# Insulin Delivery Service (IDS)

***Bluetooth*® Test Suite**

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- **Revision:** IDS.TS.p2
- **Revision Date:** 2024-10-08
- **Prepared By:** Medical Devices Working Group
- **Published during TCRL:** TCRL.2024-2-addition

# Contents

# 1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth Insulin Delivery Service (IDS) Specification with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

# 2 References, definitions, and abbreviations

## 2.1 References

This document incorporates provisions from other publications by dated or undated reference. These references are cited at the appropriate places in the text and the publications are listed hereinafter.

[1] Bluetooth Core Specification, Version 4.0 or later

[2] Test Strategy and Terminology Overview

[3] Insulin Delivery Service Specification, Version 1.0

[4] Insulin Delivery Profile Specification, Version 1.0

[5] ICS Proforma for Insulin Delivery Service

[6] GATT Test Suite, GATT.TS

[7] Characteristic and Descriptor descriptions are accessible via the Bluetooth SIG Assigned Numbers

[8] Insulin Delivery Service Implementation eXtra Information for Test, IXIT

[9] Insulin Delivery Service Specification, Version 1.0.1

[10] Insulin Delivery Service Specification, Version 1.0.2

## 2.2 Definitions

In this Bluetooth document, the definitions from [1], [2], [3], and [4] apply.

## 2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1], [2], [3], and [4] apply.

# 3 Test Suite Structure (TSS)

## 3.1 Overview

The Insulin Delivery Service (IDS) requires the presence of ATT, GAP, SM, and GATT. This is illustrated in Figure 3.1.

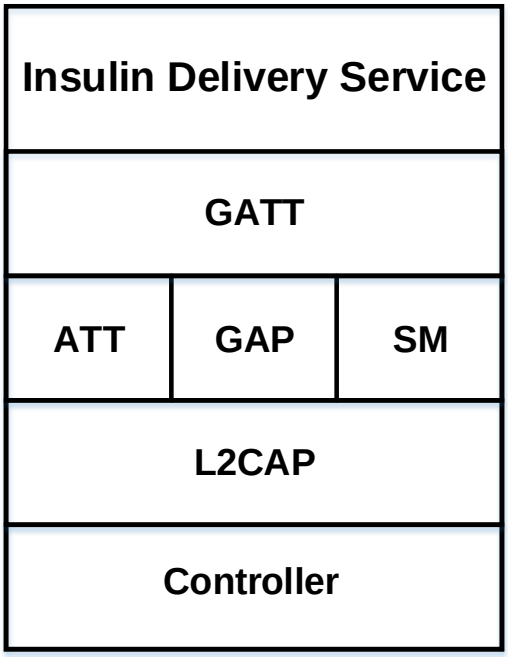


*Figure 3.1: Insulin Delivery Service test model*

## 3.2 Test strategy

The test objectives are to verify functionality of the IDS within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach covers mandatory and optional requirements in the specification and matches these to the support of the IUT as described in the ICS. Any defined test herein is applicable to the IUT, if the ICS logical expression defined in the Test Case Mapping Table (TCMT) evaluates to true.

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration including the IUT needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT.

This Test Suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the Test Suite Structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

The test cases verify that the E2E-Counter and E2E-CRC fields are either present with the appropriate values or not present according to the requirement of the service considering the IUT support for E2E-Protection.

## 3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- Configure Indication and Notification
- Characteristic Read
- IDD Status Reader Control Point Procedures
- IDD Command Control Point Procedures
- IDD Record Access Control Point Procedures
- IDD History Data
- General Error Handling

# 4 Test cases (TC)

## 4.1 Introduction

### 4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [2]. The convention used here is:
**<spec abbreviation>/<IUT role>/**<class>/**<feat>/**<func>/<subfunc>/<cap>**/<xx>-<nn>-<y>**.

Additionally, testing of this specification includes tests from the GATT Test Suite [6] referred to as Generic GATT Integrated Tests (GGIT); when used, the GGIT tests are referred to through a TCID string using the following convention:
**<spec abbreviation>/<IUT role>/<GGIT test group>**/< GGIT class >/<xx>-<nn>-<y>.

| **Identifier Abbreviation** | **Spec Identifier <spec abbreviation>** |
|---|---|
| IDS | Insulin Delivery Service |
| **Identifier Abbreviation** | **Role Identifier <IUT role>** |
| SEN | Insulin Delivery Sensor Role |
| **Identifier Abbreviation** | **Reference Identifier <GGIT test group>** |
| SGGIT | Server Generic GATT Integrated Tests |
| **Identifier Abbreviation** | **Reference Identifier <GGIT class>** |
| CHA | Characteristic |
| ISFC | Indication Supported Features Characteristic |
| SER | Service |
| **Identifier Abbreviation** | **Feature and Behaviors Identifier <feat>** |
| CBE | Common Behavior of Control Point – Error Handling |
| CCP | IDD Command Control Point Procedures |
| CCPE | IDD Command Control Point Procedures – Error Handling |
| CON | Configure Indication and Notification |
| CR | Characteristic Read |
| HDE | IDD History Data Events |
| RAA | IDD RACP – Abort Procedure |
| RAD | IDD RACP – Delete Procedure |
| RAE | IDD RACP – Error Handling |
| RAN | IDD RACP – Number Procedure |
| RAR | IDD RACP – Report Procedure |
| RCP | IDD Status Reader Control Point Procedures |
| RCPE | IDD Status Reader Control Point Procedures – Error Handling |

*Table 4.1: IDS TC feature naming convention*

### 4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner. The mandated tests from this Test Suite depend on the capabilities to which conformance is claimed.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions that is not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exists, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required to constitute a Pass verdict. However, it is noted that to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the test plan generated by the Bluetooth SIG qualification tool, with the test case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an erratum request such that the issue may be addressed.

### 4.1.3 Pass/Fail verdict conventions

Each test case has an Expected Outcome section. The IUT is granted the Pass verdict when all the detailed pass criteria conditions within the Expected Outcome section are met.

The convention in this Test Suite is that, unless there is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs, the outcome of the test is a Fail verdict.

## 4.2 Setup preambles

The procedures defined in this section are used to achieve specific conditions on the IUT and the test equipment within the tests defined in this document. The preambles here are commonly used to establish initial conditions.

### 4.2.1 ATT Bearer on LE Transport

Preamble procedure:

1. Establish an LE transport connection between the IUT and the Lower Tester.
2. Establish an L2CAP channel 0x0004 between the IUT and the Lower Tester over that LE transport.

If the Lower Tester and IUT were not previously bonded, perform a pairing procedure. If the Lower Tester and IUT were previously bonded, re-enable encryption if not already enabled.

Authorization is granted on the IUT to allow access to the characteristics of the Insulin Delivery Service.

### 4.2.2 Control Point Configuration Preamble

- Preamble Purpose

  This preamble procedure enables the IUT for use with the <Control Point Characteristic> and <Corresponding Mandatory Characteristic> described in Table 4.2.

- Preamble Procedure

  1. If a connection exists, it shall be disconnected.
  2. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
  3. The handles of the <Control Point Characteristic> and <Corresponding Mandatory Characteristic>, as required, have been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  4. The handles of the Client Characteristic Configuration descriptor of the <Control Point Characteristic> and <Corresponding Mandatory Characteristic>, as required, have been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  5. The <Control Point Characteristic> is configured for indication and <Corresponding Mandatory Characteristic>, as required, is configured for notification as described in Table 4.2.

| Control Point Characteristic | Corresponding Mandatory Characteristic | Corresponding Mandatory Characteristic configured for |
|---|---|---|
| IDD Status Reader Control Point | N/A | N/A |
| IDD Command Control Point | IDD Command Data | Notification<br>(e.g., required for Read Basal Rate Profile Template Procedure, Read ISF Profile Template Procedure, Read I2CHO Ratio Profile Template Procedure, Read Target Glucose Range Profile Template Procedure, and Get Template Status and Details Procedure) |
| IDD Record Access Control Point | IDD History Data | Notification<br>(e.g., required for All IDD RACP procedures) |

*Table 4.2: Configuration Preamble for IDD Status Reader CP, Command CP, and RACP*

## 4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in Section 6.3, Server test procedures (SGGIT), in [6] using Table 4.3 below as input:

| TCID | Service / Characteristic | Reference | Properties | Value Length (Octets) | Type |
|---|---|---|---|---|---|
| IDS/SEN/SGGIT/SER/BV-01-C [Service GGIT – Insulin Delivery] | Insulin Delivery Service | [3] 2 | - | - | Not defined |
| IDS/SEN/SGGIT/CHA/BV-02-C [Characteristic GGIT – IDD Status Changed] | IDD Status Changed characteristic | [3] 3, 3.2 | 0x22 (Read, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-03-C [Characteristic GGIT – IDD Status] | IDD Status characteristic | [3] 3, 3.3 | 0x22 (Read, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-04-C [Characteristic GGIT – IDD Annunciation Status] | IDD Annunciation Status characteristic | [3] 3, 3.4 | 0x22 (Read, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-05-C [Characteristic GGIT – IDD Features] | IDD Features characteristic | [3] 3, 3.5 | 0x02 (Read) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-06-C [Characteristic GGIT – IDD Status Reader Control Point] | IDD Status Reader Control Point characteristic | [3] 3, 3.6 | 0x28 (Write, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-07-C [Characteristic GGIT – IDD Command Control Point] | IDD Command Control Point characteristic | [3] 3, 3.7 | 0x28 (Write, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-08-C [Characteristic GGIT – IDD Command Data] | IDD Command Data characteristic | [3] 3, 3.8 | 0x10 (Notify) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-09-C [Characteristic GGIT – IDD Record Access Control Point] | IDD Record Access Control Point characteristic | [3] 3, 3.9 | 0x28 (Write, Indicate) | Skip | - |
| IDS/SEN/SGGIT/CHA/BV-10-C [Characteristic GGIT – IDD History Data] | IDD History Data characteristic | [3] 3, 3.10 | 0x10 (Notify) | Skip | - |

| TCID | Service / Characteristic | Reference | Properties | Value Length (Octets) | Type |
|---|---|---|---|---|---|
| IDS/SEN/SGGIT/CHA/BV-11-C [Characteristic GGIT – IDD Features - Indicate] | IDD Features characteristic | [9] 3, 3.5 | 0x22 (Read, Indicate) | Skip | - |

*Table 4.3: Input for the GGIT Server test procedure*

### 4.3.1 Generic GATT Indication Supported Features characteristic

Execute the Generic GATT Indication Supported Features Characteristic tests defined in Section 6.3, Server test procedures (SGGIT), in [6] using Table 4.4 below as input:

| TCID | Characteristic | Reference | TC Configuration |
|---|---|---|---|
| IDS/SEN/SGGIT/ISFC/BV-12-C [Characteristic GGIT – IDD Features indication] | IDD Features | [9] 3, 3.5.1 | N/A |

*Table 4.4: GGIT Indication Supported Features Characteristic tests*

## 4.4 Configure Indication and Notification

- Test Purpose

  This test group verifies compliant operation in response to enable and disable characteristic indication or notification.

- Reference

  [3] 3

- Initial Condition

  - The handle of each characteristic value, as well as the handle of the Client Characteristic Configuration descriptors, referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

- Test Case Configuration

| Test Case ID | Value (Requirements) |
|---|---|
| IDS/SEN/CON/BV-01-C [Configure Indication – 'IDD Status Changed'] | 0x0002 (Section 3, 3.2 in [3]) |
| IDS/SEN/CON/BV-02-C [Configure Indication – 'IDD Status'] | 0x0002 (Section 3, 3.3 in [3]) |
| IDS/SEN/CON/BV-03-C [Configure Indication – 'IDD Annunciation Status'] | 0x0002 (Section 3, 3.4 in [3]) |
| IDS/SEN/CON/BV-04-C [Configure Indication – 'IDD Status Reader Control Point'] | 0x0002 (Section 3, 3.6 in [3]) |
| IDS/SEN/CON/BV-05-C [Configure Indication – 'IDD Command Control Point'] | 0x0002 (Section 3, 3.7 in [3]) |
| IDS/SEN/CON/BV-06-C [Configure Notification – 'IDD Command Data'] | 0x0001 (Section 3, 3.8 in [3]) |
| IDS/SEN/CON/BV-07-C [Configure Indication – 'IDD Record Access Control Point'] | 0x0002 (Section 3, 3.9 in [3]) |
| IDS/SEN/CON/BV-08-C [Configure Notification – 'IDD History Data'] | 0x0001 (Section 3, 3.10 in [3]) |

*Table 4.5: Configure indication and notification test cases*

- Test Procedure

  The following test procedure applies to the test cases listed in the Table 4.5 below:

  1. The Lower Tester sends an ATT_Write_Request to disable indication or notification by writing value 0x0000 to the Client Characteristic Configuration descriptor of the characteristic.
  2. The Lower Tester reads the value of the Client Characteristic Configuration descriptor.
  3. For each test case, the Lower Tester writes the value noted in Table 4.5 to the Client Characteristic Configuration descriptor of the characteristic
  4. The Lower Tester reads the value of the Client Characteristic Configuration descriptor.

- Expected Outcome

  The following pass verdicts apply to the test cases listed in Table 4.5:

  Pass verdict

  The characteristic descriptor is successfully written, and the value returned when read is consistent with the value written.

## 4.5 Characteristic Read

This test group contains test cases to read and verify that the characteristic values required by the service are compliant.

### 4.5.1 IDD Status Changed, IDD Status, IDD Annunciation Status and IDD Features Characteristic Read

- Test Purpose

  For each test case in Table 4.6, read and verify that the values required by the service are compliant.

- Reference

  [3] 3

- Initial Condition

  - If E2E-Protection is enabled, verify that any existing connection is disconnected.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
  - The handle of the <Characteristic> value referenced in each test case in Table 4.6 below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

- Test Case Configuration

| Test Case ID | Reference | Characteristic |
|---|---|---|
| IDS/SEN/CR/BV-01-C [Characteristic Read – 'IDD Status Changed'] | [3] 3.2,4.1 | IDD Status Changed characteristics |
| IDS/SEN/CR/BV-02-C [Characteristic Read – 'IDD Status'] | [3] 3.3, 4.2 | IDD Status characteristic |
| IDS/SEN/CR/BV-03-C [Characteristic Read – 'IDD Annunciation Status'] | [3] 3.4, 4.3 | IDD Annunciation Status characteristic |
| IDS/SEN/CR/BV-04-C [Characteristic Read – 'IDD Features'] | [3] 3.5, 4.4 | IDD Features characteristic |

*Table 4.6: Test cases for IDD Characteristics Read*

- Test Procedure

  1. For each test case in Table 4.6, the Lower Tester issues an ATT_Read_Request to read the <Characteristic> value by specifying the Characteristic Value Handle.
  2. The IUT sends and ATT_Read_Response to the Lower Tester.
  3. Verify that the <Characteristic> value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.6, the characteristic is successfully read, and the characteristic value meets the requirements of the service.

