



HUB USER COMPLIANCE DOCUMENT (HUBCOM)

EECS RULES Subsidiary Document AIB-EECS-SD03: EECS Registration Databases

Version: 9.1

Date: 25 March 2026

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Status of this document

This document, the Hub User Compliance Document (HubCom) is also known as AIB-EECS-SD03: EECS Registration Databases, which is a subsidiary document to the EECS Principles and Rules of Operation (the EECS Rules) of the Association of Issuing Bodies (AIB) for The European Energy Certification System.

In the event of conflict between the text of the EECS Rules and the text of this document, the EECS Rules shall always take precedence.

The latest changes to this document were formally approved on 4 November 2025. The effective date of this EECS Rules subsidiary document is 5 November 2025.

Signed by the General Secretary:



Liesbeth Switten 4 November 2025

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Document History

Version	Issue Date	Reason for Issue
Draft 0d1	29 April 2005	Initial version
Draft 0d2	14 June 2005	Prepared for General Meeting
Release 1.0	22 September 2005	Release
Draft 1.1	23 September 2005	Revised to reflect format of other SDs
Release 2.0	20 January 2006	Revised to adopt similar format to other SDs
Release 3.0	22 September 2006	Revised to support disclosure certificates
Draft 3.1	10 November 2006	<ul style="list-style-type: none"> • Revised to support the hub • Annex A3 and B5 are updated and moved to chapter 5.2. • Annex D has gone through a complete recast. • Old Annex D moved to Annex E • Changed EAN to GS1
Release 4.0	1 January 2008	Revised to align CHP and Disclosure chapters; change the limit on exported GO; and clarify the position of AIB Test Manager



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Version	Issue Date	Reason for Issue
Release 5.0	1 January 2009	Revised to incorporate the following changes: <ul style="list-style-type: none">• CR0714 - SD03 GS1/email encoding• CR0806 - FS5 Technology code 95.
Release 5.1	1 January 2009	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR0801: Inclusion of capacity into EECS certificates
Release 5.2	1 June 2009	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR0901: Implementation Chapter 5 Multi-certificates in SD03• PRO-CR0903: removal of exportenv34.xsd, original RECS, from SD03
Release 5.3	29 July 2009	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR0902: Changes in SD03 according to CR0812 (earmarks) and correction of reference to PRO-FS06
Release 5.4	27 November 2009	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR0908: Handling of SD03 Incompliance issues• PRO-CR0909: "Generation period" and "Issue date"
Release 5.5	7 July 2010	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR1002: Implementation of new export format exportenv67
Release 5.6	12 October 2010	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR0909: "Generation period" and "Issue date"• PRO-CR0922: Start and end date of production and date of issue• PRO-CR0927: Use of single format for representing a certificate issuer
Release 5.7	1 January 2011	Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR1031: Corrections to the new export format exportenv67
Release 5.8		Revised to incorporate the following changes: <ul style="list-style-type: none">• PRO-CR1103: New export format exportenv70
Release 6.0		<ul style="list-style-type: none">• Release to support EECS Rules Release 7.0• This sub-version correct error on page 24 (addition of r: prefix next to Competent Authority)
Release 6.1	23 September 2011	<ul style="list-style-type: none">• Revised in accordance with wishes of Amsterdam GM on 23 September 2011
Release 6.2	23 November 2011	<ul style="list-style-type: none">• Addition of index in B1



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Version	Issue Date	Reason for Issue
Release 6.2 v2	2 February 2012	New AIB logo
Release 6.2 v3	22 March 2012	Corrections to indexes and error code in B3.5.2
Release 6.2 v4	31 May 2012	Error correction in exportenv70 XML schema Location. B3.2.1
Release 6.3	26 February 2013	Revised to be a document independent of the EECS Rules, to enable it to be used as part of the Hub Participant Agreement document set
Release 6.3.1	15 March 2013	Softening of “binding” requirement in art.2.4.1.3
Release 6.4	13 March 2014	ACK changed in AK; Use of heat parameter values referral to EECS Rules Fact Sheet; “ <i>Member and Competent Authority Codes</i> ”; update fact sheet names; Formal link with document ‘Specifications Hub Webservice’. (Changes in 3.2.1.14; 3.2.1.17;6.1; B5.4.27; C2.1.8; C2.1.9; D2.2.2; D2.2.3; D2.5.1; D3.3.4.; B5.5.1)
Release 6.5	08 May 2015	Immutability of data on a certificate, update of Directive references, Product Type Technology means HEC GO, How to mark the product Type for Combined HEC-RES-E GO, extra explanation on Product Status NGC/ICS, allow the mandatory fields for HEC also as optional for other GOs
Release 6.6	20 July 2015	4 extra fields on HEC GOs, new xsd v71, new class diagram v71, maximum number of certificate blocks in a transfer, recommendation issuing certificates by bundles. The Sender should validate the message toward the schema (xsd) before sending.
Release 6.7	24 September 2015	Adjustments of Note 3 of B5.2.1 and Note 4 of B5.2.1
Release 6.8	2 October 2015	<ul style="list-style-type: none">• Corrected the “Figure 3 Basic Data Transmission Protocol – format errors rejection by recipient”.• Corrected the schema V71 validation problems.• Adjusted the text in 2.3.5.4.• Clarified the B5.5.3 and B5.5.4.
Release 6.9	4 December 2015	Correction of differences identified between the EECS Rules and Subsidiary Document SD03 (“EECS Registration Databases”). Update of table B5.2 Optional and Mandatory Elements
Release 7	23 February 2016	Schema correction for Purpose and note on mandatory message id



