072 7135 5331**	The meter should indicate the following: • AuthenticationResult: Not Authentic
3	Insert the following token **4081 9066 1629 4797 6087** First token of Set PM Key token pair. $DITK_0$ to $DUTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
4	Insert the following token **0581 4004 4989 8911 0708** Second token of Set PM Key token pair. $DITK_0$ to $DUTK_0$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
5	Insert the following token **1415 4403 6261 8538 1969** First token of Set PM Key token pair. $DUTK_0$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
6	Insert the following token **0570 8742 8627 5725 9858** Second token of Set PM Key token pair. $DUTK_0$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult:Accept
7	Insert the following token encoded using $DUTK_1$. electricity meters: 5 kWh credit token **5043 5902 3122 8961 0808** water meters: 5 kl credit token **0738 8358 8984 9523 2596** gas meters: 5 m^3 credit token **2251 8328 2083 4511 7111** time meters: 5 min credit token **4399 7761 8882 3970 8530** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **1029 0925 6021 9778 5369** water currency meters: 5000 unit currency token **3392 6500 8716 8159 0241** gas currency meters: 5000 unit currency token **3280 3576 4033 8173 2819** time currency meters: 5000 unit currency token **0518 5745 1072 7135 5331**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
8	Insert the following token encoded using $DUTK_1$. electricity meters: 5 kWh credit token **5043 5902 3122 8961 0808** water meters: 5 kl credit token **0738 8358 8984 9523 2596** gas meters: 5 m^3 credit token **2251 8328 2083 4511 7111** time meters: 5 min credit token **4399 7761 8882 3970 8530** **For currency based meters insert the following :** For electricity currency meters: 5000 unit currency token **1029 0925 6021 9778 5369** For water currency meters: 5000 unit currency token **3392 6500 8716 8159 0241** For gas currency meters: 5000 unit currency token **3280 3576 4033 8173 2819** For time currency meters: 5000 unit currency token **0518 5745 1072 7135 5331**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Used

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
9	Insert the following token encoded using $DUTK_1$. electricity meters: Clear electricity credit token **6189 3998 1575 1999 0398** water meters: Clear water credit token **2762 4007 2231 5515 9783** gas meters: Clear gas credit token **3255 5914 3338 1982 4173** time meters: Clear time credit token **3326 7291 7673 7172 9804** **For currency based meters insert the following :** For electricity currency:. Clear Currency token **7045 1350 6658 8602 7095** For water currency: Clear Currency token **0237 7786 1764 6602 4384** For gas currency: Clear Currency token **0484 8983 7908 3161 1752** For time currency: Clear Currency token **4787 3478 2642 4855 2328**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
10	Insert the following token For 2 digit manufacturer code meters: **5649 3153 7254 5031 3471** For 4 digit manufacturer code meters: **0230 5843 0050 5295 1967** InitiateMeterTestDisplay token – Test number 0.	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
11	Insert the following token encoded using $DUTK_1$ with a TID greater than $5B0000_{16}$ (2004/05/04 12:16:00 PM). electricity meters: 5 kWhcredit token **5441 6748 0795 2295 9495** water meters: 5 kl credit token **1055 1061 0752 4461 1081** gas meters: 5 m^3 credit token **0896 2214 4287 2253 6572** time meters: 5 min credit token **6757 1250 0382 5416 5416** **For currency based meters insert the following :** For electricity currency meters: 5000 unit currency token **6207 2725 4849 1484 0593** For water currency meters: 5000 unit currency token **5658 5779 7603 9072 5583** For gas currency meters: 5000 unit currency token **4336 9030 4395 7492 2757** For time currency meters: 5000 unit currency token **4973 4976 1366 4690 8448**	If the meter has implemented the optional requirement to store the KeyExpiryNumber in non-volatile memory; the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: KeyExpired If the meter has NOT implemented the optional requirement to store the KeyExpiryNumber in non-volatile memory; the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
12	Insert the following token encoded using $DUTK_1$ electricity meters: 0.1 kWh credit token **3254 7497 5526 2719 5384** water meters: 0.1 kl credit token **5959 3369 8390 9248 8560** gas meters: 0.1 m^3 credit token **4722 3031 0913 0082 6790** time meters: 0.1 min credit token **2319 6625 6670 0150 3910** **For currency based meters insert the following 1 unit currency token** For electricity currency meters: 1 unit currency token **6703 1308 8592 1464 8264** For water currency meters: 1 unit currency token **6018 2385 9672 6928 5902** For gas currency meters: 1 unit currency token **6868 1791 1913 5055 8026** For time currency meters: 1 unit currency token **6892 9300 7425 8225 8084**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Old