  If the IUT has E2E-Protection enabled, then appropriate values for the E2E-Counter field and E2E-CRC field are present in the IDD Status Changed, IDD Status, IDD Annunciation Status, and IDD Features characteristics.

  If the IUT does not have E2E-Protection enabled, then the E2E-Counter field and E2E-CRC field are excluded in the IDD Status Changed, IDD Status, and IDD Annunciation Status characteristics.

  If the IUT does not have E2E-Protection enabled, then the E2E-CRC field is set to 0xFFFF and the E2E-Counter is set to 0 in the IDD Features characteristic.

  The RFU bits in Flags field are set to 0.

### IDS/SEN/CR/BV-05-C [Verify E2E-CRC and E2E-Counter calculations – IDD Status Reader CP]

- Test Purpose

  Verify the calculated E2E-CRC and E2E-Counter values when the IUT executes an IDD Status Reader Control Point procedure.

- Reference

  [3] 1.8, 3.1, 3.2.1.2, and 3.6.2

- Initial Condition

  - The IUT and the Lower Tester have E2E-Protection enabled.
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester executes the procedure included in IDS/SEN/RCP/BV-01-C [Reset Status Procedure] to reset the IDD Status Changed characteristic Flags field bits.
  2. Verify that the IDD Status Reader Control Point characteristic indication contains an E2E-CRC field and E2E-Counter field and the calculated CRC and Counter values meet the requirement of the service.
  3. Repeat step 1 and 2 until the maximum value for the E2E-Counter is reached and a rollover occurs.

- Expected Outcome

  Pass verdict

  At the beginning of each connection, the IUT transmit E2E-Counter field starts with a value of 1 and it is incremented by 1.

  When the transmit E2E-Counter field reaches its upper limit, the E2E-Counter rollovers to 1.

  The calculated E2E-Counter field and E2E-CRC field meet the requirement of the service.

### IDS/SEN/CR/BV-06-C [Verify E2E-CRC and E2E-Counter calculations – Multiple Control Points]

- Test Purpose

  Verify the calculated E2E-CRC and E2E-Counter values when the IUT executes multiple control point procedures.

- Reference

  [3] 1.8, 3.1, 3.2.1.2, 3.6.2, 3.7.2, and 3.9.4

- Initial Condition

  - The IUT and the Lower Tester have E2E-Protection enabled.
  - For each supported control point, perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point, IDD Command Control Point, or IDD Record Access Control Point characteristics.

- Test Procedure

  1. The Lower Tester executes at least twice the procedure included in IDS/SEN/RCP/BV-01-C [Reset Status Procedure] to reset the IDD Status Changed characteristic Flags field bits.
  2. Verify that the IDD Status Reader Control Point characteristic indications contain an E2E-CRC field and E2E-Counter field and the calculated CRC and Counter values meet the requirement of the service.
  3. The Lower Tester executes a supported IDD Record Access Control Point or a supported IDD Command Control Point procedure.
  4. Verify that both, IDD Status Reader Control Point characteristic and the other control point, indications contain an E2E-CRC field and E2E-Counter field and the calculated CRC and Counter values meet the requirement of the service.

- Expected Outcome

  Pass verdict

  At the beginning of each connection, the IUT transmit E2E-Counter field starts with a value of 1 and it is incremented by 1 for each control point.

  For each control point, the IUT uses a control point specific transmit E2E-Counter and receive E2E-Counter.

  The calculated E2E-CRC field and E2E-Counter field values meet the requirement of the service.

## 4.6 IDD Status Reader Control Point Procedures

This test group contains test cases to verify the IUT's ability to perform compliant operation and interpret values of the IDD Status Reader Control Point characteristic or the handling of errors specific to the procedure or control point.

Table 3.9 in [3] defines the Op Codes and Operand values used in the IDD Status Reader Control Point procedure test cases in this section.

### IDS/SEN/RCP/BV-01-C [Reset Status Procedure]

- Test Purpose

  Verify that the IUT can perform the Reset Status procedure.

- Reference

  [3] 3.6.2.1, 4.5.2.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - Lower Tester configures the IDD Status Changed characteristic for indication by performing IDS/SEN/CON/BV-01-C [Configure Indication – 'IDD Status Changed'].
  - The IUT has some of the bits in IDD Status Changed Flags field set to 1.

- Test Procedure

  1. The Lower Tester sends an ATT_Read_Request to the IUT to read the IDD Status Changed characteristic to verify that some Flags field bits are set to 1.
  2. The IUT replies with an ATT_Read_Response confirming that some of the IDD Status Changed characteristic Flags field bits are set to 1.
  3. The Lower Tester writes the Reset Status Op Code (0x030C) to the IDD Status Reader Control Point with an Operand containing Flags field with a value indicating a reset of all IDD Status Changed characteristic Flags field bits.
  4. The IUT sends an ATT_Handle_Value_Indication containing the IDD Status Changed characteristic with the updated Flags field values to the Lower Tester.
  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x303) and an Operand representing the Request Op Code (0x030C) followed by the Response Code for Success (0x0F).
  7. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  8. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication containing the IDD Status Changed characteristic with the updated Flags field values to the Lower Tester.

  The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Value Op Code (0x303) and an Operand representing the Request Op Code (0x030C) followed by the Response Code for Success (0x0F).

  All bits in the IDD Status Changed characteristic Flags field are reset.

## 4.6.1 Get Active Bolus IDs Procedure

- Test Purpose

  Verify that the IUT can perform the Get Active Bolus IDs procedure.

- Reference

  [3] 3.6.2.2, 4.5.2.3, and 4.5.2.4

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - Perform an action on the IUT that will induce it to set a supported number of active boluses as listed in <# of Active Boluses> of Table 4.7.
- Test Case Configuration

| Test Case ID | # of Active Boluses |
|---|---|
| IDS/SEN/RCP/BV-02-C [Get Active Bolus IDs Procedure – Single Bolus] | 1 |
| IDS/SEN/RCP/BV-03-C [Get Active Bolus IDs Procedure – Multiple Boluses] | 2 |

*Table 4.7: Test cases for Get Active Bolus IDs procedure*

- Test Procedure

  Based on the IUT supported number of active boluses, select the applicable test case from Table 4.7 and perform the following steps:

  1. The Lower Tester writes the Get Active Bolus IDs Op Code (0x0330) to the IDD Status Reader Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Active Bolus IDs Response Op Code (0x033F) and an Operand Active Bolus IDs record with the Number of Active Boluses and Bolus IDs of the corresponding active boluses.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.
- Expected Outcome

  Pass verdict

  For each test case in Table 4.7, the IUT determines and reports the number of active boluses and Bolus IDs.

  The reported Bolus ID fields are set in chronological order by their start time of the delivery.

### 4.6.2 Get Active Bolus Delivery Procedure

- Test Purpose

  Verify that the IUT can perform the Get Active Bolus Delivery procedure with the Bolus Value Selections described in Table 4.8.
- Reference

  [3] 3.6.2.3, 4.5.2.5, and 4.5.2.6
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - The IUT has an active bolus ID and the Lower Tester acquires the bolus ID by performing IDS/SEN/RCP/BV-02-C [Get Active Bolus IDs Procedure – Single Bolus] procedure.

- Test Case Configuration

| Test Case ID | Bolus Value Selection |
|---|---|
| IDS/SEN/RCP/BV-04-C [Get Active Bolus Delivery Procedure – Operand set to Programmed] | Bolus Value Selection set to Programmed (0x0F) |
| IDS/SEN/RCP/BV-05-C [Get Active Bolus Delivery Procedure – Operand set to Delivered] | Bolus Value Selection set to Delivered (0x3C) |

*Table 4.8: Test cases for Get Active Bolus Delivery procedure*

- Test Procedure

  For each test case in Table 4.8, using the IUT's active Bolus ID, perform the following steps:

  1. The Lower Tester writes the Get Active Bolus Delivery Op Code (0x0356) to the IDD Status Reader Control Point with an Operand containing the Bolus ID field and a <Bolus Value Selection> as described in Table 4.8.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Active Bolus Delivery Response Op Code (0x0359) and an Operand Active Bolus Delivery record containing the details for the requested bolus.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.8, the IUT indicates the IDD Status Reader Control Point characteristic with the Get Active Bolus Delivery Response Op Code (0x0359) and an Operand Active Bolus Delivery record containing the details for the requested bolus.

### IDS/SEN/RCP/BV-06-C [Get Active Basal Rate Delivery Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Active Basal Rate Delivery procedure.

- Reference

  [3] 3.6.2.4, 4.5.2.7, and 4.5.2.8

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to activate a programmed basal rate.
  2. The Lower Tester writes the Get Active Basal Rate Delivery Op Code (0x0365) to the IDD Status Reader Control Point with no Operand.
  3. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Active Basal Rate Delivery Response Op Code (0x036A) and an Operand Active Basal Rate Delivery record containing the programmed details for the requested basal rate.
  4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  5. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with the Get Active Basal Rate Delivery Response Op Code (0x036A) and an Operand Active Basal Rate Delivery record containing the programmed details for the requested basal rate.

### IDS/SEN/RCP/BV-07-C [Get Total Daily Insulin Status Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Total Daily Insulin Status procedure.

- Reference

  [3] 3.6.2.5, 4.5.2.9, and 4.5.2.10

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Get Total Daily Insulin Status Op Code (0x0395) to the IDD Status Reader Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Total Daily Insulin Status Response Op Code (0x039A) and the Operand Total Daily Insulin Status record containing the values of the Total Daily Insulin Sum of Bolus Delivered field, Total Daily Insulin Sum of Basal Delivered field and Total Daily Insulin Sum of Bolus and Basal Delivered field.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD Status Reader Control Point characteristic with the Get Total Daily Insulin Status Response Op Code (0x039A) and the Operand Total Daily Insulin Status record.

  If Boluses are not supported, the Total Daily Insulin Sum of Bolus Delivered is set to 0.

  If Basal Rate is not supported, the Total Daily Insulin Sum of Basal Delivered is set to 0.

### IDS/SEN/RCP/BV-08-C [Get Counter Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Counter Procedure with the Operand Counter Type and Counter Value Selection listed in Table 4.9.

  If the combination of the Counter Type and Counter Value Selection is supported the IUT reports a valid response. Where the Counter Type or Counter Value Selection is not supported the IUT reports a valid error response.

| | | Counter Value Selection | |
|---|---|---|---|
| **Counter Type** | IDD Lifetime (0x0F) | Remaining (0x0F) | Elapsed (0x33) |
| | IDD Warranty Time (0x33) | Remaining (0x0F) | Elapsed (0x33) |
| | IDD Loaner Time (0x3C) | Remaining (0x0F) | Elapsed (0x33) |
| | Reservoir Insulin Operation Time (0x55) | Remaining (0x0F) | Elapsed (0x33) |

*Table 4.9: Counter Types and Counter Value Selections for Get Counter Procedure*

- Reference

  [3] 3.6.2.6, 4.5.2.11, and 4.5.2.12

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. For each <Counter Type> in Table 4.9, perform the following steps:
     a. For each <Counter Value Selection> in Table 4.9, perform the following steps:
        i. The Lower Tester writes the Get Counter Op Code (0x03A6) to the IDD Status Reader Control Point using the listed Operand consisting of a <Counter Type> and <Counter Value Selection> as described in Table 4.9.
        ii. IF the <Counter Type> is NOT supported OR the <Counter Value Selection> is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid operand (0x71).
        iii. ELSE, the IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Counter Response Op Code (0x03A9) and an Operand containing a Counter record with the details of the counter type, counter value selection and requested value.
        iv. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  2. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each combination of <Counter Type> and <Counter Value Selection>, the IUT indicates the IDD Status Reader Control Point characteristic with:

  The Get Counter Response Op Code (0x03A9) and an Operand containing a Counter record with the details of the Counter Type, Counter Value Selection and Counter Value (Combination supported).

  OR

  The Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid operand (0x71) (Combination not supported).

### 4.6.3 Get Delivered Insulin and Insulin On Board Procedures

- Test Purpose

  Verify that the IUT can perform each selected test case in Table 4.10.

- Reference

  [3] 3.6.2.7, 3.6.2.8

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Case Configuration

| Test Case ID | Reference [3] | Op Code | Response Op Code | Operand |
|---|---|---|---|---|
| IDS/SEN/RCP/BV-09-C [Get Delivered Insulin Procedure] | 3.6.2.7, 4.5.2.13, 4.5.2.14 | Get Delivered Insulin (0x03C0) | Get Delivered Insulin Response (0x03CF) | Delivered Insulin record:<br>• Bolus Amount Delivered<br>• Basal Amount Delivered |
| IDS/SEN/RCP/BV-10-C [Get Insulin On Board Procedure] | 3.6.2.8, 4.5.2.15, 4.5.2.16 | Get Insulin On Board (0x03F3) | Get Insulin On Board Response (0x03FC) | Insulin On Board record:<br>• Flags<br>• Insulin On Board<br>• Remaining Duration |

*Table 4.10: Test cases for Get Delivered Insulin and Insulin On Board procedures*

- Test Procedure

  For each selected test case in Table 4.10, perform the following steps:

  1. The Lower Tester writes the <Opcode>, listed in Table 4.10, to the IDD Status Reader Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the <Response Op Code> and <Operand> as described in Table 4.10.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.10, the IUT indicates the IDD Status Reader Control Point characteristic with the <Response Op Code> and <Operand> as described in Table 4.10.

### 4.6.4 IDD Status Reader Control Point – Error Handling

This test group contains test cases to verify compliant operation of the IUT when the IDD Status Reader Control Point is written with an invalid operand or IUT does not support the procedure or other errors specific to the procedure or control point.

#### IDS/SEN/RCPE/BI-01-C [Get Active Bolus Delivery Procedure – Procedure not applicable]

- Test Purpose

  Verify that the IUT does not perform the Get Active Bolus Delivery procedure using the Test Patterns described in Table 4.11.

| Test Pattern | Bolus ID | Bolus Value Selection |
|---|---|---|
| 1 | Bolus ID of a bolus which is not an active bolus | A valid Bolus Value Selection |
| 2 | Bolus ID of a bolus which does not exist | A valid Bolus Value Selection |

*Table 4.11: Test patterns for Get Active Bolus Delivery procedure - Procedure not applicable*

- Reference

  [3] 3.6.2.3, 4.5.2.1, and 4.5.2.5

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - The Lower Tester determines an inactive bolus or a bolus that does not exist by performing the Get Active Bolus Delivery procedure and selecting a Bolus ID outside the listed boluses.

- Test Procedure

  Select one of the Test Patterns in Table 4.11 and perform the following steps once:

  1. The Lower Tester writes the Get Active Bolus Delivery Op Code (0x0356) to the IDD Status Reader Control Point with an Operand containing a Bolus ID and a Bolus Value Selection as described in Table 4.11.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0356) followed by the Response Code Value for Procedure not applicable (0x74).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0356) followed by the Response Code Value for Procedure not applicable (0x74).