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Release 7.1	13 th June 2017	<ul style="list-style-type: none"> • Add webservice description • End of mailbox support added (ref. AIB-2016-GM04-12) • Set the deadline for V71 schema implementation (ref. AIB-2017-GM02-19) • The validity of V70 and V71 schemas have been clarified and the conversion rules added • Change to V71 to allow 0 values for CO2EmissionProduced and AbsoluteCO2EmissionSaved for Res-GOs (ref. AIB-2017-GM01-17) • Technical Audit added (ref. AIB-2016-GM-03-19) • Removed “</xs:element>” in V71 schema in below location: <xs:element name="Purpose" type="xs:token"/> </xs:element> (error correction) • B5 chapter tables were unified such that each of those specifies Unit, Length and Occurrence. • Pending status handling has been added as recommended option and diagrams updated accordingly • Smaller adjustments introduced in AIB-2017-GM01-20 • Added definition for “AIB Hub” • Updated schema diagrams for V70 and V71
Release 7.2	12 th March 2018	<ul style="list-style-type: none"> • Ref: EECS-CR1705, AIB-2017-GM05-23: The description of the Capacity fields updated to support maximum 3 decimals (“Up to a total of 11 characters, including the decimal point and up to a maximum of 3 decimal places”)
Release 7.3	8 th June 2018	<ul style="list-style-type: none"> • Ref: AIB-2018-GM02-23a-b, AIB-2018-GM02-30 • Account Holder database related changes/additions • The relationship between Account Holder, Issuing Body, Registry and Domain is clarified in chapter 1.1.1.1 by adding a diagram to reflect the current situation • Minimum date for Date Operational, Issuing date and Production period • B5.2.1 – Clarified the immutability of optional fields
Release 7.4	14 th June 2019	<ul style="list-style-type: none"> • Integration of the technical audit and the member audit in Annex D • Modify the text to replace CMO by Registry where appropriate. • Deleted V70 schema
Release 7.5	10 July 2020	<p>Ref: AIB-2020-GM-04-12</p> <ul style="list-style-type: none"> • Deleted mailbox registry description (The AIB Hub provided a way to send and receive transfer messages/-acknowledgements via Email (SMTP). The AIB Hub supported the mailbox facility until 1st July 2019 for the registries connected with mailbox before end of year 2016. All the new registries were required to use web service connection from 1st January 2017.) • Added statistics schema definition • Added the validation of the combination of the Energy Source and Type of Installation • Clarified the Data Exchange Models (Chapter 4 and C4) • Updated Glossary <p>AIB-2020-GM-04-10: Addition of 2.3.1.10</p> <p>AIB-2019-GM-04 24: Replace “Energy Medium” by “Energy Carrier” except XML</p>



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Version	Issue Date	Reason for Issue
Release 8.0	25 April 2022	<ol style="list-style-type: none"> 1) V80 schema and end date for V71 schema including transformation rules. 2) Statistics Schema: introducing certificatecount datatype for improving schema validation. 3) Adding new Statistics types for Energy Carriers: "EnergyGas" and "Hydrogen"
Release 8.1	7 June 2022	<ol style="list-style-type: none"> 1) Composition Purity <ol style="list-style-type: none"> a. Correct the length of the token from four to five. 2) Storage tag: <ol style="list-style-type: none"> a. Set to compulsory for all Energy Carriers in v80 with default value on it. b. The tag length change from 3 to 5. 3) Removing empty chapter B7.2 4) In XML examples corrected attribute name for Conversion element from "type" to "tag" according to the schema 5) Minor wording changes
Release 8.2	8 November 2022	<ol style="list-style-type: none"> 1) Adding recommended maximum number of transactions per minute in Chapter 2.3.5 Performance 2) Clarification of ProductionPeriod start and end description 3) Calculation method of 'GHGEmissionsProduced' and 'GHGEmissionsSaved' length fixed to 9 characters 4) GHGEmissionProduced datatype changed to Integer 5) Adding Fact sheet numbers for the element descriptions 6) In v80 made below elements optional for also for HEC: AmountPrimaryEnergySaved, OverallPrimaryEnergySavings, GHGEmissionProduced and AbsoluteGHGEmissionSaved 7) In v80 made below optional also for Fossil energy source: GHGEmissionProduced 8) In v80, made below optional also for nuclear energy source: RadioactiveWasteProduced 9) Unified the decimals and all the Decimal(10,3) were changed to Decimal(11,3) 10) Incorporating the above-mentioned changes to v80 Schema and renaming of decimal types 11) Small error corrections of examples, description and xsd related to v80
Release 9.0	4 November 2025	<ul style="list-style-type: none"> • Adding message schema v81 • Correcting issues and typos in message schema v80 • Removing message schema v71 • Removing GS1 coding structure option for the Account Holder ID
Release 9.1	25 March 2026	<ul style="list-style-type: none"> • Adding AMQP communication protocol specification. • Clarifying security requirements, issue resolution process, registry responsibilities, performance expectations and other minor fixes. • Extending cancellation and expiration statistics collection with Production Domain Code and Cancellation Categories.



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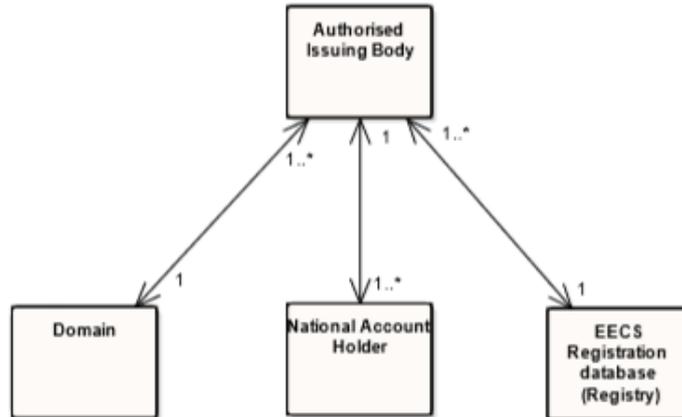


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1 Introduction and purpose

1.1 Purpose and Scope

1.1.1.1 This document addresses the technical and operational requirements for a Registration Database (“Registry”) according to The European Energy Certification System (EECS).



Legend

Authorised Issuing Body
 An Authorised Issuing Body can have only one Domain
 An Authorised Issuing Body can have one or many National Account Holders
 An Authorised Issuing Body can have only one EECS Registration Database

National Account Holder
 A National Account Holder can have only one Authorised Issuing Body

Domain
 A domain can have one or many Authorised Issuing Bodies
 There might be several Issuing Bodies for a Domain e.g. due to a transition period between two Issuing Bodies, or due different Issuing Bodies assigned for different types of certificates.