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
13	Insert the following tokens **1710 3059 6631 6129 3340** First token of Set PM Key token pair. $DUTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 0) **2885 8757 1330 2975 2974** Second token of Set PM Key token pair. $DUTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01)	The meter shall reject this key change request with a TokenResult of Reject.
14	Insert the following tokens **2697 1575 8416 6699 4921** First token of Set PM Key token pair. $DUTK_1$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3) If the keychange operation is rejected after the entry of the first token above, DO NOT enter the second token below and proceed to the next step. **6529 0356 9254 2559 2856** Second token of Set PM Key token pair. $DUTK_1$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01)	The meter shall reject this key change request with a TokenResult of Reject.
15	Insert the following token **4854 3211 2004 5481 4930** First token of Set PM Key token pair. $DUTK_1$ to $DDTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
16	Insert the following token **6079 9717 0590 0558 2232** Second token of Set PM Key token pair. $DUTK_1$ to $DDTK_0$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
17	Insert the following token **6559 9688 5027 6037 0854** First token of Set PM Key token pair. $DDTK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
18	Insert the following token **2499 3406 7913 3280 5091** Second token of Set PM Key token pair. $DDTK_0$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
19	Insert the following token encoded using $DDTK_1$ electricity meters: 5 kWh credit token **1267 6787 2677 1313 1271** water meters: 5 kl credit token **3064 6166 2033 3208 0468** gas meters: 5 m^3 credit **3517 3747 6374 8506 2920** time meters: 5 min credit token **0440 8406 0212 0877 2132** **For currency based meters insert the following :** For electricity currency meters: 5000 unit currency token **2742 1875 5247 8581 9022** For water currency meters: 5000 unit currency token **4364 8269 6178 7411 1600** For gas currency meters: 5000 unit currency token **1671 7155 8656 2006 7031** For time currency meters: 5000 unit currency token **5513 5414 3699 7699 1370**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
20	Insert the following ClearCredit token encoded using the $DDTK_1$. electricity meters: Clear electricity credit token **3499 1388 4442 7036 4724** water meters: Clear water credit token **2649 4302 8976 1965 5900** gas meters: Clear gas credit token **6708 3003 4728 8640 3674** time meters: Clear time credit token **2265 7654 6343 5685 4051** **For currency based meters insert the following:** For electricity currency meters: Clear Currency token **2057 6760 2441 4015 1322** For water currency meters: Clear Currency token **2076 7715 6170 2451 0622** For gas currency meters: Clear Currency token **0484 5771 3748 6691 3279** For time currency meters: Clear Currency token **1719 8688 5880 8264 7814**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
21	Insert the following tokens **4532 2520 3729 9503 8527** First token of Set PM Key token pair. $DDTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 0, RO = 0, Res = 0, KT = 0) **4492 6368 1196 6175 9974** Second token of Set PM Key token pair. $DDTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01)	The meter shall reject this key change request with a TokenResult of Reject.
22	Insert the following token **2446 3593 9837 4100 4506** Second token of Set PM Key token pair. $DDTK_1$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
23	Insert the following token **2241 5276 4394 0651 4365** First token of Set PM Key token pair. $DDTK_1$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

3.3.4 CTSE02 – TokenCarriertoMeterInterface; KeyChange (EA=07)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.

Step	Instruction	Expected Result
1	**Power up UUT02.**	The meter should indicate that it is ready to accept a token.
2	Insert the following token **6919 3558 1615 2134 9217** First token of Set PM Key token pair. $DITK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
3	Wait for the meter to time out on the KeyChange process	The meter should indicate that it is ready to accept a token.
4	Insert the following token **3684 4769 2894 5885 8477** Second token of Set PM Key token pair. $DITK_0$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT

Step	Instruction	Expected Result
5	Insert the following token **6919 3558 1615 2134 9217** First token of Set PM Key token pair. $DITK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
6	Insert the following token **2381 1777 9798 3525 7245** First token of Set PM Key token pair. $DDTK_1$ to $DCTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 Meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Not Valid If the token is rejected (for TCT=02 meters) – skip Step 7.
7	Insert the following token **2443 3845 4882 1458 2851** Second token of Set PM Key token pair. $DDTK_1$ to $DCTK_0$ key-change token. (KENLO = B, TI = 01) Skip this step if the token in Step 6 was rejected.	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 Meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Not Valid
8	Insert the following token **2693 5285 8204 5990 1157** First token of Set PM Key token pair. $DCTK_0$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter should indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: Not Valid
9	Insert the following token **1459 1542 6735 0318 9451** Second token of Set PM Key token pair. $DCTK_0$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01)	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 Meters, the meter should indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: Not Valid