### IDS/SEN/RCPE/BI-02-C [Get Active Bolus Delivery Procedure – Invalid Operand]

- Test Purpose

  Verify that the IUT does not perform the Get Active Bolus Delivery procedure with a Bolus Value Selection set to an RFU value.

- Reference

  [3] 3.6.2.3, 4.5.2.1, and 4.5.2.5

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - The IUT has an active bolus ID and the Lower Tester acquires the bolus ID by performing the *Get Active Bolus Delivery* procedure.

- Test Procedure

  1. The Lower Tester writes the Get Active Bolus Delivery Op Code (0x0356) to the IDD Status Reader Control Point with an Operand containing a Bolus ID and a Bolus Value Selection set to an RFU value.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0356) followed by the Response Code Value for Invalid Operand (0x71).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0356) followed by the Response Code Value for Invalid Operand (0x71).

### IDS/SEN/RCPE/BI-03-C [Get Active Basal Rate Delivery Procedure – Procedure not applicable]

- Test Purpose

  Verify that the IUT does not perform the Get Active Basal Rate Delivery procedure when there are no active basal rate profiles present.

- Reference

  [3] 3.6.2.4, 4.5.2.1, and 4.5.2.7

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.
  - The IUT Number of Active Profile Templates is 0.

- Test Procedure

  1. The Lower Tester writes the Get Active Basal Rate Delivery Op Code (0x0365) to the IDD Status Reader Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0365) followed by the Response Code Value for Procedure not applicable (0x74).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0365) followed by the Response Code Value for Procedure not applicable (0x74).

### IDS/SEN/RCPE/BI-04-C [Get Counter Procedure – Invalid Operand]

- Test Purpose

  Verify that the IUT does not perform the Get Counter procedure with the Operand Counter Type or Counter Value Selection set to an RFU value.

- Reference

  [3] 3.6.2.6, 4.5.2.1, and 4.5.2.11

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Get Counter Op Code (0x03A6) to the IDD Status Reader Control Point with an Operand containing a Counter Type and Counter Value Selection of which at least one is set to an RFU value.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid operand (0x71).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid operand (0x71).

### IDS/SEN/RCPE/BI-05-C [Status Reader CP – Op code not supported]

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an unsupported Op Code to the IDD Status Reader Control Point.

- Reference

  [3] 3.11.4, 4.5.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes an Op Code with a value from the RFU range (e.g. 0x0505 – 0x0F3C) to the IDD Status Reader Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (selected value from Step 1) followed by the Response Code Value for Op Code not supported (0x70).

3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (selected value from Step 1) followed by the Response Code Value for Op Code not supported (0x70).

## 4.7 IDD Command Control Point Procedures

This test group contains test cases to verify the IUT's ability to perform compliant operation and interpret values of the IDD Command Control Point and IDD Command Data characteristics.

Table 3.10 in [3] defines the Op Codes, Operators and Operand values used in the IDD Command Control Point procedure test cases in this section.

### IDS/SEN/CCP/BV-01-C [Set Therapy Control State Procedure]

- Test Purpose

  Verify that the IUT can perform the Set Therapy Control State procedure.

- Reference

  [3] 3.7.2.2, 4.6.2.1 and 4.6.2.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - Lower Tester configures the IDD Status characteristic for indication by performing IDS/SEN/CON/BV-02-C [Configure Indication – 'IDD Status'].
  - The IUT is in a therapy state which allows the IUT to change to a *Run* Therapy Control State.

- Test Procedure

  1. The Lower Tester writes the Set Therapy Control State Op Code (0x0F5A) to the IDD Command Control Point with an Operand containing a Therapy Control State field set to *Run*.
  2. The IUT sends an ATT_Handle_Value_Indication containing the IDD Status characteristic handle and value to the Lower Tester.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F5A) followed by the Response Code Value for Success (0x0F).
  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication containing the IDD Status characteristic handle and value to the Lower Tester.

  The IUT sets the Therapy Control State as provided by the Operand with the Therapy Control State field set to Run (0x55).

  The IUT sends an indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F5A) followed by the Response Code Value for Success (0x0F).

### IDS/SEN/CCP/BV-02-C [Set Flight Mode Procedure]

- Test Purpose

  Verify that the IUT can perform the Set Flight Mode procedure.

- Reference

  [3] 3.7.2.3, 4.6.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Set Flight Mode Op Code (0x0F66) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F66) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT confirms the receipt of the Set Flight Mode command before activating the flight mode.

  The IUT sends an indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F66) followed by the Response Code Value for Success (0x0F).

### IDS/SEN/CCP/BV-03-C [Snooze Annunciation Procedure]

- Test Purpose

  Verify that the IUT can perform the Snooze Annunciation procedure.

- Reference

  [3] 3.7.2.4, 4.6.2.4, and 4.6.2.5

- Initial Condition
  - The Lower Tester configures the IDD Annunciation Status characteristic for indication by performing IDS/SEN/CON/BV-03-C [Configure Indication – 'IDD Annunciation Status'].
  - The IUT has an annunciation and the Lower Tester knows the Annunciation Instance ID.
  - The Lower Tester re-sets the Annunciation Status Changed bit in the IDD Status Changed characteristic.
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
- Test Procedure
  1. The Lower Tester writes the Snooze Annunciation Op Code (0x0F69) to the IDD Command Control Point with an Operand containing the Annunciation Instance ID indicating the annunciation to snooze.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Annunciation Status characteristic with a value Snoozed in the Annunciation Status field.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Snooze Annunciation Response Op Code (0x0F96) and an Operand containing the Annunciation Instance ID of the snoozed annunciation.
  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. The Lower Tester sends an ATT_Read_Request to the IUT with the attribute handle set to the handle of the IDD Status Changed characteristic.
  7. The IUT replies with an ATT_Read_Response which contains the value of the attribute that has been read confirming that the IDD Status Changed characteristic Flags field bit for the Annunciation Status Changed bit is set to True.
  8. Once the snoozing time is over, the IUT sends an ATT_Handle_Value_Indication of the IDD Annunciation Status characteristic with a value Pending in the Annunciation Status field.
  9. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  10. Verify that the characteristic value meets the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT sets the Annunciation Status field of the IDD Annunciation Status characteristic to value Snoozed (0x3C) for the annunciation denoted by the Annunciation Instance ID field.

  In step 7, the IUT confirms that the Annunciation Status Changed bit of the Flags field of the IDD Status Changed characteristic is set to True.

  Once the snoozing time is over, in step 8, the IUT sends an ATT_Handle_Value_Indication of the IDD Annunciation Status characteristic with a value Pending in the Annunciation Status field.

### 4.7.1 Confirm Annunciation Procedure

- Test Purpose

  Verify that the IUT can perform the Confirm Annunciation procedure with an Annunciation Instance ID with the <Annunciation Status Value> as described in Table 4.12.

- Reference

  [3] 3.7.2.5, 4.6.2.6, and 4.6.2.7

- Initial Condition
  - The IUT has an active annunciation and the Lower Tester knows the Annunciation Instance ID with the <Annunciation Status Value> as described in Table 4.12.
  - The Lower Tester re-sets the Annunciation Status Changed bit in the IDD Status Changed characteristic.
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
- Test Case Configuration

| Test Case ID | Annunciation Status Value |
|---|---|
| IDS/SEN/CCP/BV-04-C [Confirm Annunciation Procedure – Snoozed to Confirmed] | Snoozed |
| IDS/SEN/CCP/BV-05-C [Confirm Annunciation Procedure – Pending to Confirmed] | Pending |

*Table 4.12: Test cases for Confirm Annunciation procedures*

- Test Procedure

  For each selected test case in Table 4.12, perform the following steps:

  1. The Lower Tester writes the Confirm Annunciation Op Code (0x0F99) to the IDD Command Control Point with an Operand containing an Annunciation Instance ID, with the <Annunciation Status Value> as described in Table 4.12, indicating the annunciation to be confirmed.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Confirm Annunciation Response (0x0FA5) and an Operand containing the Annunciation Instance ID of the confirmed annunciation.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester sends an ATT_Read_Request to the IUT with the attribute handle set to the handle of the IDD Status Changed characteristic.
  5. The IUT replies with an ATT_Read_Response which contains the value of the attribute that has been read confirming that the IDD Status Changed characteristic Flags field bit for the Annunciation Status Changed bit is set to True.
  6. The Lower Tester sends an ATT_Read_Request to the IUT with the attribute handle set to the handle of the IDD Annunciation Status characteristic.
  7. The IUT replies with an ATT_Read_Response which contains the value of the attribute that has been read confirming that the Annunciation Present bit of Flag fields is set to *False* and IUT no longer provides information about the confirmed annunciation.
  8. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.12, the IUT sends an indication of the IDD Command Control Point characteristic with the Confirm Annunciation Response (0x0FA5) and an Operand containing the Annunciation Instance ID of the confirmed annunciation.

  The IUT sets the Annunciation Status Changed bit of the IDD Status Changed characteristic Flags field to True.

  The confirmed annunciation is no longer active and the IUT no longer provides information about the annunciation, Annunciation Present bit of Flag field is set to False.

### 4.7.2 Read a Profile Template Procedure

- Test Purpose

  Verify that the IUT can perform the applicable Read Profile Template Procedure in Table 4.13.

- Reference

  [3] 3.7.2.1.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - For each supported profile template type, in Table 4.13, the IUT has a template with status set to configured and the Lower Tester acquires the template number by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Case Configuration

| Test Case ID | Reference [3] | <Profile Template Op Code> | <Profile Template Response Op Code> | <Profile Template Record> |
|---|---|---|---|---|
| IDS/SEN/CCP/BV-06-C [Read Basal Rate Profile Template Procedure] | 3.7.2.6, 4.6.2.8, 4.6.2.9 | Read Basal Rate Profile Template (0x0FAA) | Read Basal Rate Profile Template Response (0x0FC3) | Basal Rate Profile Template Record |
| IDS/SEN/CCP/BV-07-C [Read ISF Profile Template Procedure] | 3.7.2.25, 4.6.2.40, 4.6.2.41 | Read ISF Profile Template (0x12B8) | Read ISF Profile Template Response (0x12D1) | ISF Profile Template Record |
| IDS/SEN/CCP/BV-08-C [Read I2CHO Ratio Profile Template Procedure] | 3.7.2.27, 4.6.2.44, 4.6.2.45 | Read I2CHO Ratio Profile Template (0x12ED) | Read I2CHO Ratio Profile Template Response (0x1414) | I2CHO Ratio Profile Template Record |
| IDS/SEN/CCP/BV-09-C [Read Target Glucose Range Profile Template Procedure] | 3.7.2.29, 4.6.2.48, 4.6.2.49 | Read Target Glucose Range Profile Template (0x1428) | Read Target Glucose Range Profile Template Response (0x1441) | Target Glucose Range Profile Template Record |

*Table 4.13: Test cases for IDD Command CP Characteristic Read Profile Template Procedure*

- Test Procedure

  The following test procedure applies to the test cases listed in Table 4.13:

  1. The Lower Tester writes the appropriate read <Profile Template Op Code> to the IDD Command Control Point with an Operand comprising the corresponding profile template number (see Table 4.13).
  2. The IUT sends one or more ATT_Handle_Value_Notification of the IDD Command Data characteristic with the Response Code set to the appropriate <Profile Template Response Op Code> and an Operand containing the corresponding <Profile Template Record> (see Table 4.13) until all time blocks of the profile have been sent.
  3. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code with value of <Profile Template Op *C*ode> (see Table 4.13) followed by the Response Code Value for Success (0x0F).
  4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends one or more ATT_Handle_Value_Notification of the IDD Command Data characteristic until all time blocks of the profile template record have been sent to the Lower Tester.

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Value for Success (0xF0).

  The value of the characteristic meets the requirements of the service.

### 4.7.3 Write a Profile Template Procedure

- Test Purpose

  Verify that the IUT can perform the applicable Write Profile Template procedure in Table 4.14.

- Reference

  [3] 3.7.2.1.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - For each supported profile template type, in Table 4.14, the IUT has a template with status set to configurable and the Lower Tester acquires the template number by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Case Configuration

| **Test Case ID** | **Reference** [3] | **<Profile Template Op Code>** | **<Profile Template Response Op Code>** | **<Profile Template Record>** |
|---|---|---|---|---|
| IDS/SEN/CCP/BV-10-C [Write Basal Rate Profile Template Procedure] | 3.7.2.7, 4.6.2.10, 4.6.2.11 | Write Basal Rate Profile Template (0x0FCC) | Write Basal Rate Profile Template Response (0x0FF0) | Basal Rate Profile Template record |
| IDS/SEN/CCP/BV-11-C [Write ISF Profile Template Procedure] | 3.7.2.26, 4.6.2.42, 4.6.2.43 | Write ISF Profile Template (0x12DE) | Write ISF Profile Template Response (0x12E2) | ISF Profile Template record |
| IDS/SEN/CCP/BV-12-C [Write I2CHO Ratio Profile Template Procedure] | 3.7.2.28, 4.6.2.46, 4.6.2.47 | Write I2CHO Ratio Profile Template (0x141B) | Write I2CHO Ratio Profile Template Response (0x1427) | I2CHO Ratio Profile Template record |
| IDS/SEN/CCP/BV-13-C [Write Target Glucose Range Profile Template Procedure] | 3.7.2.30, 4.6.2.50, 4.6.2.51 | Write Target Glucose Range Profile Template (0x144E) | Write Target Glucose Range Profile Template Response (0x1472) | Target Glucose Range Profile Template record |

*Table 4.14: Test cases for IDD Command CP Characteristic Write Profile Template Procedure*

- Test Procedure

  The following test procedure applies to the test cases listed in in Table 4.14:

  1. The Lower Tester writes the appropriate <Profile Template Op Code> to the IDD Command Control Point with an Operand comprising the corresponding <Profile Template Record> (see Table 4.14) with the appropriate Flags field (Bit 0, End Transaction, set to *False*), a profile template number, first time block number index, duration(s) and, based on profile template, the rate(s) in IU/h or insulin sensitivity factors in mg/dL or insulin-to-carbohydrate ratios in grams or the lower and upper target glucose limits in mg/dL according to the IXIT [8].
  2. For each received profile template record, the IUT performs a plausibility check. After a successful plausibility check, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code set to the appropriate <Profile Template Response Op Code> (see Table 4.14) and an Operand containing the appropriate Flags Field (Bit 0, Transaction Completed, set to *False*), profile template number and first time block number index.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Repeat steps 1 - 3 until the end of the transaction is reached.
  5. End of Transaction: The Lower Tester writes the appropriate <Profile Template Op *Co*de> to the IDD Command Control Point with an Operand comprising the corresponding <Profile Template Record> (see Table 4.14) with the appropriate Flag Field (Bit 0, End Transaction, set to True), profile template number and appropriate time block number index, duration(s) and rate(s).
  6. For the received profile template record, the IUT performs an end of transaction plausibility check. After a successful end of transaction plausibility check the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code set to the appropriate <Profile Template Response Op Code> (see Table 4.14) and an Operand containing the Flags Field (Bit 0, Transaction Completed, set to *True*), profile template number and first time block number index.
  7. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  8. The Lower Tester verifies that the template is set to configured by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure] procedure.
  9. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  After each received Profile Template record and successful plausibility check, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code set to the <Profile Template Response Op Code> (see Table 4.14) and an Operand containing the appropriate Flags Field (Bit 0, Transaction Completed, set to False), profile template number and first time block number index.