EECS Registration Database (registry)
 An EECS Registration Database can have one or many Authorised Issuing Bodies.

1.1.1.2 It specifically addresses

- (a) the transfer of information from or to an EECS Registration Database;
- (b) file formats and transport protocols;
- (c) common identifiers; and
- (d) the testing of interfaces.

1.1.1.3 This document deals with electronic interfaces only.

1.1.1.4 This document is subject to the change management procedures set out in the EECS Rules and related subsidiary documents.



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- 1.1.1.5 Unless specifically stated otherwise, the terms applied in this document shall have the meaning assigned to them in the EECS Rules; if a specific term is not defined in the EECS Rules, but has been defined in the Hub Participant Agreement, the term shall have the meaning defined therein.
- 1.2 Approach**
- 1.2.1 General**
- 1.2.1.1 The approach to the interface definition process adopted in this document is to partition the specification into stand-alone units that may, if required, be changed without affecting any other unit. A description of the business process follows and provides a contextual background.
- 1.2.2 Principles and rules of operation to be observed by Hub Users**
- 1.2.2.1 Section 2 describes the principles which Hub Users are required to support, and the rules of operation that apply to them, in particular those relating to:
- (a) The allocation of responsibilities for handling and transmitting data;
 - (b) Security;
 - (c) The obligations and warranties of Hub Users, including those relating to certificates, error handling, contingency and performance; and
 - (d) The consequences of data transfer.
- 1.2.3 Definition of the content of certificates according to the EECS standard**
- 1.2.3.1 Section 3 defines the information to be held on certificates from a business perspective.
- 1.2.4 Data Exchange Process and Requirements**
- 1.2.4.1 A business process can be represented by a 'transaction', which can be a message (or sequence of messages) that fulfils a business function. For example: 'submit report request' leads to 'report sent' or 'error message - not available'. Each of these messages can be defined as a logical 'flow' meeting a specific requirement, and which can be classified by its business characteristics:
- (a) Originating Party;
 - (b) Receiving Party;
 - (c) Initiating event (e.g. user request, another flow, timer expires);
 - (d) Processing requirements
 - (e) Data content at the business level;
 - (f) Mechanism (whether this is Manual, or Electronic Data File Transfer); and
 - (g) Validation rules.
- 1.2.4.2 Sections 4 and 5 cover these issues.
- 1.2.5 Identifier Standards**
- 1.2.5.1 The data that is exchanged between EECS Registration Databases includes information relating to Accounts and Production Devices. It is important that these entities are uniquely identified, and that the identification should remain unique even after a series of transactions. The scope of these identifiers must therefore include at least the whole



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- EECS community, irrespective of the particular scheme or schemes that any particular Registration Database supports.
- 1.2.5.2 These matters are addressed in ANNEX A - EECS Identifiers
- 1.2.5.3 This defines what the data flow contains in terms of fields, their attributes and how the fields are grouped within the flow. At the same time, the rules for which fields and groups are optional or mandatory and whether and how often groups can be repeated are specified.
- 1.2.5.4 This logical message definition encompasses all the data visible at the user level and is closely aligned to the database design, since the flows are used to populate the database and/or are derived from their contents. The physical file format defines the data representation and control information. Similarly to the logical definition, a naming convention and layout standards are set out so that the information can be exchanged and validated in a consistent and unambiguous form.
- 1.2.5.5 These matters are addressed in: ANNEX B - EECS Transfer Interface File Specification
- 1.2.6 Data Transfer Protocols**
- 1.2.6.1 The data transfer mechanism for electronic data interchange is considered to be separate from the format of the data file. The mechanism provides for secure and reliable exchange of data that is appropriate for the maintenance of a clear audit trail of certificate transfer and the avoidance of double counting.
- 1.2.6.2 To the extent required by the AIB Hub Participant Agreement, all certificate transfers between two Registries should be transferred via the AIB Hub.
- 1.2.6.3 These matters are addressed in: ANNEX C - EECS Transfer and Account Holders Interface Transport Specification
- 1.2.7 Interface Testing**
- 1.2.7.1 In order to ensure that each EECS Registration Database is able to transfer via the AIB Hub information in a form that complies with the requirements identified above it is necessary to test each instance of such a database. The specification addresses the basic test process and the tests that are to be performed and does not cover the reporting of tests for the purposes of assessment or the process for qualifying and EECS Registration Database for the purposes of certificate storage.
- 1.2.7.2 The tests are addressed in: ANNEX D - EECS Transfer Interface Test Specification for the Hub.

2 Principles and rules of operation to be observed by Hub Users

2.1 Responsibilities in the framework of handling and transmission of data

2.1.1.1 A successful and reliable messaging and transaction system requires:

- (a) That each Message is assumed to be transferred from the Registry of the Sender to the Registry of the Recipient through the Hub;
- (b) That every failure of delivery must be discovered by the sending registry in cooperation with receiving registry and where applicable with Superuser;
- (c) That the relevant Message is clearly identifiable as coming from the intended Sender;
- (d) That the relevant Message must be assumed to have been sent and arrived without alteration of any of its data ("integrity");
- (e) That the Messages are sent with a high confidence that they will not be understood and/or used by any reasonably equipped third party.
- (f) That the Registries keeps their master data up to date including changes to Fact Sheets and that Registries keep their Account Holders list up to date in Central Account Holder Database in AIB Hub.

The Hub has implemented reasonable solutions to deal with the requirements set out both in this document, and in the documents to which it refers.

The Hub User acknowledges the importance of these principles; it acknowledges that the solutions must be regarded as reasonably sufficient in order to safeguard the operational and regulatory requirements, and that it will respect the requirements in order to safeguard the operation and the credibility of the Hub service.

2.1.1.2 The Hub User acknowledges that it has read and understood the process descriptions, including the expected tasks, roles and responsibilities of the Hub User and the AIB in that respect and the requirements set forth in this document including its Annexes.