Step	Instruction	Expected Result
10	Insert the following token encoded using $DCTK_1$ with a TID greater than $5A45A1_{16}$ (2004/05/04 12:16:00 PM). electricity meters: 5 kWh credit token **6268 5867 8403 2854 2221** water meters: 5 kl credit token **5551 4387 3758 6324 7115** gas meters: 5 m^3 credit token **4108 7156 9105 6705 1962** time meters: 5 min credit token **5646 1551 3360 2062 2852** **For currency based meters insert the following:** electricity currency meters: 5000 unit currency token **1886 8207 2329 2830 2947** water currency meters: 5000 unit currency token **3631 9505 7324 5440 6613** gas currency meters: 5000 unit currency token **5614 8399 9233 0447 1482** time currency meters: 5000 unit currency token **6982 0203 8380 3508 7499**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 Meters, the meter should indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid
11	Insert the following ClearCredit token encoded using $DCTK_1$. electricity meters: Clear electricity credit token **1285 9620 6521 1697 0906** water meters: Clear water credit token **0569 5340 9397 8400 1298** gas meters: Clear gas credit token **7291 1112 3344 0601 5276** time meters: Clear time credit token **2048 2523 0052 3312 2571** **For currency based meters insert the following :** electricity currency meters: ClearCurrency token **0570 3273 0007 2307 5003** water currency meters: ClearCurrency token **6402 6355 0778 7723 3275** gas currency meters: ClearCurrency token **4298 2201 3692 4702 5399** time currency meters: ClearCurrency token **1784 5884 7866 7612 4440**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid

Step	Instruction	Expected Result
12	Insert the following tokens **1679 1356 0672 3742 6267** First token of Set PM Key token pair. $DCTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 0) **7320 0503 4511 8836 8997** Second token of Set PM Key token pair. $DCTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01)	The meter shall reject this key change request with a TokenResult of Reject.
13	Insert the following token **5352 2546 8070 6109 9946** First token of Set PM Key token pair. $DCTK_1$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid
14	Insert the following token **7034 7767 8825 9055 5409** Second token of Set PM Key token pair. $DCTK_1$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01)	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid

3.3.5 CTSE03 – TokenCarriertoMeterInterface; KeyChange (EA=07)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.

Step	Instruction	Expected Result
1	**Power up UUT03.**	The meter should indicate that it is ready to accept a token.

Step	Instruction	Expected Result
2	Insert the following token encoded using $DITK_0$ with a TID greater than $5A45A1_{16}$. electricity meters: 5 kWh credit token **0770 3262 8093 4183 2316** water meters: 5 kl credit token **0518 3957 9021 3300 4467** gas meters: 5 m^3 credit token **3687 6738 5030 1378 2541** time meters: 5 min credit token **3919 1291 5738 3300 9972** **For currency based meters insert the following:** electricity currency meters: 5000 unit currency token **2963 4423 7059 8523 4186** water currency meters: 5000 unit currency token **3045 7551 4538 7589 5260** gas currency meters: 5000 unit currency token **4479 4690 6309 8612 9184** time currency meters: 5000 unit currency token **3765 8900 3934 0759 6405**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
3	Insert the following token **4432 1577 7319 5860 4856** First token of Set PM Key token pair. $DITK_0$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
4	Insert the following token **4126 7355 0700 0455 7605** Second token of Set PM Key token pair. $DITK_0$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01)	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
5	Insert the following token **1225 6329 7497 1592 3854** First token of Set PM Key token pair. $DCTK_1$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 1, KT = 1)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid

Step	Instruction	Expected Result
6	Insert the following token **2290 3455 4199 8486 7695** Second token of Set PM Key token pair. $DCTK_1$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01)	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid

3.3.6 CTSE04 – TokenCarriertoMeterInterface (EA=11)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
1	Power up UUT01-11 .	The meter should indicate that it is ready to accept a token.
2	Insert the following token encoded using $DUTK_1$: electricity meters: 5 kWh credit token **4332 6510 4007 3071 1477** water meters: 5 kl credit token **6424 7683 5501 7107 5276** gas meters: 5 m^3 credit token **1113 8946 0475 9303 1799** time meters: 5 min credit token **6293 7041 8695 3956 5710** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **4418 8490 5861 5641 8548** water currency meters: 5000 unit currency token **1920 8714 0418 9520 6896** gas currency meters: 5000 unit currency token **1809 9892 4567 3822 6700** time currency meters: 5000 unit currency token **0681 7326 3492 7712 1469**	The meter should indicate the following: • AuthenticationResult: Not Authentic
3	Insert the following token **2846 4114 1881 2826 2597** First token of Set PM Key token set. $DITK_0$ to $DUTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
4	Insert the following token **3959 8006 3846 9179 8970** Second token of Set PM Key token set. $DITK_0$ to $DUTK_0$ key-change token. (SGCHO = 01E Hex)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
5	Insert the following token **4180 0214 7998 1241 3141** Third token of Set PM Key token set. $DITK_0$ to $DUTK_0$ key-change token. (SGCLO = 240 Hex)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
6	Insert the following token **4490 8191 8105 2932 9246** Fourth token of Set PM Key token set. $DITK_0$ to $DUTK_0$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
7	Insert the following token **3059 7434 3176 8411 6395** First token of Set PM Key token set. $DUTK_0$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
8	Insert the following token **2469 6375 4914 0967 7814** Second token of Set PM Key token set. $DUTK_0$ to $DUTK_1$ key-change token. (SGCHO = 01E Hex)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
9	Insert the following token **3952 8962 1445 6286 5667** Third token of Set PM Key token set. $DUTK_0$ to $DUTK_1$ key-change token. (SGCLO = 240 Hex)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT
10	Insert the following token **5636 2436 0909 6976 2506** Fourth token of Set PM Key token set. $DUTK_0$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01)	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult:Accept
11	Insert the following token encoded using $DUTK_1$: electricity meters: 5 kWh credit token **4332 6510 4007 3071 1477** water meters: 5 kl credit token **6424 7683 5501 7107 5276** gas meters: 5 m^3 credit token **1113 8946 0475 9303 1799** time meters: 5 min credit token **6293 7041 8695 3956 5710** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **4418 8490 5861 5641 8548** water currency meters: 5000 unit currency token **1920 8714 0418 9520 6896** gas currency meters: 5000 unit currency token **1809 9892 4567 3822 6700** time currency meters: 5000 unit currency token **0681 7326 3492 7712 1469**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
12	Insert the following token encoded using $DUTK_1$: electricity meters: 5 kWh credit token **4332 6510 4007 3071 1477** water meters: 5 kl credit token **6424 7683 5501 7107 5276** gas meters: 5 m^3 credit token **1113 8946 0475 9303 1799** time meters: 5 min credit token **6293 7041 8695 3956 5710** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **4418 8490 5861 5641 8548** water currency meters: 5000 unit currency token **1920 8714 0418 9520 6896** gas currency meters: 5000 unit currency token **1809 9892 4567 3822 6700** time currency meters: 5000 unit currency token **0681 7326 3492 7712 1469**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Used
13	Insert the following token encoded using the $DUTK_1$. electricity meters: Clear electricity credit token **1064 7556 7000 5395 3018** water meters: Clear water credit token **7086 6626 1360 3637 8376** gas meters: Clear gas credit token **5169 9740 7237 9035 0576** time meters: Clear time credit token **3527 4753 0348 1714 9802** **For currency based meters insert the following:** electricity currency meters: ClearCurrency token **5689 8661 9928 4706 4788** water currency meters: ClearCurrency token **5671 9748 2549 0014 6331** gas currency meters: ClearCurrency token **5441 2123 2386 0113 9702** time currency meters: ClearCurrency token **6995 1156 8466 9823 2336**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

Step	Instruction	Expected Result – as described by the manufacturer in Table 1
14	Insert the following token For 2 digit manufacturer code meters: **5649 3153 7254 5031 3471** For 4 digit manufacturer code meters: **0230 5843 0050 5295 1967** InitiateMeterTestDisplay token – Test number 0.	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
15	Insert the following token encoded using $DUTK_1$ with a TID greater than $5B0000_{16}$. electricity meters: 5 kWh credit token **6603 0439 4897 0236 6114** water meters: 5 kl credit token **1562 6067 2668 2086 0862** gas meters: 5 m^3 credit token **7262 0046 8908 4156 6435** time meters: 5 min credit token **5610 2876 0713 6535 7763** **For currency based meters insert the following** : electricity currency meters: 1 unit currency token **0344 0846 3231 2099 9244** water currency meters: 1 unit currency token **5413 2179 9221 2053 5097** gas currency meters: 1 unit currency token **5304 2366 3239 9672 1261** time currency meters: 1 unit currency token **2278 3323 8749 9984 1533**	If the meter has implemented the optional requirement to store the KeyExpiryNumber in non-volatile memory; the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: KeyExpired If the meter has NOT implemented the optional requirement to store the KeyExpiryNumber in non-volatile memory; the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