  The IUT receives all time blocks of the entire profile template within a transaction.

  After a successful end of transaction plausibility check, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code set to the appropriate <Profile Template Response Op Code> (see Table 4.14) and an Operand containing the Flags Field (Bit 0, Transaction Completed, set to True), profile template number and first time block number index

  Upon successfully completing the end of transaction plausibility check, the IUT sets the profile template to configured and template is stored.

### IDS/SEN/CCP/BV-14-C [Set TBR Adjustment Procedure – Without a TBR Template]

- Test Purpose

  Verify that the IUT can perform the Set TBR Adjustment procedure.

- Reference

  [3] 3.7.2.8, 4.6.2.1, and 4.6.2.12

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The Lower Tester knows the IUT's supported TBR Type by performing IDS/SEN/CR/BV-04-C [Characteristic Read – 'IDD Features'].
  - The Lower Tester knows the details of the TBR record.

- Test Procedure

  1. The Lower Tester writes the Set TBR Adjustment Op *Co*de (0x0FFF) to the IDD Command Control Point with an Operand comprising a TBR record.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of Request Op Code (0x0FFF) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the TBR is set according to the TBR adjustment procedure by performing IDS/SEN/RCP/BV-06-C [Get Active Basal Rate Delivery Procedure].
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of Request Op Code (0x0FFF) followed by the Response Code Value for Success (0x0F).

  The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Active Basal Rate Delivery Response Op Code (0x036A) and an Operand Active Basal Rate Delivery record containing the TBR details according to the TBR adjustment procedure.

### IDS/SEN/CCP/BV-15-C [Set TBR Adjustment Procedure – With a TBR Template]

- Test Purpose

  Verify that the IUT can perform the Set TBR Adjustment procedure with the IUT supporting TBRs and TBR templates.

- Reference

  [3] 3.7.2.8, 4.6.2.1, and 4.6.2.12

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The IUT has a TBR Template which is set to configured and the Lower Tester acquires the template details (i.e. template number and configured status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  - The Lower Tester acquires the TBR details for the TBR template by performing IDS/SEN/CCP/BV-17-C [Get TBR Template Procedure] procedure.
- Test Procedure
  1. The Lower Tester writes the Set TBR Adjustment Op *Co*de (0x0FFF) to the IDD Command Control Point with an Operand with a TBR record comprising a TBR Template Number.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of Request Op Code (0x0FFF) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the TBR is set according to the TBR adjustment procedure and TBR Template by performing IDS/SEN/RCP/BV-06-C [Get Active Basal Rate Delivery Procedure].
  5. Verify that the characteristic values meet the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of Request Op Code (0x0FFF) followed by the Response Code Value for Success (0x0F).

  The IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Active Basal Rate Delivery Response Op Code (0x036A) and an Operand Active Basal Rate Delivery record containing the TBR details according to the TBR adjustment procedure.

### IDS/SEN/CCP/BV-16-C [Cancel TBR Adjustment Procedure]

- Test Purpose

  Verify that the IUT can perform the Cancel TBR Adjustment procedure.
- Reference

  [3] 3.7.2.9, 4.6.2.1
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The IUT has an active TBR.
  - The Lower Tester can set the active TBR by performing the IDS/SEN/CCP/BV-14-C [Set TBR Adjustment Procedure – Without a TBR Template] procedure.

- Test Procedure

  1. The Lower Tester writes the Cancel TBR Adjustment Op *Co*de (0x1111) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x1111) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that there is no active TBR based on the provided TBR settings by performing the IDS/SEN/RCP/BV-06-C [Get Active Basal Rate Delivery Procedure].
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x1111) followed by the Response Code Value for Success (0x0F).

  The IUT indicates the IDD Status Reader Control Point characteristic with the Get Active Basal Rate Delivery Response Op Code (0x036A) and an Operand Active Basal Rate Delivery record with bit 0, TBR Present, of Flags field set to 0.

### IDS/SEN/CCP/BV-17-C [Get TBR Template Procedure]

- Test Purpose

  Verify that the IUT can perform the Get TBR Template procedure.

- Reference

  [3] 3.7.2.10, 4.6.2.14, and 4.6.2.15

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a configured TBR Template. The TBR Template can be set by the Lower Tester by performing the IDS/SEN/CCP/BV-18-C [Set TBR Template Procedure].
  - The Lower Tester can acquire the template details (i.e. TBR template number and configured status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Procedure

  1. The Lower Tester writes the Get TBR Template Op *Co*de (0x111E) to the IDD Command Control Point with an Operand containing a TBR Template Number.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get TBR Template Response Op Code (0x1122) and Operand TBR Template record.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get TBR Template Response Op Code (0x1122) and Operand TBR Template record.

### IDS/SEN/CCP/BV-18-C [Set TBR Template Procedure]

- Test Purpose

  Verify that the IUT can perform the Set TBR Template procedure.

- Reference

  [3] 3.7.2.11, 4.6.2.16, and 4.6.2.17

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a configurable TBR Template.
  - The Lower Tester acquires the template details (i.e. TBR template number and configurable status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure] procedure.

- Test Procedure

  1. The Lower Tester writes the Set TBR Template Op *Co*de (0x112D) to the IDD Command Control Point with an Operand containing a TBR Template record.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set TBR Template Response Op Code (0x1144) and Operand TBR Template Number.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the TBR Template is set according to the TBR Template record by performing the IDS/SEN/CCP/BV-17-C [Get TBR Template Procedure] and that the TBR template is set to configured by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set TBR Template Response Op Code (0x1144) and Operand TBR Template Number.

  The TBR Template is set according to the TBR Template record and the TBR template is set to configured.

### IDS/SEN/CCP/BV-19-C [Set Bolus Procedure – Without a Bolus Template]

- Test Purpose

  Verify that the IUT can perform the Set Bolus Procedure, with the bolus record not including a Bolus Template Number, using the Test Patterns described in Table 4.15.

| Test Pattern | Bolus Type |
|---|---|
| 1 | Fast |
| 2 | Extended |
| 3 | Multiwave |

*Table 4.15: Test patterns for IDD Command Control Point Characteristic Set Bolus procedure*

- Reference

  [3] 3.7.2.12, 4.6.2.18, and 4.6.2.19

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The IUT has an available bolus to be set and the Lower Tester acquires the currently available bolus type that can be set by performing the IDS/SEN/CCP/BV-22-C [Get Available Boluses Procedure].

- Test Procedure

  Select one of the Test Patterns in Table 4.15 and perform the following steps:

  1. The Lower Tester writes the Set Bolus Op *Co*de (0x114B) to the IDD Command Control Point with an Operand containing a Bolus record with the supported bolus type as described in Table 4.15. Other parameters of the Bolus record, but not listed in Table 4.15, are set to enable the supported bolus type.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set Bolus Response Op Code (0x1177) and Operand Bolus ID.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the details of the supported bolus are set according to the Bolus record, IF Bolus Type=Extended OR Bolus Type=Multiwave OR Bolus Type=Fast AND Bolus Delay Time=present, by performing the IDS/SEN/RCP/BV-04-C [Get Active Bolus Delivery Procedure – Operand set to Programmed].
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set Bolus Response Op Code (0x1177) and Operand Bolus ID.

  The IUT creates the Bolus ID as a unique identifier for the programmed bolus.

  The IUT sets the supported bolus with the provided settings.

### IDS/SEN/CCP/BV-20-C [Set Bolus Procedure – With a Bolus Template]

- Test Purpose

  Verify that the IUT can perform the Set Bolus procedure with the bolus record including a Bolus Template Number.

- Reference

  [3] 3.7.2.12, 4.6.2.18, and 4.6.2.19

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The IUT has a configured bolus template. The Lower Tester can acquire the template details (i.e. bolus template number and configured status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  - The Lower Tester can acquire the bolus template record details by performing the IDS/SEN/CCP/BV-23-C [Get Bolus Template Procedure].

- Test Procedure

  1. The Lower Tester writes the Set Bolus Op *Co*de (0x114B) to the IDD Command Control Point with an Operand containing a Bolus record comprising the Bolus Template Number.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set Bolus Response Op Code (0x1177) and Operand Bolus ID.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the details of the bolus are set according to the Bolus Template by performing the Get Active Bolus Delivery procedure.
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sets the bolus with the provided settings of the bolus template and ignores the values of the fields that are also available in the Bolus record.

  The IUT sends an indication of the IDD Command Control Point characteristic with the Set Bolus Response Op Code (0x1177) and Operand Bolus ID.

### IDS/SEN/CCP/BV-21-C [Cancel Bolus Procedure]

- Test Purpose

  Verify that the IUT can perform the Cancel Bolus procedure.

- Reference

  [3] 3.7.2.13, 4.6.2.20, and 4.6.2.21

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - Perform an action on the IUT that will induce it to set a bolus with a Bolus ID that is known to the Lower Tester or perform IDS/SEN/CCP/BV-19-C [Set Bolus Procedure – Without a Bolus Template] procedure.
- Test Procedure
  1. The Lower Tester writes the Cancel Bolus Op Code (0x1178) to the IDD Command Control Point with an Operand containing the Bolus ID of the set Bolus.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Cancel Bolus Response Op Code (0x1187) and Operand Bolus ID.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the bolus ID is no longer active by performing the Get Active Bolus Delivery procedure.
  5. Verify that the characteristic values meet the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT cancels the bolus denoted by the specified Bolus ID.

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Cancel Bolus Response Op Code (0x1187) and Operand Bolus ID.

  The IUT indicates the IDD Status Reader Control Point characteristic with the Response Code Op Code (0x0303) an Operand consisting of the Request Op Code (0x0356) followed by the Response Code Value for Procedure not applicable (0x74).

### IDS/SEN/CCP/BV-22-C [Get Available Boluses Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Available Boluses procedure.
- Reference

  [3] 3.7.2.14, 4.6.2.22, and 4.6.2.23
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
- Test Procedure
  1. The Lower Tester writes the Get Available Boluses Op *Co*de (0x1188) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Available Boluses Response Op Code (0x11B4) and an Operand containing a Flags field.
  3. The IUT receives *an* ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT checks and indicates which bolus types are currently available to be set.

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Available Boluses Response Op Code (0x11B4) and Operand containing a Flags field.

### IDS/SEN/CCP/BV-23-C [Get Bolus Template Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Bolus Template procedure.

- Reference

  [3] 3.7.2.15, 4.6.2.24, and 4.6.2.25

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a configured bolus template and the Lower Tester knows the Bolus Template Number.
  - The Lower Tester can acquire the template details (i.e. bolus template number and configured status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Procedure

  1. The Lower Tester writes the Get Bolus Template Op *Co*de (0x11BB) to the IDD Command Control Point with an Operand containing a Bolus Template Number.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Bolus Template Response Op Code (0x11D2) and Operand containing a Bolus Template record.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT gets and indicates the parameters of the specified bolus template.

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Bolus Template Response Op Code (0x11D2) and Operand containing a Bolus Template record.

### IDS/SEN/CCP/BV-24-C [Set Bolus Template Procedure]

- Test Purpose

  Verify that the IUT can perform the Set Bolus Template procedure using the Test Patterns in Table 4.16.

| Test Pattern | Bolus Type |
|---|---|
| 1 | Fast |
| 2 | Extended |
| 3 | Multiwave |

*Table 4.16: Test patterns for IDD Command Control Point Characteristic Set Bolus Template procedure*

- Reference

  [3] 3.7.2.16, 4.6.2.26, and 4.6.2.27

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a configurable bolus template and the Lower Tester knows the Bolus Template Number.
  - The Lower Tester can acquire the template details (i.e. bolus template number and configurable status) by performing IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Procedure

  Select one of the Test Patterns in Table 4.16 and perform the following steps once:

  1. The Lower Tester writes the Set Bolus Template Op *Co*de (0x11DD) to the IDD Command Control Point with an Operand containing a Bolus Template record with supported bolus type as described in Table 4.16. Other parameters of the Bolus Template record, but not listed in Table 4.16, are set to enable the supported bolus type.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set Bolus Template Response Op Code (0x11E1) and Operand containing a Bolus Template Number.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the details of the bolus template are set according to the Bolus Template record by performing the IDS/SEN/CCP/BV-23-C [Get Bolus Template Procedure].
  5. The Lower Tester verifies that the bolus template status is set to configured by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  6. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Set Bolus Template Response Op Code (0x11E1) and Operand containing a Bolus Template Number.

  The IUT writes the settings of the bolus template record to the template with the corresponding Bolus Template Number and the template is set to configured.

### IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Template Status and Details procedure.

- Reference

  [3] 3.7.2.17, 3.8.1.8, 4.6.2.28, and 4.6.2.29

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Get Template Status and Details Op Code (0x11EE) to the IDD Command Control Point with no Operand.
  2. For each supported profile template type, the IUT sends an ATT_Handle_Value_Notification of the IDD Command Data characteristic with Get Template Status and Details Response Op Code (0x1212) and an Operand containing a Template Status and details record.
  3. The IUT sends an ATT_Handle_Value_Notification from the IUT containing the IDD Command Data characteristic handle and value to the Lower Tester.
  4. After notifying the last template status and details record, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing a Request Op Code (0x11EE) followed by the Response Code Value for Success (0x0F).
  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends supported template status and details records.

  If the Template Type field value, of Template Status and Details record, is not a Profile Template type, the Max Number of Supported Time Blocks is set to 0.

  The IUT confirms the completion of the procedure by indicating the IDD Command Control Point characteristic with a Response Code Op Code (0x0F55) and Response Code Value of Success (0x0F).

### IDS/SEN/CCP/BV-26-C [Reset Template Status Procedure]

- Test Purpose

  Verify that the IUT can perform the Reset Template Status procedure.

- Reference

  [3] 3.7.2.18, 4.6.2.30, and 4.6.2.31

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has one or more configurable and configured templates. The Lower Tester acquires the one or more template details by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
- Test Procedure
  1. The Lower Tester writes the Reset Template Status Op *Co*de (0x121D) to the IDD Command Control Point with an Operand containing Number of Templates to Reset and Template Numbers.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Reset Template Status Response Op Code (0x1221) and Operand containing Number of Templates Reset and Template Numbers.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the reset templates are no longer configured by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  5. Verify that the characteristic values meet the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Reset Template Status Response Op Code (0x1221) and Operand containing Number of Templates Reset and Template Numbers.