2.1.1.3 The Hub User acknowledges that the requirements set forth in this document and every update thereof must be at all times respected in order to safeguard:

- (a) the correct and smooth operation of the Hub;
- (b) the security of the transactions via the Hub; and
- (c) the avoidance of risks, disputes and claims between Hub users, the AIB and other Participants.

2.1.1.4 Any exports of Certificates via the Hub require that all mandatory data, codes and identifiers that are required to be included in a Certificate, must be provided, in accordance with the mandatory specifications set forth in this document. The Hub Users will have no obligation to provide the data that is mentioned in this document as "optional" in order to be compliant with the system. However, Hub Users shall assess whether the provision of such optional data will be necessary for their business purposes. However, all data received shall be maintained (2.2.1.4).

2.1.1.5 The Hub User who sends data via the Hub ("the Sender") is responsible for the accurate creation of Messages, the application of appropriate security measures, the transmission of Messages and the monitoring of responses from the Hub and the Recipient of the data. The Sender will apply the rules agreed between him and the Recipient in relation

to the validity, meaning and interpretation of the transferred Transaction Data. The Sender should validate the message toward the schema (xsd) before sending.

- 2.1.1.6 The Hub User acting as Sender shall only accept a Transfer Request from the duly authorized personnel of an Account Holder with respect to a Certificate held on that Account Holder's Transferrable Account on that Hub User's Registry.
- 2.1.1.7 The operator of the Hub is responsible for the distribution of the data messages and the acknowledgements between the Registries of the Sender and the Recipient. The Hub will validate the formal compliance of the data. However, the AIB Hub will not systematically verify the content of the transferred data. The acknowledgement of a Message will not imply that the content of the transferred data must be deemed correct, valid or even validly existing.
- 2.1.1.8 The Recipient of transferred data is responsible for the verification, correct handling and processing of received data.
- 2.1.1.9 Each Hub User must manage the files, the security, availability, capacity and the performance of its own server locations. Each Hub User is responsible for monitoring the contents of its specified receipt container on its own server location, and for initiating the processing operation when an incoming file is detected.

2.2 Security

- 2.2.1.1 A sufficient level of security is a crucial requirement for the operation of the Hub and the operation of a Registry.
- 2.2.1.2 For WS (SOAP) communication, the messages must be encrypted and may be digitally signed in the way it is described in C1.4 WS (SOAP) Protocol Specification
- 2.2.1.3 For AMQP communication, the message must be digitally signed. With Transport layer security (mTLS) no additional encryption is needed on message payload because mTLS ensure both data confidentiality and integrity.
- 2.2.1.4 All data included in a Certificate must be maintained by a receiving Hub User, where this data includes but is not limited to the ICS, Label, Purpose information and optional fields. Each Domain may at its sole discretion decide which items of certificate information that it wishes to display. The data incorporated in a Certificate may not be modified or deleted after it has been transferred outside of the Domain in which it has been issued.
- 2.2.1.5 The Hub Users and/or Registry Operators are responsible for the configuration and maintenance of firewalls to manage the allowed connections from and to the Hub and to monitor unusual access to their systems, and they shall provide and maintain sufficient protection against harmful software and unwanted access through state of the art protective software and policies.
- 2.2.1.6 The access to the Hub is restricted to the Hub User and/or Registry Operator, and its personnel that require access in the normal course of the Hub User's or Registry Operator's business. The Hub User will take reasonable security precautions to prevent unauthorized persons from gaining access to the Hub and the data stored in and transmitted through the Hub, the Hub User's Registry and any connected Registry, using authorization policies and password protection.

2.3 Hub User's obligations and warranties

2.3.1 General

- 2.3.1.1 The Hub User may not sell, lease, license, furnish, or otherwise provide or permit access to the Hub to any other person or entity. The Hub User will not engage in the operation of any illegal business use or permit anyone else to use the Hub or the data transferred

via the Hub, or any part thereof, for any illegal purpose or any purpose not agreed under the Agreement.

- 2.3.1.2 The Hub User shall ensure that Transactions are only executed upon instructions of Account holders that are issued by persons that are authorized to give such instructions.
- 2.3.1.3 The Hub User acknowledges that Messages contain confidential information, and it will ensure that Messages sent by him as Sender or received by it as Recipient will be maintained in confidence and are not disclosed to any unauthorized person, nor used by any unauthorized person other than for the purposes of the intended transaction. Any authorized disclosure to a third party shall be done on the same terms.
- 2.3.1.4 The Hub User shall not disrupt or try to gain unauthorized access to any account, computer, hardware, or network related to the Hub's services or other user's services.
- 2.3.1.5 The Hub User shall not (try to) obtain any data from the Hub service or related hardware, except data that is intended to be provided or made available to the Hub User.
- 2.3.1.6 The Hub User shall not damage, disable, overburden, or impair the Hub service (or the hardware and/or network(s) connected to the service) or interfere with anyone else's ability to access or use the service.
- 2.3.1.7 The Hub User shall in general not violate any regulations, legal provisions, codes of conduct or guidelines that may be applicable to the transfer of Transaction Data via the Hub, including any specific rules applicable to a particular Certification Scheme or specific category of Certificates.
- 2.3.1.8 It is the responsibility of a Hub User to verify whether the applications of Registrants for the registration of Production Devices in its Domain are compliant with applicable legal provisions and Domain Protocols and other agreed criteria. The Hub User will notify the AIB of any material breach of regulations or agreements by a Registrant or Participant if it is of the reasonable opinion that such breach could affect the transfer of Certificates out of its Registry into the Registry of another Hub user.
- 2.3.1.9 In the event of any misappropriation or misuse by the Hub User or anyone who is accessing the Hub or the data contained therein or transmitted through the Hub, AIB shall have the right to obtain injunctive relief for its data and materials and/or the data and materials of other users or other third parties.
- 2.3.1.10 The Hub User acknowledges that the AIB shall be entitled to disconnect the Hub User's Registry from the Hub, or limit its usage, in case of urgent circumstances or reasonable indications of such circumstances, as established by the Hub Participant Agreement. Urgent problems may require an interruption of the service without timely notification as established by the Emergency Plan.