16	Insert the following token encoded using $DUTK_1$ electricity meters: 0.1 kWh credit token **0189 4861 3849 0274 6738** water meters: 0.1 kl credit token **3361 5882 2698 6720 9763** gas meters: 0.1 m^3 credit token **1283 4777 7449 5288 5749** time meters: 0.1 min credit token **6963 7187 1494 6089 7601** **For currency based meters insert the :** electricity currency meters: following 1 unit currency token **2478 6860 6519 8835 3500** water currency meters: following 1 unit currency token **1353 9423 1701 0774 2584** gas currency meters: following 1 unit currency token **4436 8474 3620 2800 8665** time currency meters: following 1 unit currency token **2166 8406 7712 4043 5969**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Old
17	Insert the following tokens First token of Set PM Key token set. $DUTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 0) **6790 9198 0272 6334 6723** Second token of Set PM Key token set. $DUTK_1$ to $DITK_1$ key-change token. (SGCHO = 01E Hex) **2851 5034 9289 6083 5090** Third token of Set PM Key token set. $DUTK_1$ to $DITK_1$ key-change token. (SGCLO = 240 Hex) **3474 5694 5454 1743 5440** Fourth token of Set PM Key token set. $DUTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01) **6725 3023 8791 8195 8745**	The meter shall reject this key change request with a TokenResult of Reject.

18	Before proceeding with this test step, please note the following: If the keychange operation is rejected after the entry of any token below, DO NOT enter any further tokens in this step and proceed to the next step. Insert the following tokens First token of Set PM Key token pair. $DUTK_1$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3) **5383 5984 1272 2785 2555** Second token of Set PM Key token set. DUTK1 to DCTK1 key-change token. (SGCHO = 01E Hex) **0083 5180 6823 5099 1739** Third token of Set PM Key token set. DUTK1 to DCTK1 key-change token. (SGCLO = 240 Hex) **7054 9670 0285 9373 3676** Fourth token of Set PM Key token set. $DUTK_1$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01) **3886 3324 5921 8466 2532**	The meter shall reject this key change request with a TokenResult of Reject.
19	Insert the following token First token of Set PM Key token set. $DUTK_1$ to $DDTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1) **5161 2849 8840 7030 2432**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
20	Insert the following token Second token of Set PM Key token set. $DUTK_1$ to $DDTK_0$ key-change token. (SGCHO = 01E Hex) **0910 6893 8346 0785 1728**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
21	Insert the following token Third token of Set PM Key token set. $DUTK_1$ to $DDTK_0$ key-change token. (SGCLO = 240 Hex) **3428 4774 4992 5179 5117**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT
22	Insert the following token Fourth token of Set PM Key token set. $DUTK_1$ to $DDTK_0$ key-change token. (KENLO = B, TI = 01) **2682 8047 4964 0183 4991**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

23	Insert the following token First token of Set PM Key token set. $DDTK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1) **0066 1467 4121 9058 1397**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
24	Insert the following token Second token of Set PM Key token set. $DDTK_0$ to $DDTK_1$ key-change token. (SGCHO = 01E Hex) **5984 1936 8308 2803 9524**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
25	Insert the following token Third token of Set PM Key token set. $DDTK_0$ to $DDTK_1$ key-change token. (SGCLO = 240 Hex) **2128 4424 2302 6987 3233**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT
26	Insert the following token Fourth token of Set PM Key token pair. $DDTK_0$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01) **5170 6947 2156 0328 4261**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
27	Insert the following token encoded using $DDTK_1$ electricity meters: 5 kWh credit token **3842 6165 2133 6699 0347** water meters: 5 kl credit token **6606 3447 4805 6408 7962** gas meters: 5 m^3 credit token **4687 1771 7913 4246 6660** time meters: 0.1 min credit token **2513 5258 2607 5222 9414** **For currency based meters insert the following :** electricity currency meters: 5000 unit currency token **4553 8567 6800 2804 9620** water currency meters: 5000 unit currency token **2971 7203 2166 7456 7780** gas currency meters: 5000 unit currency token **2972 6919 6658 4252 3254** time currency meters: 5000 unit currency token **7370 0981 2765 0813 1832**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid

28	Insert the following ClearCredit token encoded using the $DDTK_1$. electricity meters: Clear electricity credit token **3238 3064 2683 2383 2055** water meters: Clear water credit token **7134 8231 0897 6418 3902** gas meters: Clear gas credit token **4360 4632 2533 5606 6084** time meters: Clear time credit token **6561 0795 9705 5903 8657** **For currency based meters insert the following:** For electricity currency meters: ClearCurrency token **1330 5809 7951 3927 6923** For water currency meters: ClearCurrency token **6487 8205 2892 0218 3641** For gas currency meters: ClearCurrency token **1029 2614 7245 1484 4428** For time currency meters: ClearCurrency token **2870 6135 4829 6462 8887**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
29	Insert the following tokens First token of Set PM Key token set. $DDTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 0, RO = 0, Res = 0, KT = 0) **2947 8307 9543 1011 8298** Second token of Set PM Key token set. $DDTK_1$ to $DITK_1$ key-change token. (SGCHO = 01E Hex) **4626 4214 2435 2688 3966** Third token of Set PM Key token set. $DDTK_1$ to $DITK_1$ key-change token. (SGCLO = 240 Hex) **3380 5637 8960 4811 4702** Fourth token of Set PM Key token set. $DDTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01) **4479 8855 6371 3544 7614**	The meter shall reject this key change request with a TokenResult of Reject.
30	Insert the following token Fourth token of Set PM Key token set. $DDTK_1$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01) **1153 4465 0662 7704 2498**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 4thKCT

31	Insert the following token First token of Set PM Key token set. $DDTK_1$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2) **6339 7261 4442 6387 8587**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
32	Insert the following token Second token of Set PM Key token set. $DDTK_1$ to $DUTK_1$ key-change token. (SGCHO = 01E Hex) **2149 7312 3979 8829 2703**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
33	Insert the following token Third token of Set PM Key token set. $DDTK_1$ to $DUTK_1$ key-change token. (SGCLO = 240 Hex) **3371 0138 8767 5281 4438**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept

3.3.7 CTSE05 – TokenCarriertoMeterInterface; KeyChange (EA=11)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.

Step	Instruction	Expected Result
1	**Power up the UUT02-11.**	The meter should indicate that it is ready to accept a token.
2	Insert the following token First token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1) **2271 0304 3385 0697 2387**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT
3	Insert the following token Second token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (SGCHO = 01E Hex) **0749 7401 9030 3552 1928**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
4	Insert the following token Third token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (SGCLO = 240 Hex) **6115 4661 1976 8843 1031**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdCT
5	Wait for the meter to time out on the KeyChange process	The meter should indicate that it is ready to accept a token.

Step	Instruction	Expected Result
6	Insert the following token Fourth token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01) **3412 3931 4825 6737 1298**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 4thKCT
7	Insert the following token Third token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (SGCLO = 240 Hex) **6115 4661 1976 8843 1031**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT
8	Insert the following token Second token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (SGCHO = 01E Hex) **0749 7401 9030 3552 1928**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT
9	Insert the following token First token of Set PM Key token set. $DITK_0$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 1) **2271 0304 3385 0697 2387**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
10	Insert the following token First token of Set PM Key token set. $DDTK_1$ to $DCTK_0$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3) **5945 8981 3864 0295 0429**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
11	Insert the following token Second token of Set PM Key token set. $DDTK_1$ to $DCTK_0$ key-change token. (SGCHO = 01E Hex) **4757 0549 8060 9876 2466**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid

Step	Instruction	Expected Result
12	Insert the following token Third token of Set PM Key token set. $DDTK_1$ to $DCTK_0$ key-change token. (SGCLO = 240 Hex) **7213 8948 7246 7566 0343**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
13	Insert the following token Fourth token of Set PM Key token set. $DDTK_1$ to $DCTK_0$ key-change token. (KENLO = B, TI = 01) **0639 0509 1539 3067 6098**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
14	Insert the following token First token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3) **4329 3157 7767 3247 3108**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Not Authentic • ValidationResult: NotValid
15	Insert the following token Second token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (SGCHO = 01E Hex) **2838 7760 7425 1282 5940**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
16	Insert the following token Third token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (SGCLO = 240 Hex) **1663 5399 6193 6899 2479**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid

Step	Instruction	Expected Result
17	Insert the following token Fourth token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01) **0173 2465 0350 0296 1963**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
18	Insert the following token encoded using $DCTK_1$ with a TID greater than $5A45A1_{16}$. electricity meters: 5 kWh credit token **6735 8726 7756 6062 8492** water meters: 5 kl credit token **4632 6626 5373 8382 9773** gas meters: 5 m^3 credit token **4452 5203 3492 9763 2874** gas meters: 5 m^3 credit token **5505 4676 8924 0775 8051** **For currency based meters insert the following:** electricity currency meters: 5000 unit currency token **1971 5473 9984 6094 0531** water currency meters: 5000 unit currency token **6820 8761 5885 7324 9912** gas currency meters: 5000 unit currency token **5754 9022 1582 3065 6758** time currency meters: 5000 unit currency token **0696 1448 5923 0876 7612**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid

Step	Instruction	Expected Result
19	Insert the following ClearCredit token encoded using DCTK1. electricity meters: Clear electricity credit token **4616 4211 1424 6145 7735** water meters: Clear water credit token **6758 1669 2345 7917 6627** gas meters: Clear gas credit token **4719 3153 3829 0719 7523** time meters: Clear time credit token **4243 9515 5847 0360 6874** **For currency based meters insert the following:** For electricity currency meters: ClearCurrency token **5270 1915 8904 5231 1544** For water currency meters: ClearCurrency token **5183 2257 7505 0629 9247** For gas currency meters: ClearCurrency token **1736 9823 8641 8867 0821** For time currency meters: ClearCurrency token **1780 2158 1890 1922 7821**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
20	Insert the following tokens First token of Set PM Key token set. $DCTK_1$ to $DITK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 0) **2735 3861 7887 6141 8521** Second token of Set PM Key token set. $DCTK_1$ to $DITK_1$ key-change token. (SGCHO = 01E Hex) **2262 4649 2666 4363 1936** Third token of Set PM Key token set. $DCTK_1$ to $DITK_1$ key-change token. (SGCLO = 240 Hex) **2531 9916 2980 8673 9266** Fourth token of Set PM Key token set. $DCTK_1$ to $DITK_1$ key-change token. (KENLO = B, TI = 01) **4021 0957 1201 2554 6182**	The meter shall reject this key change request with a TokenResult of Reject.

Step	Instruction	Expected Result
21	Insert the following token First token of Set PM Key token set. $DCTK_1$ to $DUTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 2) **4013 5561 0705 0265 2404**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
22	Insert the following token Second token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (SGCHO = 01E Hex) **3981 9376 3595 6953 8505**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
23	Insert the following token Third token of Set PM Key token set. $DCTK_0$ to $DCTK_1$ key-change token. (SGCLO = 240 Hex) **3860 7237 9069 8184 5341**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid
24	Insert the following token Fourth token of Set PM Key token set. $DCTK_1$ to $DUTK_1$ key-change token. (KENLO = B, TI = 01) **0157 8511 3970 2066 8166**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid

3.3.8 CTSE06 – TokenCarriertoMeterInterface; KeyChange (EA=11)

Overview: This test verifies compliance with respect to the application layer of the TokenCarrierToMeterInterface.

Step	Instruction	Expected Result
1	**Power up the UUT03-11.**	The meter should indicate that it is ready to accept a token.
2	Insert the following token encoded using $DITK_0$ with a TID greater than $5A45A1_{16}$. electricity meters: 5 kWh credit token **5677 5183 7883 3760 8094** water meters: 5 kl credit token **4044 3331 8928 8319 1032** gas meters: 5 m^3 credit token **7208 0993 5003 5868 7930** gas meters: 5 m^3 credit token **6364 1251 5202 8562 7883** **For currency based meters insert the following:** For electricity currency meters: 5000 unit currency token **3111 4171 5768 7509 7065** For water currency meters: 5000 unit currency token **6109 0368 0693 8315 1282** For gas currency meters: 5000 unit currency token **1746 3341 0650 5472 2180** For time currency meters: 5000 unit currency token **5787 9937 0130 0836 7637**	The meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept
3	Insert the following token First token of Set PM Key token set. $DITK_0$ to $DCTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 0, KT = 3) **0422 8104 1227 2078 4920**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid

Step	Instruction	Expected Result
4	Insert the following token Second token of Set PM Key token set. $DITK_0$ to $DCTK_1$ key-change token. (SGCHO = 01E Hex) **6369 9449 2453 7501 4304**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
5	Insert the following token Third token of Set PM Key token set. $DITK_0$ to $DCTK_1$ key-change token. (SGCLO = 240 Hex) **6919 7643 4678 9640 1131**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
6	Insert the following token Fourth token of Set PM Key token set. $DITK_0$ to $DCTK_1$ key-change token. (KENLO = B, TI = 01) **4338 5580 3522 1486 8070**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: NotValid
7	Insert the following token First token of Set PM Key token set. $DCTK_1$ to $DDTK_1$ key-change token. (KENHO = 5, KRN = 1, RO = 0, Res = 1, KT = 1) **1234 7746 1850 4816 2276**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 1stKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: Notvalid
8	Insert the following token Second token of Set PM Key token set. $DCTK_1$ to $DDTK_1$ key-change token. (SGCHO = 01E Hex) **2826 5700 0290 3145 7032**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 2ndKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: Notvalid

Step	Instruction	Expected Result
9	Insert the following token Third token of Set PM Key token set. $DCTK_1$ to $DDTK_1$ key-change token. (SGCLO = 240 Hex) **1861 7777 0086 6489 6228**	For TCT=01 meters, the meter shall indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: 3rdKCT For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: Notvalid
10	Insert the following token Fourth token of Set PM Key token set. $DCTK_1$ to $DDTK_1$ key-change token. (KENLO = B, TI = 01) **5591 1311 1526 8305 8195**	For TCT=01 meters, the meter should indicate the following: • AuthenticationResult: Authentic • ValidationResult: Valid • TokenResult: Accept For TCT=02 meters, the meter shall indicate the following: • AuthenticationResult: NotAuthentic • ValidationResult: NotValid

4 Annexure A – Compliance Verification Request

1.	Manufacturer:		
2.	Product Name/Model:		
3.	Product Firmware Version:		
4.	Contact Name:		
5.	Mobile Number: Phone Number: Faxcimile Number: Email Address:		
6.	Physical and Postal Address		
7.	Date:		
8	Indicate if the samples will be collected or destroyed after test	Collected	Destroyed

5 Annexure A.1 – Entity E Additional Information

Table 1 - Entity E Supplier Submitted Information

1.	Allocated Manufacturer Code:				
2.	Multi-phase meter:	Yes	No	(Tick what is applicable)	
3.	Does the meter support decoder key expiry:	Yes	No	(Tick what is applicable)	
4.	Does the meter support EA=07	Yes	No	(Tick what is applicable)	
5.	Does the meter support EA=11	Yes	No	(Tick what is applicable)	
6.	Does the meter support tamper	Yes	No	(Tick what is applicable)	
7.	Describe how the meter indicates that it is ready to receive a token:				
8.	Describe how the meter indicates the acceptance of a token:				
9.	Describe how the meter indicates the rejection of a token:				
10.	Describe how the meter indicates that a token is old or has expired:				
11.	Describe how the meter indicates that a token has been previously used:				
12.	Describe how the meter indicates that a key change operation completed successfully:				
13.	Describe how the meter indicates that a credit token has been rejected due to a credit overflow condition should the token be accepted:				
14.	Describe how the meter indicates that a token has been rejected due to the expiration of the decoder key:				
15.	Describe how the meter indicates that a token has been rejected due to the token being incorrectly typed in.				
16.	Describe how the meter indicates the acceptance of the first “Set PM key” token of the “Set PM key” token pair.				
17.	Describe how the meter indicates the acceptance of the second “Set PM key” token of the “Set PM key” token pair. This may be identical to the indication described in 16 above.				
18.	State which Utility is supported if this is a unit based meter	Electricity	Water	Gas	Time
19.	State which currency is supported if this is a currency based meter	Electricity	Water	Gas	Time

7 Annexure B – Test overviews

The tests below all test for Authentication, validation, and cancellation processes, as well as the test described in the table below.

Test No	Description	IEC62055-51 Applicable Clause	Other implementations tested
CTSE01 and CTSE04	TokenCarriertoMeterInterface	7	APDUExtraction process
CTSE02 and CTSE05	TokenCarriertoMeterInterface; KeyChange	7	APDUExtraction process
CTSE03 and CTSE06	TokenCarriertoMeterInterface; KeyChange	7	APDUExtraction process