  The IUT marks the templates identified by the Template Numbers field as not configured.

### IDS/SEN/CCP/BV-27-C [Activate Profile Templates Procedure]

- Test Purpose

  Verify that the IUT can perform the Activate Profile Templates procedure.
- Reference

  [3] 3.7.2.19, 4.6.2.32, and 4.6.2.33
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has one or more configured profile templates. The Lower Tester acquires the one or more profile template details by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
- Test Procedure
  1. The Lower Tester writes the Activate Profile Templates Op *Co*de (0x122E) to the IDD Command Control Point with an Operand containing Number of Profile Templates to Activate and Profile Template Numbers with the template number to be activated.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Activate Profile Templates Response Op Code (0x1247) and Operand containing Number of Profile Templates Activated and Profile Template Numbers.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

4. The Lower Tester verifies that the profile templates identified by the Profile Template Numbers field are activated by performing the Get Activated Profile Templates procedure.
5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Activate Profile Templates Response Op Code (0x1247) and Operand containing a Number of Profile Templates Activated and Profile Template Numbers.

  The IUT activates the profile templates identified by the Profile Template Numbers field.

### IDS/SEN/CCP/BV-28-C [Get Activated Profile Templates Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Activated Profile Templates procedure.

- Reference

  [3] 3.7.2.20, 4.6.2.34, and 4.6.2.35

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has one or more configured templates, but none active.

- Test Procedure

1. The Lower Tester writes the Get Activated Profile Templates Op *Co*de (0x1248) to the IDD Command Control Point with no Operand.
2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op Code (0x1274) and Operand containing the Number of Active Profile Templates field set to 0 and no Profile Template Numbers field.
3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
4. The Lower Tester activates the one or more configured templates by performing the IDS/SEN/CCP/BV-27-C [Activate Profile Templates Procedure].
5. The Lower Tester writes the Get Activated Profile Templates Op *Co*de (0x1248) to the IDD Command Control Point with no Operand.
6. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op Code (0x1274) and Operand containing the Number of Activated Profile Templates field set to the number of templates activated and Profile Template Numbers field set to the activated profile template numbers.
7. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
8. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  If there are currently no active profile templates, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op

Code (0x1274) and Operand containing the Number of Active Profile Templates field set to 0 and no Profile Template Numbers field.

After the one or more configured template are activated, in step 6, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op Code (0x1274) and Operand containing Number of Active Profile Templates and active Profile Template Numbers.

### IDS/SEN/CCP/BV-29-C [Start and Stop Priming Procedures]

- Test Purpose

  Verify that the IUT can perform the Start and Stop Priming procedures.

- Reference

  [3] 3.7.2.21, 3. 7.2.22, 4.6.2.1, and 4.6.2.36

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Start Priming Op *Co*de (0x127B) to the IDD Command Control Point with an Operand Amount field value as specified in the IXIT [8].
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x127B) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.
  5. The Lower Tester writes the Stop Priming Op *Co*de (0x1284) to the IDD Command Control Point with no Operand.
  6. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x1284) followed by the Response Code Value for Success (0x0F).
  7. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  8. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT confirms the execution of the Start Priming procedure by sending an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x127B) followed by the Response Code Value for Success (0x0F).

  The IUT confirms the execution of the Stop Priming procedure by sending an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x1284) followed by the Response Code Value for Success (0x0F).

### IDS/SEN/CCP/BV-30-C [Set Initial Reservoir Fill Level Procedure]

- Test Purpose

  Verify that the IUT can perform the Set Initial Reservoir Fill Level procedure.

- Reference

  [3] 3.7.2.23, 4.6.2.1, and 4.6.2.38

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Set Initial Reservoir Fill Level Op Code (0x128B) to the IDD Command Control Point with an Operand Fill *Level*.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x128B) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the reservoir fill level was set according to the Fill Level field by reading the IDD Status characteristic Reservoir Remaining Amount field.
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sets the fill level of the reservoir to the provided insulin level.

  The IUT indicates the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x128B) followed by the Response Code Value for Success (0x0F).

### IDS/SEN/CCP/BV-31-C [Reset Reservoir Insulin Operation Time Procedure]

- Test Purpose

  Verify that the IUT can perform the Reset Reservoir Insulin Operation Time procedure.

- Reference

  [3] 3.6.2.6, 3.7.2.24, 4.5.2.11, 4.5.2.12, and 4.6.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Status Reader Control Point characteristics.
  - The IUT's Counter Type Reservoir Insulin Operation Time Remaining default value is reported in the IXIT [8].

- Test Procedure

  1. The Lower Tester writes the Reset Reservoir Insulin Operation Time Op *Co*de (0x12B7) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x12B7) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester writes the Get Counter Op Code (0x03A6) to the IDD Status Reader Control Point using the Operand consisting of Counter Type Reservoir Insulin Operation Time (0x55) and a Counter Value Selection set to Remaining (0x0F),

     a. IF the Get Counter Op Code (0x03A6) is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Op Code not supported (0x70).

     b. ELSE IF the Counter Type Reservoir Insulin Operation Time (0x55) is NOT supported OR Counter Value Selection Remaining (0x0F) is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid Operand (0x71).

     c. ELSE, the IUT sends an ATT_Handle_Value_Indication of the IDD Status Reader Control Point characteristic with the Get Counter Response (0x03A9) and an Operand containing a Counter record with the details of the Counter Type Reservoir Insulin Operation Time (0x55) and Counter Value Selection Remaining (0x0F) value.

  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. IF the Get Counter Op Code (0x03A6) is supported, repeat Steps 4 and 5 with the Counter Value Selection set to Elapsed (0x33).
  7. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT indicates the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x12B7) followed by the Response Code Value for Success (0x0F).

  If the Get Counter procedure, Counter Type Reservoir Insulin Operation Time (0x55) and either or both Counter Value Selections are supported, the IUT indicates the IDD Status Reader Control Point characteristic with the Get Counter Response (0x03A9) and an Operand containing a Counter record with the details of the Counter Type Reservoir Insulin Operation *Time* (0x55) and,

  - Counter Value Selection Remaining (0x0F) value which matches the default value, or
  - Counter Value Selection Elapsed (0x33) value which matches 0.

  The reset of the Reservoir Insulin Operation Time (0x55) counter value for Remaining (0x0F), provided in the IXIT [8], and *Elapsed* (0x33) are considered to match the values reported by the Get Counter procedure if the difference in time is less than or equal to what can be explained by distance in a minute between the Lower Tester and IUT completing all test steps.

  If the Get Counter Op Code is NOT supported, the IUT indicates the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Op Code not supported (0x70).

If the Counter Type Reservoir Insulin Operation Time (0x55) OR the selected Counter Value Selections are NOT supported, the IUT indicates the IDD Status Reader Control Point characteristic with Response Code Op Code (0x0303) and an Operand consisting of the Request Op Code (0x03A6) followed by the Response Code Value for Invalid Operand (0x71).

### IDS/SEN/CCP/BV-32-C [Get Max Bolus Amount Procedure]

- Test Purpose

  Verify that the IUT can perform the Get Max Bolus Amount procedure.

- Reference

  [3] 3.7.2.31, 4.6.2.52, and 4.6.2.53

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT's Max Bolus Amount field is set and the value is reported in the IXIT [8].

- Test Procedure

  1. The Lower Tester writes the Get Max Bolus Amount Op Code (0x147D) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Max Bolus Amount Response Op Code (0x1482) and an Operand containing the Max Bolus Amount.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Max Bolus Amount Response Op Code (0x1482) and an Operand containing the Max Bolus Amount.

  The IUT reports the maximum bolus amount that can be delivered in a single bolus.

### IDS/SEN/CCP/BV-33-C [Set Max Bolus Amount Procedure]

- Test Purpose

  Verify that the IUT can perform the Set Max Bolus Amount procedure.

- Reference

  [3] 3.7.2.32, 4.6.2.1, and 4.6.2.54

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT's Max Bolus Amount field value is known from the IXIT [8].

- Test Procedure

  1. The Lower Tester writes the Set Max Bolus Amount Op Code (0x148D) to the IDD Command Control Point with an Operand containing a Max Bolus Amount field.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x148D) followed by the Response Code Value for Success (0x0F).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the set maximum bolus amount that can be delivered in a single bolus is set according to the IXIT [8].
  5. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x148D) followed by the Response Code Value for Success (0x0F).

### 4.7.4 IDD Command Control Point – Error Handling

This test group contains test cases to verify compliant operation of the IUT when an IDD Command Control Point is written with an invalid operand or operand is out of range or IUT does not support the procedure or other errors specific to the procedure or control point.

#### IDS/SEN/CCPE/BI-01-C [Command CP – Op Code not supported]

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an unsupported Op Code, where the procedure refers to a feature that is not supported, to the IDD Command Control Point.

- Reference

  [3] 3.7.1, 3.11.4, 4.6.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The Lower Tester knows the IUT unsupported features by reading the IDD Feature Flags field (Flags field supported feature bit is set to False).

- Test Procedure

  1. The Lower Tester writes an Op Code, where the procedure refers to a feature that is not supported, to the IDD Command Control Point with an appropriate Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (selected value from Step 1) followed by the Response Code Value for Op Code not supported (0x70).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (selected value from Step 1) followed by the Response Code Value for Op Code not supported (0x70).

### IDS/SEN/CCPE/BI-02-C [Set Therapy Control State Procedure – Invalid operand]

- Test Purpose

  Verify that the IUT does not perform the Set Therapy Control State procedure using the Test Patterns described in Table 4.17.

| Test Pattern | Therapy Control State |
|---|---|
| 1 | Set to RFU |
| 2 | Set to Undetermined |

*Table 4.17: Test patterns for IDD Command Control Point Characteristic Set Therapy Control State procedure*

- Reference

  [3] 3.7.2.2, 3.11.4, 4.6.2.1 and 4.6.2.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  Select one of the Test Patterns in Table 4.17 and perform the following steps once:

  1. The Lower Tester writes the Set Therapy Control State Op Code (0x0F5A) to the IDD Command Control Point with an Operand containing a Therapy Control State field set as described in Table 4.17.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Value Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F5A) followed by the Response Code Value for Invalid operand (0x71).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD Command Control Point characteristic with the Response Code Value Op Code (0x0F55) and an Operand representing the Request Op Code (0x0F5A) followed by the Response Code Value for Invalid operand (0x71).

### IDS/SEN/CCPE/BI-03-C [Write Basal Rate Profile Template Procedure – Parameter out of range]

- Test Purpose

  Verify that the IUT does not perform the Write Basal Rate Profile Template procedure using the Test Patterns described in Table 4.18.

| Test Pattern | Profile Template record parameter | Value |
|---|---|---|
| 1 | Profile Template Number | Out of range |
| 2 | First Time Block Number Index | 0 |
| 3 | First Time Block Number Index | Greater than the maximum number of supported time blocks supported by profile |
| 4 | Number of time blocks | Greater than the maximum number of supported time blocks supported by profile |

*Table 4.18: Test patterns for Write Basal Rate Profile Template Procedure – Parameter out of range*

- Reference

  [3] 3.7.2.1.2, 3.7.2.7, 3.11.4, 4.6.2.1, and 4.6.2.10

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has Basal Rate Profile Template with status set to configurable and the Lower Tester acquires the template details by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure] procedure.

- Test Procedure

  Select one of the Test Patterns in Table 4.18 and perform the following steps once:

  1. The Lower Tester writes the Write Basal Rate Profile Template Op Code (0x0FCC) to the IDD Command Control Point with an Operand comprising the Basal Rate Profile Template record with the appropriate Flags field (Bit 0, End Transaction, set to False), and a profile template number, first time block number index, and time blocks as described in Table 4.18.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Parameter out of range (0x73).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Parameter out of range (0x73).

### IDS/SEN/CCPE/BI-04-C [Stop Priming Procedure – Procedure not applicable]

- Test Purpose

  Verify that the IUT does not perform the Stop Priming procedure when a Start Priming procedure was not started.

- Reference

  [3] 3.7.2.22, 3.11.4, and 4.6.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - A Start Priming procedure is not initiated.

- Test Procedure

  1. The Lower Tester writes the Stop Priming Op *Co*de (0x1284) to the IDD Command Control Point with no Operand.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x1284) followed by the Response Code Value for Procedure not applicable (0x74).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x1284) followed by the Response Code Value for Procedure not applicable (0x74).

### IDS/SEN/CCPE/BI-05-C [Write Basal Rate Profile Template Procedure – Plausibility check failed within a transaction]

- Test Purpose

  Verify that the IUT does not perform the Write Basal Rate Profile Template procedure, using the Test Patterns in Table 4.19, when the plausibility check fails within a transaction.

| Test Pattern | Invalid Operand Parameter | Valid Operand Parameters |
|---|---|---|
| 1 | A different Basal Rate Profile Template Number | • First Time Block Number Index<br>• Duration(s) and Rate(s) (as applicable) |
| 2 | A repeated First Time Block Number Index | • Basal Rate Profile Template<br>• Duration(s) and Rate(s) (as applicable) |
| 3 | First Time Block Number Index set to 2 | • Basal Rate Profile Template Number<br>• Duration(s) and Rate(s) (as applicable) |

*Table 4.19: Test patterns for Write Basal Rate Profile Template Procedure - Plausibility check within a transaction*

- Reference

  [3] 3.7.2.1.2, 3.7.2.7, 4.6.2.1, and 4.6.2.10

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a basal rate profile template with status set to configurable and the Lower Tester acquires the template details by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  - The IUT supports more than one basal rate template.

- Test Procedure

  1. The Lower Tester writes the Write Basal Rate Profile Template Op Code (0x0FCC) to the IDD Command Control Point with an Operand comprising the Basal Rate Profile Template record with the Flags field Bit 0 (Transaction Completed), set to False, Bit 1 (Second Time Block Present) and Bit 2 (Third Time Block Present) set to True.
  2. For the received profile template record, the IUT performs a plausibility check. After a successful plausibility check, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Write Basal Rate Profile Template Response Op Code (0x0FF0) and an Operand containing the appropriate Flags Field (Bit 0, Transaction Completed, set to False), profile template number and first time block number index.
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Using one of the Test Patterns in Table 4.19, the Lower Tester writes the Write Basal Rate Profile Template Op Code (0x0FCC) to the IDD Command Control Point with an Operand comprising the Basal Rate Profile Template record with the appropriate Flags field (Bit 0, End Transaction, set to *False*), and parameters as described in Table 4.19.
  5. For the received profile template record, the IUT performs a plausibility check. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Plausibility check failed (0x75).
  6. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  7. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  In Step 2, after the successful plausibility check, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Write Basal Rate Profile Template Response Op Code (0x0FF0) and an Operand containing the appropriate Flags Field (Bit 0, Transaction Completed, set to False), profile template number and first time block number index.

  In Step 5, the IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Plausibility check failed (0x75).