2.3.2 Specific rules in relation to Certificates

- 2.3.2.1 The Hub User (and/or, where relevant, the Registry Operator), shall hold Certificates only within the framework of the normal operations of Competent Bodies in accordance with the purpose and scope of the Hub Participant Agreement and the applicable legislation, and they shall not hold Certificates for purposes of personal trade or financial gain or any other purpose that is not compatible with the function and role of Competent Bodies. Exceptionally, the Hub User may (i) purchase and own a Certificate for the sole purpose of (a) proving the nature of the Output that it has consumed; or (b) testing the system under the conditions set forth in this document, or (ii) hold a Certificate if the holder of the Certificate has defaulted on an undisputed payment to the Hub User, in which case the Hub User may hold the Certificate in order to take appropriate actions in accordance with national law to minimize its losses.
- 2.3.2.2 The Hub User and the Registry Operator shall ensure that Certificates are as far as practicable, protected against claims of the Hub User's or Registry Operator's creditors.

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- 2.3.2.3 The Certificates transferred via the Hub must specify at least the data required by national legislation and the mandatory data required by this document Subject to that requirement Certificates transferred by non-AIB Members need not be compliant with the EECS Rules including the subsets thereof unless and insofar referred to in the Hub Participant Agreement.
 - 2.3.2.4 The Hub User shall not present any data rendered in any misleading or incorrect format.
 - 2.3.2.5 The Cancellation and Withdrawal of Certificates will occur in accordance with the applicable legal provisions, the relevant Domain Protocol and agreements between the Competent Bodies and Participants in that respect.
 - 2.3.2.6 The Hub User shall ensure that no Certificate will be cancelled for use in another Domain than the Domain wherein it is held, unless transfer is not possible for technical reasons and an ex-domain cancellation agreement has been agreed between the relevant Hub Users. Furthermore, the Hub User shall report the statistic information in relation to the ex-domain cancellations to the AIB.

2.3.3 Error handling

- 2.3.3.1 The Hub User shall ensure that any inaccurate information in its Registry, e.g. (but not limited to) inaccuracies due to erroneous information submitted by Registrants or Participants or changes regarding Production Devices, will be corrected as soon as practicable and that all relevant Participants will be informed.
- 2.3.3.2 In case an error has been introduced into, or with respect to, a Certificate held in an Account Holder's Account in the Hub User's Registry, in the course of its transfer into that Account or afterwards, the Hub User shall correct the error in or with respect to that Certificate and any errors that may have been replicated in Certificates split from it, or withdraw the Certificate. In case such error is noticed after a transfer of the relevant Certificate to or from the Registry of another Competent Body, the Hub User will immediately inform that Competent Body.
- 2.3.3.3 Where there is evidence that a Message has been corrupted or if any Message is identified or reasonably capable of being identified as incorrect, it shall be re-transmitted by the Sender as soon as practicable with a clear indication that it is a corrected Message.
- 2.3.3.4 Notwithstanding that the Sender is responsible and liable for the completeness and accuracy of a Message, the Sender shall not be liable for the consequences of an incomplete or incorrect transmission if the error is or should in all circumstances be reasonably obvious to the Recipient. In such event the Recipient must immediately inform the Sender thereof.
- 2.3.3.5 If the Recipient has a reason to believe that a Message is not intended for him, he shall take reasonable action to inform the Sender. He shall ensure the confidentiality of the information.

2.3.4 Contingency

- 2.3.4.1 The Hub User shall operate reliable and secure systems, which will have adequate capacity. The Hub User shall apply state of the art back-up and recovery procedures (DRP) in order to safeguard the Market Participants and the users of the Hub against the loss of data in the Registry and the loss of Transaction Data and to allow timely recovery.

2.3.5 Performance

- 2.3.5.1 This section sets out performance expectations for the Registries, and the Hub User should optimize their systems to try to achieve these benchmarks. The transfer time of

data between the initiation of the transfer by the Sender and the receipt of the data by the Recipient can be expected to take:

- (a) Maximum of 30 calendar days for transfers where manual approval is needed. If this criterium is not met, corrective measures shall be taken in order to find out the reason for delay and to improve the performance.
- (b) Maximum of 4 hours in case of registries which automatically accept the incoming transfers. This time limit can be influenced by the current traffic on AIB Hub side and therefore this 4-hour limit shall be considered only from transfer status "Waiting for Confirmation". If this criterium is not met, corrective measures shall be taken in order to find out the reason for delay and to improve the performance.
- (c) In case of an unscheduled Registry outage, the abovementioned performance expectations don't apply and the Registry performance is monitored and evaluated by TSU and SU after the outage is over.
- (d) In case of a scheduled Registry outage (e.g. due to maintenance or system release) which is expected to take longer than 4 hours during the business hours, it is required that the Registry administrators inform the AIB Secretariat at support@aib-net or by creating AIB Service Desk ticket or by informing ISU representatives and other registry operators (ISU + CMO mail lists). In this case, the abovementioned performance expectations don't apply. Expected behaviour is:
 - (i) WS (SOAP) – when the Registry outage is short (e.g., less than 1 business day) and the Hub User does not require the Registry to be disconnected from the AIB Hub side for the duration of the outage, transfers are manually resent by TSU after the outage ends. In this case, the recommendation from point (b) above is to be calculated only from the moment after those transfers are resent to the Recipient.
 - (ii) WS (SOAP) – when the Registry outage is longer and the Hub User requires the Registry to be disconnected from the AIB Hub side for the duration of the outage, transfers must be resent by the Sender after the outage ends.
 - (iii) AMQP – the Registry picks up the transfers from their incoming queue after the outage ends.

2.3.5.2 The total time between the receipt of a Message by a Recipient and the receipt of the acknowledgement of that receipt, sent by the Recipient to the original Sender of the Message, will depend on the service provided by AIB's service provider as well as the performance of the registries that are involved. The applicable guidelines are set forth in the SLA which is part of the Hub Participant Agreement and is added as an Annex to that agreement.

2.3.5.3 The AIB shall be entitled to interrupt the service of the Hub in case of urgent circumstances or reasonable indications of such circumstances, such as irregularities, errors, issues of security, damage control and/or protection of intellectual property rights. Urgent problems may require an interruption of the service without timely notification.

2.3.5.4 To ensure the performance of the AIB Hub a transfer may not contain more certificate bundles than a cap configured in the AIB Hub. This limit is currently set to 5000 on WS (SOAP) communication and 15000 on AMQP communication. A certificate bundle starts:

- (a) WS (SOAP) - with the tag <r:Certificates> and ends with the tag </r:Certificates>.
- (b) AMQP XML - with the tag <r:Certificates> and ends with the tag </r:Certificates>.
- (c) AMQP JSON – with "certificates": [{ ...certificateBundle }]

More details about a certificate bundle can be found in paragraph B3.4.8.



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- 2.3.5.5 To avoid transfers with a high number of records and to ensure the performance of the AIB Hub and Registries, it is highly recommended to issue and exchange certificates which contain the same information in bundles. These bundles can contain more than 1 MWh.
- 2.3.5.6 In case of the WS (SOAP) communication, to ensure the performance of the AIB Hub and Receiving Registry, a Sender or Sender Registry is highly recommended to send maximum of ten transfers per one minute.
- 2.3.5.7 To ensure the smooth functioning of the services, it is highly recommended to ensure that a Registry has capacity of handling at least ten transfer requests per one minute from AIB Hub.
- 2.3.6 Miscellany**
- 2.3.6.1 The Hub User and where relevant the Registry Operator must produce and publish regular statistical reports and must accept the use of this data by the AIB for statistical purposes. The Hub Participant Agreement contains the detailed requirements regarding this information. The AIB shall only disclose the reported data as statistical data. Refer to B6 Statistics Elements Description for details of the required Statistics.
- 2.3.6.2 The obligations of the Hub User and/or Registry operator stated herein must be respected by all of the Hub User's and/or Registry Operator's personnel and/or agents or service providers and their personnel. The Hub User or Registry Operator will duly inform its personnel, agents or service providers having access to the Hub of these obligations and will reasonably ensure that its personnel, agents and/or service providers will respect these obligations.
- 2.3.6.3 The Hub User will operate with properly trained and reliable personnel.
- 2.3.6.4 Where a Registry Operator operates, or shall operate, the Registry of the Hub User, this operator shall comply with all obligations set forth in this document as obligations of the Hub User.
- 2.4 Consequences of data transfer - Evidence**
- 2.4.1.1 The Hub User accepts the Integrity of all Messages transmitted in accordance with the applicable Messaging Protocol and confirmed by an acknowledgement message, unless such Messages can be proven to have been corrupted as a result of technical failure on the part of hardware, system or transmission line.
- 2.4.1.2 The Hub User shall keep reliable electronic records of all material communications and transactions between Hub Users and/or Participants regarding the registration of Production Devices and the Issue, Transfer and Cancellation of Certificates. The retention period shall be 10 years as a minimum, but not less than the minimum retention period required by national law applicable to the Hub User.
- 2.4.1.3 In case of disputes between the Hub User and any other user, or between the Hub User and any Participant, the AIB may act as a trusted third party and upon request, it may prove by means of its relevant logs that certain data has passed or not passed the Hub at a certain point in time, and that an acknowledgement message was sent or not sent with a limitation in time of one year after the alleged transmission. In that case, the Hub User must accept the statement of the AIB as a presumption, which is considered valid evidence unless the Hub User can provide evidence of the contrary, and the Hub User will ensure that his customers will accept the same.

3 Certificate Information

3.1.1.1 This section describes the information to be held at a certificate according to the EECS standard. Technical details of identifiers, field definitions and valid values can be found in: ANNEX A - EECS Identifiers and ANNEX B - EECS Transfer Interface File Specification. The arrangements for transfer and retention of EECS Certificates shall be such that the data associated with an EECS Certificate shall not change in any way once it has been properly issued, except to indicate that it has expired, cancelled or withdrawn.

3.2 General information

3.2.1 Each EECS Certificate shall contain the information as instructed in the EECS Rules

3.2.1.1 v80 schema - valid until the end of October 2027

- (a) Refer to EECS Rules Release 8 v1.
- (b) Support Energy Carriers: “Electricity”, “EnergyGas” and “Hydrogen”
- (c) Relevant EECS Rules chapters for requirements for certificate information:
 - (i) EECS Rules C3.5.4 Each EECS Certificate shall contain the following information
 - (ii) EECS Rules Section PART IV: N ELECTRICITY SCHEME RULES:
 - (1) N6.5 Information on EECS Certificates
 - (2) N6.6 Additional Information in Certificates
 - (iii) EECS Rules Section PART IV: O GAS SCHEME RULES:
 - (1) O7 Information on EECS Gas Certificates
 - (2) O8 Additional information on EECS Gas Certificates

3.2.1.2 v81 schema - valid from the date it is implemented in the AIB Hub until further specified

- (a) Refer to EECS Rules Release 8 v1.10
- (b) Supported Energy Carriers: “Electricity”, “EnergyGas” and “Hydrogen”
- (c) Relevant EECS Rules chapters for requirements for certificate information:
 - (i) EECS Rules C3.5.4 Each EECS Certificate shall contain the following information
 - (ii) EECS Rules Section PART IV: N ELECTRICITY SCHEME RULES:
 - (1) N6.5 Information on EECS Certificates
 - (2) N6.6 Additional Information in Certificates
 - (iii) EECS Rules Section PART IV: O GAS SCHEME RULES:
 - (1) O7 Information on EECS Gas Certificates
 - (2) O8 Additional information on EECS Gas Certificates

3.2.2 Format of the information fields is given in this document in Section B4.6 Data Field Definitions – Certificate Transfer File Certificates

4 Data Exchange Processes

4.1 Basic Model (for WS (SOAP) communication protocol)

4.1.1.1 The following diagram represents the basic data exchange models. The model is based on data flows and authorisation routes.