### IDS/SEN/CCPE/BI-06-C [Write Basal Rate Profile Template Procedure – Plausibility check failed at the end of a transaction]

- Test Purpose

  Verify that the IUT does not perform the Write Basal Rate Profile Template procedure, using the Test Patterns in Table 4.20, when the plausibility check fails at the end of a transaction.

| Test Pattern | Plausibility Check |
|---|---|
| 1 | The sum of all time block durations is less (<) than 24 h and there are no gaps between the time blocks |
| 2 | The sum of all time block durations is greater (>) than 24 h and there are no gaps between the time blocks |
| 3 | The sum of all time block durations is (=) 24 h and there are gaps between the time blocks |

*Table 4.20: Test Patterns for Write Basal Rate Profile Template Procedure - Plausibility check at the end of a transaction*

- Reference

  [3] 3.7.2.1.2, 3.7.2.7, 4.6.2.1, and 4.6.2.10

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a basal rate profile template with status set to configurable and the Lower Tester acquires the template details by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Procedure

  Select one of the Test Patterns in Table 4.20 and perform the following steps:

  1. The Lower Tester writes the Write Basal Rate Profile Template Op Code (0x0FCC) to the IDD Command Control Point with an Operand comprising the Basal Rate Profile Template record with Flags field (Bit 0, End Transaction, set to True), a profile template number, and first time block number index, duration(s) and rate(s) as described in Table 4.20.
  2. For the received profile template record, the IUT performs an end of a transaction plausibility check using the selected Test Pattern in Table 4.20. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Plausibility check failed (0x75).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Plausibility check failed (0x75).

### IDS/SEN/CCPE/BI-07-C [Set Bolus Procedure – Maximum Bolus Number Reached]

- Test Purpose

  Verify that the IUT does not perform the Set Bolus procedure if a bolus of a specified type is currently not available.

- Reference

  [3] 3.7.2.12, 4.6.2.1, and 4.6.2.18

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - Perform an action on the IUT that sets the maximum number of allowed boluses for a supported bolus type as indicated in the IXIT [8].

- Test Procedure

  1. The Lower Tester writes the Set Bolus Op *Co*de (0x114B) to the IDD Command Control Point with an Operand containing a Bolus record with a new bolus set to the supported bolus type for the maximum number of allowed boluses according to the IXIT [8].
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x114B) followed by the Response Code Value Maximum Bolus Number reached (0x76).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x114B) followed by the Response Code Value Maximum Bolus Number reached (0x76).

### IDS/SEN/CCPE/BI-08-C [Activate Profile Templates Procedure – Procedure not applicable]

- Test Purpose

  Verify that the IUT does not perform the Activate Profile Templates procedure with a profile template which is not configured.

- Reference

  [3] 3.7.2.19, 4.6.2.1, 4.6.2.32, and 4.6.2.33

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT supports at least 1 template, and the Profile Template Numbers value of a not-configured profile template is known from the IXIT [8].

- The IUT has no active profile template.
- The Lower Tester acquires the template details (template numbers, configurable and configured status) by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].

- Test Procedure

  1. The Lower Tester writes the Activate Profile Templates Op Code (0x122E) to the IDD Command Control Point with an Operand containing the Number of Profile Templates to Activate set to at least 1 and the Profile Template Numbers value set to the not-configured template specified in the IXIT [8].
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x122E) followed by the Response Code Value for Procedure not applicable (0x74).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester writes the Get Activated Profile Templates Op *Co*de (0x1248) to the IDD Command Control Point with no Operand.
  5. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op Code (0x1274) and Operand containing the Number of Activated Profile Templates field set to 0.
  6. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester
  7. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand containing the Request Op Code (0x122E) followed by the Response Code Value for Procedure not applicable (0x74).

  The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Get Activated Profile Templates Response Op Code (0x1274) and Operand containing the Number of Activated Profile Templates field set to 0.

## 4.8 IDD Record Access Control Point Procedures

This test group contains test cases to verify that the IUT can be configured, conducts compliant operation, provides correctly formatted values of the IDD History Data characteristic, and interprets correctly values of the IDD Record Access Control Point characteristic.

Table 3.22 in [10] defines the Op Codes, Operators and Operand values used in the IDD Record Access Control Point procedure test cases in this section.

### IDS/SEN/RAN/BV-01-C [Report Number of Stored Records Procedure]

- Test Purpose

  Verify that the IUT can perform the Report Number of Stored Records procedure with the combination of Operators and Operands listed in Table 4.21.

  If the combination of the Operator and Operand is supported the IUT reports a valid response. Where the Operator or Operand or the combination is not supported the IUT reports a valid error response.

| | | Inner Loop: Operand | | |
|---|---|---|---|---|
| | | Sequence Number (0x0F) | Sequence number filtered by Reference Time Event (0x33) | Sequence Number filtered by Non-Reference Time Event (0x3C) |
| **Outer Loop: Operator** | All records (0x33) | N/A | N/A | N/A |
| | Less than or equal to (0x3C) | <Max filter value> | <Max filter value> | <Max filter value> |
| | Greater than or equal to (0x55) | <Min filter value> | <Min filter value> | <Min filter value> |
| | Within range of (inclusive) (0x5A) | <Min filter value>, <Max filter value> | <Min filter value>, <Max filter value> | <Min filter value>, <Max filter value> |
| | First record (0x66) | N/A | N/A | N/A |
| | Last record (0x69) | N/A | N/A | N/A |

The following apply to the filter parameters:

- Maximum (Max) filter value must not be greater than the largest known sequence number value.
- Minimum (Min) filter value must not be less than the lowest known sequence number value.
- Minimum (Min) filter value must be less than or equal to the Maximum (Max) filter value.

*Table 4.21: IDD RACP – Operators and Operands*

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.
  - Perform an action on the IUT that will induce it to generate at least 5 records; of which one record should be a supported reference time history event.
  - The Lower Tester knows the Sequence Number for the records.

- Test Procedure

  1. For each <Operator> in Table 4.21, perform the following steps (outer loop):
     a. For each <Operand> in Table 4.21, perform the following steps (inner loop):
        i. The Lower Tester writes the Report Number of Stored Records Op Code (0x5A) to the IDD RACP using the listed <Operator>, <Operand> and corresponding filter parameter(s) as applicable.
        ii. IF the <Operator> is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x5A) followed by the Response Code Value for Operator not supported (0x04).
        iii. ELSE IF the <Operand> is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x5A) followed by the Response Code Value for Operand not supported (0x09).
        iv. ELSE, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Number of Stored Records Response Op Code (0x66) an

Operator of Null (0x0F) and an Operand representing the number of records that were found.

v. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

2. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each combination of <Operator>, and as applicable <Operand>, the IUT sends

  - one indication of the IDD Record Access Control Point characteristic with the Number of Stored Records Response Op Code containing a valid Operator and Operand. The value of the Operand represents the correct number of available records (Combination supported).

    OR

  - the appropriate error message (Combination not supported).

### IDS/SEN/RAN/BV-02-C [Report Number of Stored Records Procedure - With no records]

- Test Purpose

  Verify that the IUT responds properly if the Report Number of Stored Records procedure is performed using a mandatory Operator, and Operand as applicable, when the IUT does not contain any records.

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.2

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

  - Perform an action on the IUT that will induce it to remove all the stored records (by having the Lower Tester perform a Delete Stored Records procedure) or the Lower Tester knows the last sequence number.

- Test Procedure

  1. The Lower Tester writes the Report Number of Stored Records Op Code (0x5A) to the IDD RACP using a mandatory Operator, and Operand as applicable, which request records number which do not exist.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Number of Stored Records Response Op Code (0x66) an Operator of Null (0x0F) and an Operand representing that no records were found (0x0000 0000).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD RACP characteristic with the Number of Stored Records Response Op Code (0x66) an Operator of Null (0x0F) and an Operand representing that no records were found (0x0000 0000).

### IDS/SEN/RAD/BV-01-C [Delete Stored Records Procedure]

- Test Purpose

  Verify that the IUT can perform the Delete Stored Records procedure with the combination of Operators and Operands listed in Table 4.21.

  If the combination of the Operator and Operand is supported the IUT reports a valid response. Where the Operator or Operand or the combination is not supported the IUT reports a valid error response.

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.3

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate at least 5 records; of which one record should be a supported reference time history event.
  2. Verify that the Lower Tester knows the Sequence Number for the generated records.
  3. For each <Operator> in Table 4.21, perform the following steps (outer loop):

     a. For each <Operand> in Table 4.21, perform the following steps (inner loop):

        i. The Lower Tester writes the Delete Stored Records Op Code (0x3C) to the IDD RACP using the listed <Operator>, <Operand> and corresponding filter parameter(s) as applicable.

        ii. IF the <Operator> is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x3C) followed by the Response Code Value for Operator not supported (0x04).

            a) The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

        iii. ELSE IF the <Operand> is NOT supported, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x3C) followed by the Response Code Value for Operand not supported (0x09).

            a) The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

        iv. ELSE IF the <Operand> is Sequence Number filtered by Reference Time Event and NO reference time events exist in the requested sequence number range OR IF the <Operand> is Sequence Number filtered by Non-Reference Time Event and ONLY reference time events exist in the requested sequence number range, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the

Request Op Code (0x3C) followed by the Response Code Value for No Records Found (0x06).

a) The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

v. ELSE, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x3C) followed by the Response Code for Success (0xF0).

a) The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

b) The Lower Tester verifies that the records have been deleted by performing the Report Number of Stored Records Op Code (0x5A) with an applicable Operator and Operand.

c) Perform an action on the IUT that will induce it to generate at least 5 records; of which one record should be a supported reference time history event.

d) Verify that the Lower Tester knows the Sequence Number for the generated records.

4. Verify that the characteristic value meets the requirements of the service

- Expected Outcome

  Pass verdict

  For each combination of <Operator>, and as applicable <Operand>, the IUT sends

  - One indication of the IDD RACP characteristic with the Response Code Op Code containing a valid Operator and Operand for each operation (Combination supported).

    OR

  - The appropriate error message (Combination not supported)

  The Sequence Number is not reset by the Delete Stored Records operation.

### IDS/SEN/RAR/BV-01-C [Report Stored Records Procedure]

- Test Purpose

  Verify that the IUT can perform the Report Stored Records procedure with the combination of Operators and Operands listed in Table 4.21.

  If the combination of the Operator and Operand is supported the IUT reports a valid response. Where the Operator or Operand or the combination is not supported the IUT reports a valid error response.

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.4

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.
  - Perform an action on the IUT that will induce it to generate at least 5 records; of which one record should be a supported reference time history event.
  - The Lower Tester knows the Sequence Number for the records.

- Test Procedure

  1. For each <Operator> in Table 4.21, perform the following steps (outer loop):

     a. For each <Operand> in Table 4.21, perform the following steps (inner loop):

        i. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using the listed <Operator>, <Operand> and corresponding filter parameter(s) as applicable.

        ii. IF the <Operator> is NOT supported the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operator not supported (0x04).

        iii. ELSE IF the <Operand> is NOT supported the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operand not supported (0x09).

        iv. ELSE IF the <Operand> is Sequence Number filtered by Reference Time Event and NO reference time events exist in the requested sequence number range OR IF the <Operand> is Sequence Number filtered by Non-Reference Time Event and ONLY reference time events exist in the requested sequence number range, the IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for No Records Found (0x06).

        v. ELSE, the IUT sends ATT_Handle_Value_Notification(s) of the IDD History Data characteristic, representing the required records; number and characteristic values depend on the <Operator>, <Operand>, corresponding filter parameter(s) and the generated list of records.

           a) The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Success (0xF0).

        vi. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

  2. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  For each combination of <Operator>, and as applicable <Operand>, the IUT sends

  - The required number of notifications of the IDD History Data characteristic and an indication containing the IDD RACP characteristic handle and value (Combination supported).

    OR

  - The appropriate error message (Combination not supported).

  The value of the Sequence Number increments by 1 for each successive IDD History Data characteristic notification.

  The oldest record is transmitted before newer records.

### IDS/SEN/RAA/BV-01-C [Abort Operation Procedure]

- Test Purpose

  Verify that the IUT can perform an Abort Operation of the Report Stored Records procedure with a Null Operator and no Operand.

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.5

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate enough records such that the transmission is not able to complete before and abort procedure is attempted.
  2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).
  3. The IUT starts to send ATT_Handle_Value_Notification of the IDD History Data characteristic.
  4. The Lower Tester writes the Abort Operation Op Code (0x55) to the IDD RACP with an Operator of Null (0x0F) and no Operand.
  5. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x55) followed by the Response Code for Success (0xF0).
  6. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  7. Verify that the notifications stop.
  8. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends some, but not all notifications of the IDD History Data characteristic.

  The IUT sends one indication of the IDD RACP characteristic with the Response Code Op Code containing a Response Code Value in the Operand set to Success.

## 4.8.1 IDD Record Access Control Point Procedures – Error Handling

This test group contains test cases to verify compliant operation of the IUT when the IDD Record Access Control Point Procedures is written with values outside defined ranges, or considered invalid or unexpected.

### IDS/SEN/RAE/BI-01-C [Report Stored Records – 'No Records Found']

- Test Purpose

  Verify that the IUT responds properly if the Report Stored Records procedure is performed using a supported Operator, and Operand as applicable, when the IUT does not contain any records.

- Reference

  [10] 3.9.3, 3.9.4.1, and 3.9.4.4

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.
  - Perform an action on the IUT that will induce it to remove all the stored records (by having the Lower Tester perform a Delete Stored Records procedure) or the Lower Tester knows the last sequence number.
- Test Procedure
  1. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using a supported Operator, and Operand as applicable, which request records which do not exist.
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F), an Operator of Null (0x0F), and an Operand representing the Request Op Code followed by the Response Code Value for No Records Found (0x06).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code followed by the Response Code Value for No Records Found (0x06).

### IDS/SEN/RAE/BI-02-C [IDD RACP Specific Error – 'Client Characteristic Configuration Descriptor Improperly Configured']

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform an IDD RACP procedure with a Client Characteristic Configuration descriptor that is not configured.
- Reference

  [10] 3.9.4.6
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.
- Test Procedure
  1. The Lower Tester resets to 0 the Client Characteristic Configuration descriptor of the IDD History Data characteristic.
  2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).
  3. The IUT sends an ATT_Error_Response with Error Code Client Characteristic Configuration Descriptor Improperly Configured (0xFD).
  4. Verify that the characteristic value meets the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT responds with an Attribute Protocol Application Error Code set to Client Characteristic Configuration Descriptor Improperly Configured (0xFD).

### IDS/SEN/RAE/BI-03-C [IDD RACP Specific Error – 'Operand not supported']

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an Op Code to the IDD RACP with an Operand Filter Type with a value from the RFU range.

- Reference

  [3] 3.9.4.6

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of Greater than or equal to (0x55) and an Operand Filter Type with a value from the RFU range followed by an appropriate Filter Parameters (minimum filter value).
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operand not supported (0x09).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operand not supported (0x09).

### IDS/SEN/RAE/BI-04-C [IDD RACP Specific Error – 'Procedure Already in Progress']

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform an IDD RACP procedure before another IDD RACP procedure is completed.

- Reference

  [10] 3.9.4.6

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate several (~100) records.
  2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).
  3. Before the procedure is completed, the Lower Tester performs the same procedure again by writing the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).

4. The IUT sends an ATT_Error_Response with Error Code Procedure Already in Progress (0xFE).
5. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT rejects the Write Request to start the second procedure and responds with an ATT_Error_Response with Error Code set to Procedure Already in Progress (0xFE).

### IDS/SEN/RAE/BI-05-C [IDD RACP Specific Error – 'Operator not Supported']

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an Op Code to the IDD RACP with an Operator with a value from the RFU range.

- Reference

  [3] 3.9.4.6

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator with a value from the RFU range and an Operand Sequence Number (0x0F).
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operator not supported (0x04).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Operator not supported (0x04).

### IDS/SEN/RAE/BI-06-C [IDD RACP Specific Error – 'Invalid Operator']

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an Op Code to the IDD RACP with an invalid Operator.

- Reference

  [3] 3.9.4.6

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of Null (0x0F) and Operand Sequence Number (0x0F).
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Invalid Operator (0x03).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Invalid Operator (0x03).

## 4.9 IDD History Data

This test group contains test cases to verify the IUT's handling of various history events.

### IDS/SEN/HDE/BV-01-C [IDD History Data – 'Chronological order of History Events and Sequence Number Incremented by 1']

- Test Purpose

  Verify that the history events are in chronological order and the Sequence Number is incremented by 1.

- Reference

  [10] 3.10.4.2, 3.10.4.3, and 4.9

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate a supported event type which requires at least three notifications of the IDD History Data characteristic.
  2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).
  3. The IUT sends at least three ATT_Handle_Value_Notification of the IDD History Data characteristic.
  4. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Success (0xF0).
  5. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  6. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The history events are in chronological order and the Sequence Number is incremented by 1 for each successive IDD History Data characteristic value.

### IDS/SEN/HDE/BV-02-C [IDD History Data – 'Event Types']

- Test Purpose

  Verify that the IUT can respond with the correct formatting and grouping of history events for the Test Patterns described in Table 4.22.

| Test Pattern | Event Type |
|---|---|
| 1 | Reference Time |
| 2 | Reference Time Base Offset |
| 3 | Bolus Calculated Part 1 of 2 |
| | Bolus Calculated Part 2 of 2 |
| 4 | Bolus Programmed Part 1 of 2 |
| | Bolus Programmed Part 2 of 2 |
| 5 | Bolus Delivered Part 1 of 2 |
| | Bolus Delivered Part 2 of 2 |
| 6 | Delivered Basal Rate Changed |
| 7 | TBR Adjustment Started |
| | Delivered Basal Rate Changed |
| 8 | TBR Adjustment Ended |
| | Delivered Basal Rate Changed |
| 9 | TBR Adjustment Changed |
| | Delivered Basal Rate Changed |
| 10 | Profile Template Activated |
| 11 | Basal Rate Profile Template Time Block Changed |
| 12 | Total Daily Insulin Delivery |
| 13 | Therapy Control State Changed |
| 14 | Operational State Changed |
| 15 | Reservoir Remaining Amount Changed |
| 16 | Annunciation Status Changed Part 1 of 2 |
| | Annunciation Status Changed Part 2 of 2 |
| 17 | ISF Profile Template Time Block Changed |
| 18 | I2CHO Profile Template Time Block Changed |
| 19 | Target Glucose Range Profile Template Time Block Changed |
| 20 | Priming Started |
| 21 | Priming Done |
| 22 | Data Corruption |
| 23 | Pointer Event |
| 24 | Bolus Template Changed Part 1 of 2 |
| | Bolus Template Changed Part 2 of 2 |
| 25 | TBR Template Changed |
| 26 | Max Bolus Amount Changed |

*Table 4.22: IDD History Data Event Types*

- Reference

  [3] 3.10.1, 3.10.2, 3.10.3, 3.10.4, and 4.9

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.
  - The IUT supports the event type being tested.

- Test Procedure

  1. Ensure that the IUT has no stored records.
  2. For each Test Pattern, and supported event type, in Table 4.22, repeat the following steps:
     a. Perform an action on the IUT that will induce it to generate the event type and applicable related event type.
     b. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of Greater than or equal to (0x55) and using the Sequence Number (0x0F) Filter Type in the Operand followed by a minimum value for the filter representing the sequence number since the last test pattern execution.
     c. The IUT sends one or more ATT_Handle_Value_Notification of the IDD History Data characteristic.
     d. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Success (0xF0).
     e. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
     f. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Success (0xF0).

  The events of the same group are recorded in a sequence with increased Sequence Number field values and the same Relative Offset field value.

## 4.10 General Error Handling

This test group contains test cases to verify the IUT's error handling behavior for various scenarios.

### IDS/SEN/CBE/BI-01-C [General Error Handling – 'Client Characteristic Configuration Descriptor Improperly Configured']

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform an IDD Command Control Point procedure with a Client Characteristic Configuration descriptor that is improperly configured.

- Reference

  [3] 3.7.2.6, 3.11.4

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.

- Test Procedure

  1. The Lower Tester resets to 0 both the Client Characteristic Configuration descriptors of the IDD Command Data and IDD Command Control Point characteristics.
  2. The Lower Tester writes the Read Basal Rate Profile Template Op Code (0x0FAA) to the IDD Command Control Point with an Operand comprising a Basal Rate Profile Template Number.
  3. The IUT sends an ATT_Error_Response with Error Code Client Characteristic Configuration Descriptor Improperly Configured (0xFD).
  4. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Error_Response with Error Code Client Characteristic Configuration Descriptor Improperly Configured (0xFD).

### IDS/SEN/CBE/BI-02-C [General Error Handling – 'Invalid Operand Structure']

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an Op Code to the IDD Record Access Control Point with an Operand containing a filter parameter where none was expected.

- Reference

  [3] 3.11.4

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Record Access Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate 3 or more records and a Reference Time history event.

2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33) and Operand Filter Type value set to Sequence Number *(*0x0F) and a Filter Parameter set to any value.
3. The IUT sends an ATT_Handle_Value_Indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Invalid Operand (0x05).
4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
5. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the IDD RACP characteristic with the Response Code Op Code (0x0F) an Operator of Null (0x0F) and an Operand representing the Request Op Code (0x33) followed by the Response Code Value for Invalid Operand (0x05).

### IDS/SEN/CBE/BI-03-C [General Error Handling – 'Procedure Already in Progress']

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform an IDD Command CP procedure before another IDD RACP procedure is completed.

- Reference

  [10] 3.7.1, 3.9.4.4, 3.9.4.6, and 3.11.4

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point and IDD Record Access Control Point characteristic.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate several (~100) records.
  2. The Lower Tester writes the Report Stored Records Op Code (0x33) to the IDD RACP using an Operator of All records (0x33).
  3. Before the procedure is completed, the Lower Tester writes a mandatory Op Code to the IDD Command Control Point with, if applicable, the corresponding Operand.
  4. The IUT sends an ATT_Error_Response with Error Code Procedure Already in Progress (0xFE).
  5. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT rejects the Write Request from step 3 and responds with an Attribute Protocol Application Error Code set to Procedure Already in Progress (0xFE).

### IDS/SEN/CBE/BI-04-C [General Error Handling – 'Common Transaction Behavior']

- Test Purpose

  Verify that, if a transaction fails, the IUT discards all the data of the transaction.

- Reference

  [3] 3.7.2.1.2, 3.7.2.7, and 3.11.2

- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Command Control Point characteristic.
  - The IUT has a basal rate profile template with the Configurable Flags field set to *True*, and Configured Flags field set to False.
  - The Lower Tester knows the basal rate profile template details such as the Configurable and Configured Flags field status by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
- Test Procedure
  1. The Lower Tester writes the Write Basal Rate Profile Template Op Code (0x0FCC) to the IDD Command Control Point with an Operand Basal Rate Profile Template record with the Flags field (Bit 0, End Transaction, set to True), a basal rate profile template number, first time block number index, duration(s) less (<) than 24 h, and rate(s).
  2. The IUT sends an ATT_Handle_Value_Indication of the IDD Command Control Point characteristic with the Response Code Op Code (0x0F55) and an Operand consisting of the Request Op Code (0x0FCC) followed by the Response Code Value for Plausibility check failed (0x75).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester verifies that the basal rate profile template is configurable and that the basal rate profile template does not contain data (Configured Flags field is set to False), by performing the IDS/SEN/CCP/BV-25-C [Get Template Status and Details Procedure].
  5. The Lower Tester attempts to read the basal rate profile template from step 4.
  6. Verify that the characteristic value meets the requirements of the service.
- Expected Outcome

  Pass verdict

  The IUT sends a Plausibility check failed (0x75) and ends the basal rate profile template writing procedure. The IUT sends a Procedure not applicable (0x74) as the basal rate profile template is not configured and cannot be read as only configured template can contain data.

### IDS/SEN/CBE/BI-05-C [General Error Handling – 'Invalid Counter']

- Test Purpose

  Verify that the IUT does not allow a write of the IDD Status Reader Control Point characteristic if a required E2E-Counter is invalid.
- Reference

  [3] 1.7, 1.8, 3.6.2.5, 3.12, and 4.5.2.9
- Initial Condition
  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Get Total Daily Insulin Status Op Code (0x0395) to the IDD Status Reader Control Point with no Operand and an invalid E2E-Counter value set to 2 as the initial E2E-Counter starts with a value of 1 at the initial connection.
  2. The IUT sends an ATT_Error_Response with Error Code Invalid Counter (0x82).
  3. The Lower Tester receives an ATT_Error_Response with Error Code Invalid Counter (0x82).
  4. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Error_Response with Error Code Invalid Counter (0x82).

### IDS/SEN/CBE/BI-06-C [General Error Handling – 'Invalid CRC']

- Test Purpose

  Verify that the IUT does not allow a write of the IDD Status Reader Control Point characteristic if the required E2E-CRC is invalid.

- Reference

  [3] 1.7, 1.8, 3.6.2.5, 3.12, and 4.5.2.9

- Initial Condition

  - Perform the preamble described in Section 4.2.2 to enable the IUT for use with the <Control Point Characteristic> set to IDD Status Reader Control Point characteristic.

- Test Procedure

  1. The Lower Tester writes the Get Total Daily Insulin Status Op Code (0x0395) to the IDD Status Reader Control Point with no Operand and with an invalid E2E-CRC field attached.
  2. The IUT sends an ATT_Error_Response with Error Code Invalid CRC (0x81).
  3. The Lower Tester receives an ATT_Error_Response with Error Code Invalid CRC (0x81).
  4. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends an ATT_Error_Response with Error Code Invalid CRC (0x81).

# 5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The IUT will be tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

**Item:** Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for Insulin Delivery Service (IDS) [5].

**Feature:** A brief, informal description of the feature being tested.

**Test Case(s):** The applicable test case identifiers, required for Bluetooth Qualification, if the corresponding y/x references defined in the Item column are supported. Further details about the function of the TCMT are elaborated in [2].

For purpose and structure of the ICS/IXIT, refer to [2].

| Item | Feature | Test Case(s) |
|---|---|---|
| IDS 2/1 | IDS Service Definition | IDS/SEN/SGGIT/SER/BV-01-C |
| IDS 2/2 | IDD Status Changed | IDS/SEN/SGGIT/CHA/BV-02-C<br>IDS/SEN/CON/BV-01-C<br>IDS/SEN/CR/BV-01-C |
| IDS 2/3 | IDD Status | IDS/SEN/SGGIT/CHA/BV-03-C<br>IDS/SEN/CON/BV-02-C<br>IDS/SEN/CR/BV-02-C |
| IDS 2/4 | IDD Annunciation Status | IDS/SEN/SGGIT/CHA/BV-04-C<br>IDS/SEN/CON/BV-03-C<br>IDS/SEN/CR/BV-03-C |
| IDS 2/5 AND NOT IDS 3a/1 | Read IDD Features | IDS/SEN/SGGIT/CHA/BV-05-C<br>IDS/SEN/CR/BV-04-C |
| IDS 2/5 AND IDS 3a/2 | IDD Features indication | IDS/SEN/SGGIT/CHA/BV-11-C<br>IDS/SEN/SGGIT/ISFC/BV-12-C |
| IDS 2/6 AND IDS 3/1 | Verify E2E-Protection with IDD Status Reader CP | IDS/SEN/CR/BV-05-C |
| (IDS 2/6 AND (IDS 2/7 OR IDS 2/9)) AND IDS 3/1 | Verify E2E-Protection with multiple CPs | IDS/SEN/CR/BV-06-C |
| IDS 2/6 | IDD Status Reader Control Point | IDS/SEN/SGGIT/CHA/BV-06-C<br>IDS/SEN/CON/BV-04-C<br>IDS/SEN/RCPE/BI-05-C |
| IDS 2/2 AND IDS 5/1 | Reset Status | IDS/SEN/RCP/BV-01-C |
| IDS 3/6 OR IDS 3/7 OR IDS 3/8 | Get Active Bolus IDs or Get Active Bolus Delivery | IDS/SEN/RCP/BV-02-C<br>IDS/SEN/RCP/BV-03-C<br>IDS/SEN/RCP/BV-04-C<br>IDS/SEN/RCP/BV-05-C<br>IDS/SEN/RCPE/BI-01-C<br>IDS/SEN/RCPE/BI-02-C |