- (a) The process described does not show all scenarios but it is intended to provide a basis for describing business requirements. See more examples in C2 AIB HUB Web Service and AMQP Interface Description.

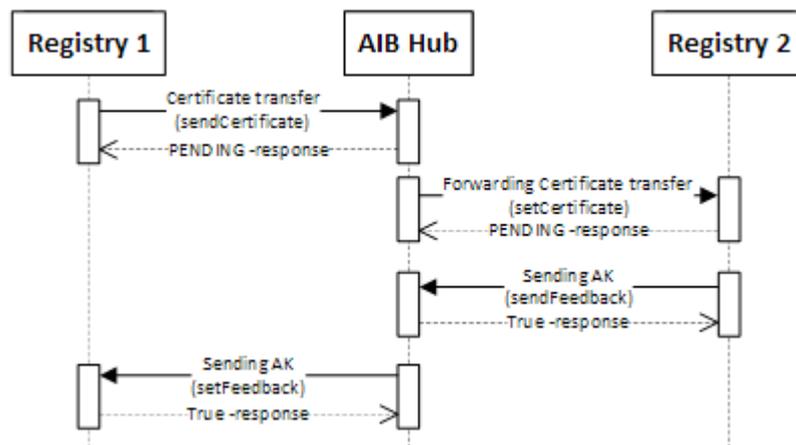


Figure 1 Basic Data Transmission Protocol – asynchronous AK

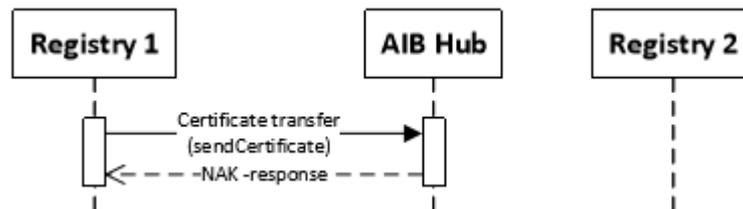


Figure 2 Basic Data Transmission Protocol – format or data errors detected by the Hub

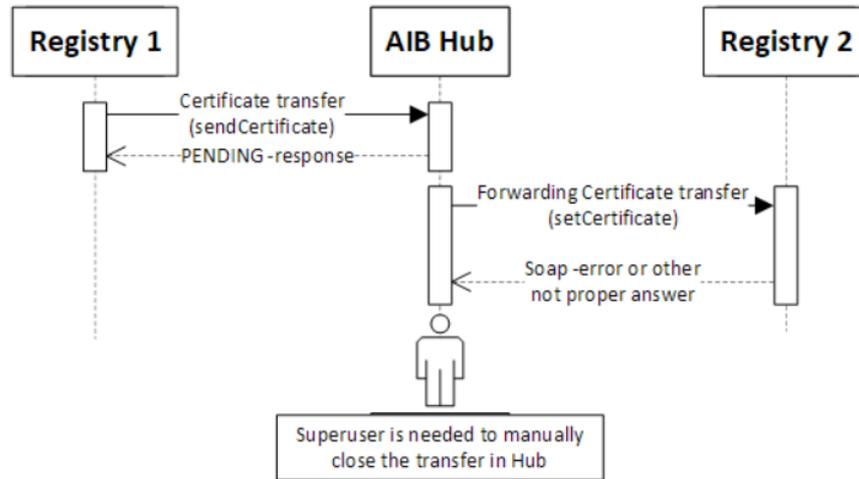


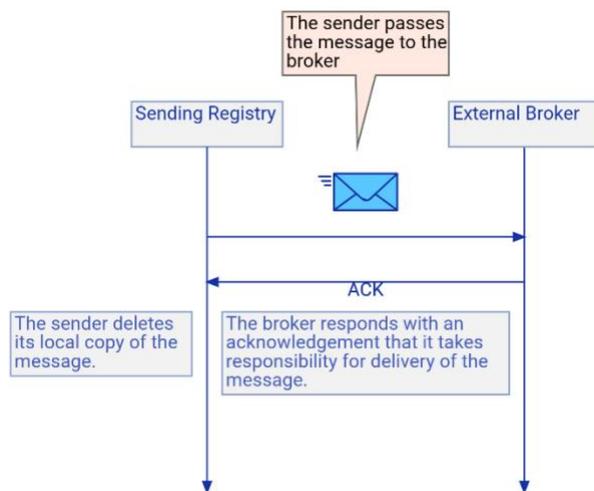
Figure 6 Basic Data Transmission Protocol – There are cases when Superuser (user role in AIB Hub) manual action is needed to close a transfer. E.g. if Recipient Registry does not give expected response for the setCertificate call

4.2 Basic Model (AMQP communication protocol)

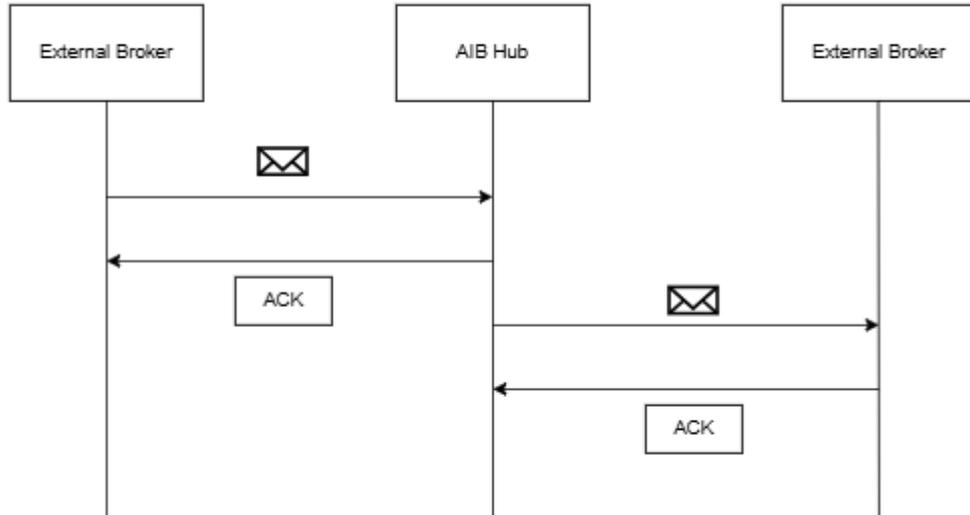
4.2.1 AMQP communication works on principle FIFO (First in First out). When the message is returned to the queue due to any issue with technical acknowledgment etc. message is returned on top of the queue.