| Item | Feature | Test Case(s) |
|---|---|---|
| IDS 3/2 | Get Active Basal Rate Delivery | IDS/SEN/RCP/BV-06-C<br>IDS/SEN/RCPE/BI-03-C |
| IDS 5/5 AND (IDS 3/2 OR IDS 3/6 OR IDS 3/7 OR IDS 3/8) | Get Total Daily Insulin Status | IDS/SEN/RCP/BV-07-C |
| IDS 5/6 | Get Counter | IDS/SEN/RCP/BV-08-C<br>IDS/SEN/RCPE/BI-04-C |
| IDS 5/7 AND (IDS 3/2 OR IDS 3/6 OR IDS 3/7 OR IDS 3/8) | Get Delivered Insulin | IDS/SEN/RCP/BV-09-C |
| IDS 3/16 | Get Insulin On Board | IDS/SEN/RCP/BV-10-C |
| IDS 2/7 | IDD Command Control Point | IDS/SEN/SGGIT/CHA/BV-07-C<br>IDS/SEN/CON/BV-05-C |
| IDS 2/7 AND NOT (IDS 3/2 OR IDS 3/3 OR IDS 3/4 OR IDS 3/5 OR IDS 3/6 OR IDS 3/7 OR IDS 3/8 OR IDS 3/10 OR IDS 3/13 OR IDS 3/14 OR IDS 3/15) | IDD Command Control Point – Op Code not supported | IDS/SEN/CCPE/BI-01-C |
| IDS 2/3 AND IDS 2/7 AND IDS 6/1 | Set Therapy Control State | IDS/SEN/CCP/BV-01-C<br>IDS/SEN/CCPE/BI-02-C |
| IDS 2/7 AND IDS 6/2 | Set Flight Mode | IDS/SEN/CCP/BV-02-C |
| IDS 2/7 AND IDS 6/3 AND (IDS 4/1 AND (IDS 4/2 OR IDS 4/3 OR IDS 4/4)) | Snooze Annunciation | IDS/SEN/CCP/BV-03-C |
| IDS 2/7 AND IDS 6/4 AND (IDS 4/1 AND (IDS 4/2 OR IDS 4/3 OR IDS 4/4)) | Confirm Annunciation | IDS/SEN/CCP/BV-04-C<br>IDS/SEN/CCP/BV-05-C |
| IDS 2/7 AND IDS 3/2 | Read Basal Rate Profile Template or Write Basal Rate Profile Template | IDS/SEN/CCP/BV-06-C<br>IDS/SEN/CCP/BV-10-C<br>IDS/SEN/CCPE/BI-03-C<br>IDS/SEN/CCPE/BI-05-C<br>IDS/SEN/CCPE/BI-06-C<br>IDS/SEN/CBE/BI-01-C<br>IDS/SEN/CBE/BI-04-C |
| IDS 2/7 AND (IDS 3/3 OR IDS 3/4) | Set TBR Adjustment or Cancel TBR Adjustment | IDS/SEN/CCP/BV-14-C<br>IDS/SEN/CCP/BV-16-C |
| IDS 2/7 AND ((IDS 3/3 OR IDS 3/4) AND IDS 3/5) | TBR Template | IDS/SEN/CCP/BV-15-C<br>IDS/SEN/CCP/BV-17-C<br>IDS/SEN/CCP/BV-18-C |

| Item | Feature | Test Case(s) |
|---|---|---|
| IDS 2/7 AND (IDS 3/6 OR IDS 3/7 OR IDS 3/8) | Set Bolus without a Bolus Template or Cancel Bolus or Get Available Boluses | IDS/SEN/CCP/BV-19-C<br>IDS/SEN/CCPE/BI-07-C<br>IDS/SEN/CCP/BV-21-C<br>IDS/SEN/CCP/BV-22-C |
| IDS 2/7 AND (IDS 3/6 OR IDS 3/7 OR IDS 3/8) AND IDS 3/10 | Get Bolus Template or Set Bolus Template | IDS/SEN/CCP/BV-20-C<br>IDS/SEN/CCP/BV-23-C<br>IDS/SEN/CCP/BV-24-C |
| IDS 2/7 AND (IDS 3/2 OR IDS 3/5 OR IDS 3/10 OR IDS 3/13 OR IDS 3/14 OR IDS 3/15) | Get Template Status and Details or Reset Template Status | IDS/SEN/CCP/BV-25-C<br>IDS/SEN/CCP/BV-26-C |
| IDS 2/7 AND (IDS 3/2 OR IDS 3/13 OR IDS 3/14 OR IDS 3/15) | Activate Profile Templates or Get Activated Profile Templates | IDS/SEN/CCP/BV-27-C<br>IDS/SEN/CCP/BV-28-C<br>IDS/SEN/CCPE/BI-08-C |
| IDS 2/7 AND IDS 6/20 | Start Priming or Stop Priming | IDS/SEN/CCP/BV-29-C<br>IDS/SEN/CCPE/BI-04-C |
| IDS 2/7 AND IDS 6/22 | Set Initial Reservoir Fill Level | IDS/SEN/CCP/BV-30-C |
| IDS 2/7 AND IDS 6/23 | Reset Reservoir Insulin Operation Time | IDS/SEN/CCP/BV-31-C |
| IDS 2/7 AND IDS 3/13 | ISF Profile Template | IDS/SEN/CCP/BV-07-C<br>IDS/SEN/CCP/BV-11-C |
| IDS 2/7 AND IDS 3/14 | I2CHO Ratio Profile Template | IDS/SEN/CCP/BV-08-C<br>IDS/SEN/CCP/BV-12-C |
| IDS 2/7 AND IDS 3/15 | Target Glucose | IDS/SEN/CCP/BV-09-C<br>IDS/SEN/CCP/BV-13-C |
| IDS 2/7 AND IDS 6/30 | Get Max Bolus Amount | IDS/SEN/CCP/BV-32-C |
| IDS 2/7 AND IDS 6/31 | Set Max Bolus Amount | IDS/SEN/CCP/BV-33-C |
| IDS 2/8 | IDD Command Data | IDS/SEN/SGGIT/CHA/BV-08-C<br>IDS/SEN/CON/BV-06-C |
| IDS 2/9 | IDD Record Access Control Point | IDS/SEN/SGGIT/CHA/BV-09-C<br>IDS/SEN/CON/BV-07-C<br>IDS/SEN/RAE/BI-02-C |
| IDS 2/9 AND IDS 7/3 | Report Stored Records | IDS/SEN/RAR/BV-01-C<br>IDS/SEN/RAE/BI-01-C<br>IDS/SEN/RAE/BI-03-C<br>IDS/SEN/RAE/BI-04-C<br>IDS/SEN/RAE/BI-05-C<br>IDS/SEN/RAE/BI-06-C<br>IDS/SEN/CBE/BI-02-C<br>IDS/SEN/HDE/BV-01-C |
| (IDS 2/9 AND IDS 7/3) AND IDS 2/7 | IDD RACP and IDD Command CP | IDS/SEN/CBE/BI-03-C |

| Item | Feature | Test Case(s) |
|---|---|---|
| IDS 2/9 AND IDS 7/2 | Delete Stored Records | IDS/SEN/RAD/BV-01-C |
| IDS 2/9 AND IDS 7/1 | Report Number of Stored Records | IDS/SEN/RAN/BV-01-C<br>IDS/SEN/RAN/BV-02-C |
| IDS 2/9 AND IDS 7/4 | Abort Operation | IDS/SEN/RAA/BV-01-C |
| IDS 2/10 | IDD History Data | IDS/SEN/SGGIT/CHA/BV-10-C<br>IDS/SEN/CON/BV-08-C |
| IDS 2/9 AND ((IDS 8/1 AND NOT IDS 8/2) OR (IDS 8/2 AND NOT IDS 8/1) OR IDS 8/3 OR IDS 8/4 OR IDS 8/5 OR IDS 8/6 OR IDS 8/7 OR IDS 8/8 OR IDS 8/9 OR IDS 8/10 OR (IDS 3/2 AND IDS 2/7) OR IDS 8/12 OR IDS 8/13 OR IDS 8/14 OR IDS 8/15 OR IDS 8/16 OR (IDS 3/13 AND IDS 2/7) OR (IDS 3/14 AND IDS 2/7) OR (IDS 3/15 AND IDS 2/7) OR IDS 8/20 OR IDS 8/21 OR IDS 8/22 OR IDS 8/23 OR IDS 8/24 OR IDS 8/25 OR IDS 8/26) | IDD History Data - Event Types | IDS/SEN/HDE/BV-02-C |
| IDS 5/5 AND IDS 3/1 | E2E-Counter and E2E-CRC | IDS/SEN/CBE/BI-05-C<br>IDS/SEN/CBE/BI-06-C |

*Table 5.1: Test case mapping*

# 6 IDD Status Reader CP Test Matrix

The following table summarizes the combination of some of the IDD Status Reader Control Point Op Codes and the Response Code Values that are tested and not tested. For the table, below, the following key applies:

YES = A test for this combination exists.

NO = A test for this combination does not exist.

N/A = Not a valid combination.

| **IDD Status Reader CP Response Code** | **IDD Status Reader CP Op Code** | | | | |
|---|---|---|---|---|---|
| | Get Active Bolus Delivery | Get Active Basal Rate Delivery | Get Counter | Reset Status | Other |
| Success | N/A | N/A | N/A | YES | N/A |
| Op Code not supported | NO | NO | YES | NO | YES |
| Invalid Operand | YES | N/A | YES | N/A | NO |
| Procedure not completed | NO | NO | NO | NO | NO |
| Parameter out of range | N/A | N/A | N/A | N/A | N/A |
| Procedure not applicable | YES | YES | NO | NO | N/A |

*Table 6.1: IDD Status Reader Control Point Response Code test coverage*

# 7 IDD Command CP Test Matrix

The following table summarizes the combination of some of the IDD Command Control Point Op Codes and the Response Code Values that are tested and not tested. For the tables, below, the following key applies:

YES = A test for this combination exists.

NO = A test for this combination does not exist.

N/A = Not a valid combination.

| **IDD Command CP Response Code** | **IDD Command CP Op Code** | | | | |
|---|---|---|---|---|---|
| | Set Therapy Control State | Write Basal Rate Profile | Set Bolus | Stop Priming | Other |
| Success | YES | N/A | N/A | YES | N/A |
| Op Code not supported | N/A | N/A | N/A | N/A | YES |
| Invalid Operand | YES | NO | NO | N/A | N/A |
| Procedure not completed | NO | NO | NO | NO | N/A |
| Parameter out of range | N/A | YES | N/A | N/A | N/A |
| Procedure not applicable | NO | NO | NO | YES | N/A |
| Plausibility check failed | N/A | YES | N/A | N/A | N/A |
| Maximum Bolus Number reached | N/A | N/A | YES | N/A | N/A |
| Procedure already in progress | NO | NO | NO | NO | NO |

*Table 7.1: IDD Command Control Point Response Code test coverage*

# 8 IDD RACP Test Matrix

The following tables summarize the features of IDD RACP and the combinations with other features that are tested and not tested. For the tables, below, the following key applies:

YES = A test for this combination exists.

NO = A test for this combination does not exist.

N/A = Not a valid combination.

| **IDD RACP Operators** | **IDD RACP Request Op Codes** | | | |
|---|---|---|---|---|
| | Report stored records | Delete stored records | Abort operation | Report number of stored records |
| All records | YES | YES | N/A | YES |
| Less than or equal to | YES | YES | N/A | YES |
| Greater than or equal to | YES | YES | N/A | YES |
| Within range of (inclusive) | YES | YES | N/A | YES |
| First record | YES | YES | N/A | YES |
| Last record | YES | YES | N/A | YES |
| Null | N/A | N/A | YES | N/A |

*Table 8.1: IDD RACP Operator test coverage*

| **IDD RACP Response Codes** | **IDD RACP Request Op Codes** | | | | |
|---|---|---|---|---|---|
| | Report stored records | Delete stored records | Abort operation | Report number of stored records | Other |
| Success | YES | YES | YES | N/A | N/A |
| Op Code not supported | N/A | N/A | N/A | N/A | NO |
| Invalid Operator | YES | NO | N/A | NO | N/A |
| Operator not supported | YES | YES | N/A | YES | N/A |
| Invalid Operand | YES | NO | NO | NO | N/A |
| No records found | YES | YES | N/A | N/A | N/A |
| Abort unsuccessful | N/A | N/A | NO | N/A | N/A |
| Procedure not completed | NO | NO | NO | NO | N/A |
| Operand not supported | YES | YES | NO | YES | N/A |
| Procedure not applicable | NO | NO | N/A | NO | N/A |
| Procedure already in progress | YES | NO | NO | NO | N/A |

*Table 8.2: IDD RACP Response Code test coverage*

| **IDD RACP Operators** | **Filter Type** | | |
|---|---|---|---|
| | Sequence Number | Sequence Number filtered by Reference Time Event | Sequence Number filtered by Non-Reference Time Event |
| All records | YES – No Operand Used | | |
| Less than or equal to | YES | YES | YES |
| Greater than or equal to | YES | YES | YES |
| Within range of (inclusive) | YES | YES | YES |
| First record | YES – No Operand Used | | |
| Last record | YES – No Operand Used | | |

*Table 8.3: IDD RACP Filter Type test coverage*

# 9 Revision history and acknowledgments

***Revision History***

| Publication Number | Revision Number | Date | Comments |
|---|---|---|---|
| 0 | 1.0.0 | 2018-06-20 | Approved by BTI. Prepared for publication. |
| | p1r00–r08 | 2021-05-11 – 2021-12-23 | TSE 16861 (rating 4): Added new test group ISFC. New test cases added: IDS/SEN/SGGIT/CHA/BV-11-C and IDS/SEN/SGGIT/ISFC/BV-12-C (E16246). Updated TCMT accordingly.<br>TSE 18088 (rating 2): Converted the following test cases into GGIT tests: IDS/SEN/SD/BV-01-C, IDS/SEN/DEC/BV-01-C – -09-C, IDS/SEN/DES/BV-01-C – 08-C. The new GGIT converted TCIDs are: IDS/SEN/SGGIT/SER/BV-01-C, IDS/SEN/SGGIT/CHA/BV-02-C – -10-C. Updated TCMT accordingly.<br>TSE 18125 (rating 1): In IDS/SEN/HDE/BV-02-C, removed from the Pass verdict section Table 4.23, Compound Event Groups of IDD History Data Event Types.<br>Performed template-related editorials, including updating the copyright language to align with v2 of the DNMD. |
| 1 | p1 | 2022-01-25 | Approved by BTI on 2022-01-06. Prepared for TCRL 2021-2 publication. |
| | p2r00–r02 | 2024-08-07 – 2024-08-09 | TSE 25222: Updated the initial condition and the test procedure for test case IDS/SEN/CCPE/BI-08-C. |
| | | | TSE 24990 (rating 2): Per E24597, updated test cases IDS/SEN/CBE/BI-03-C, IDS/SEN/HDE/BV-01-C, IDS/SEN/RAA/BV-01-C, IDS/SEN/RAD/BV-01-C, IDS/SEN/RAR/BV-01-C, IDS/SEN/RAN/BV-01-C and -02-C, and IDS/SEN/RAE/BI-01-C, -02-C, and -04-C. Updated Table 8.3. Added reference for IDS Specification v1.0.2.<br>Deleted all revision history comments prior to p0 and made formatting updates for template alignment. |
| 2 | p2 | 2024-10-08 | Approved by BTI on 2024-09-11. IDS v1.0.2 adopted by the BoD on 2024-10-01. Prepared for TCRL 2024-2-addition publication. |

***Acknowledgments***

| Name | Company |
|---|---|
| Jörg Brakensiek | Bluetooth SIG, Inc. |
| Ismail Mohamud | Bluetooth SIG, Inc. |
| Christoph Fischer | F. Hoffmann-La Roche AG |
| Nathaniel Hamming | F. Hoffmann-La Roche AG |
| Florian Kubala | F. Hoffmann-La Roche AG |

| Name | Company |
|---|---|
| Harald Prinzhorn | F. Hoffmann-La Roche AG |
| Leif-Alexandre Aschehoug | Nordic Semiconductor ASA |