4.2.2 The following diagram represents the basic data exchange models. The model is based on data flows and authorisation routes.

(a) The process described does not show all scenarios, but it is intended to provide a basis for describing business requirements for sending transfers and technical acknowledgements

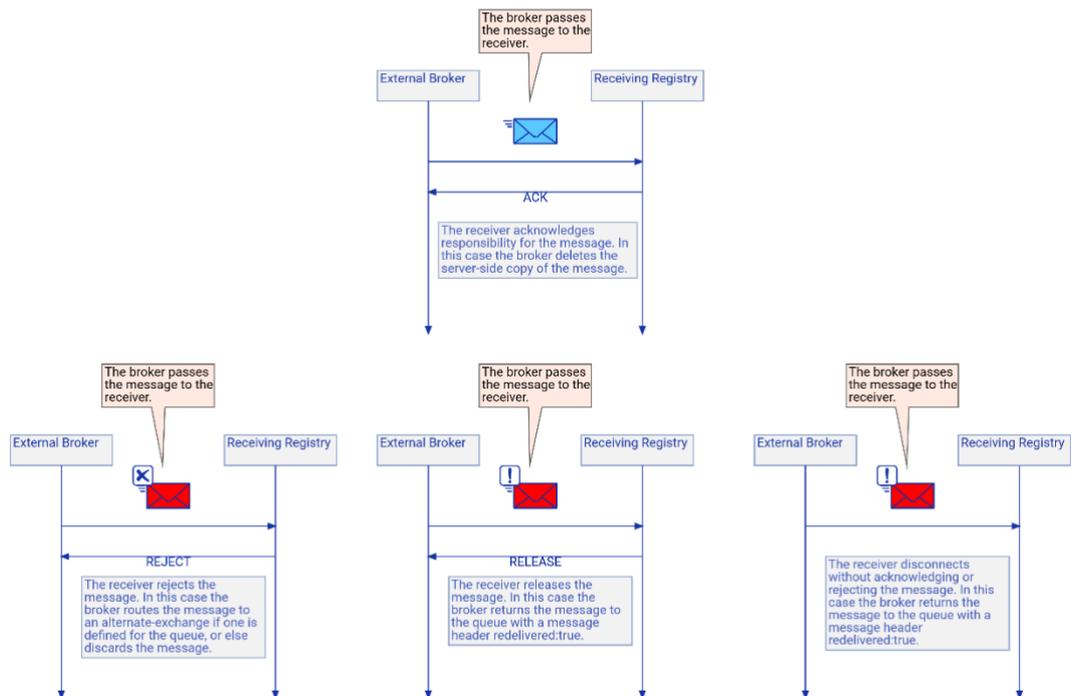


Registry successfully writes message to the queue and receive technical ACK from the External Broker.



AIB Hub successfully pick message from the External Broker and return technical ACK. After validations and transfer workflow in AIB Hub, message is written to the queue on external broker. This is also confirmed by receiving technical ACK. (status of transfer in AIB Hub is “Waiting for Response”).

Example of all possible scenarios between External broker and the Receiving registry



Note: In the AMQP messaging model, both transfer and acknowledgement messages use the same message structure and delivery mechanism. The acknowledgement workflow is identical to the transfer workflow shown in this figure, with the roles of the Sending Registry and Receiving Registry reversed.

4.3 Basic Data Transmission Protocol

4.3.1 Responsibilities of Sender

4.3.1.1 The Sender is responsible for the accurate creation of messages, the application of appropriate security measures, the transmission of messages and the monitoring of responses from the AIB Hub and Recipient(s). The Sender:

- (a) Creates a transfer message;
- (b) Checks the syntax of the message before sending;
- (c) Applies appropriate message security measures;
- (d) Sends the message to the Recipient via the AIB Hub;
- (e) Checks if an acknowledgement is received within the appropriate timescale;
- (f) In case the acknowledgement has not been received within the appropriate timescale, keep the status of the transfer open and check the status of the transfer from the AIB Hub:
 - (i) WS (SOAP)
 - (1) If the transfer is not found from the AIB Hub:

Agree with TSU/SU on possibility to resend the message payload (e.g. EECS GOs) as a new transfer.
Reinitiate the transfer (with new MessageId).
 - (2) If the transfer is found from the AIB Hub but the status is unclear (e.g. timeout):

Sender contacts the Recipient and Superuser via Service Desk or other agreed communication channel.
 - (3) If the transfer is in status completed/rejected with error A94:

Sending registry is responsible for closing transfer on its side accordingly.
 - (ii) AMQP
 - (1) If the transfer is not found in AIB Hub after one hour:

Resend the transfer with the same Message ID as a retry.
 - (2) If the transfer is closed as Completed in AIB Hub, but is still open on sender's side:

Option 1: Resend the transfer with the same Message ID as a retry to receive ACK again if transfer is still present in AIB Hub transfer log (transfers are deleted from AIB Hub after defined period of 30 days from last status change and stored only in DMe).

Option 2: Close transfer manually on your side in accordance with AIB Hub status of the transfer.

- (3) If the transfer is found in the AIB Hub but status is unclear:

Sender contacts the Recipient and Superuser via Service Desk or other agreed communication channel.

- (g) In case an acknowledgement is received:
- (i) positive: logs the message as received and takes appropriate action;
 - (ii) negative: checks for software or message errors, repairs errors and resends data as a new file using a new Message ID;
 - (iii) WS SOAP only: Pending: keep the transfer open until either positive or negative answer is received. Cooperate with Superuser and Recipient if questions arise.

4.3.2 Responsibilities of the AIB Hub

4.3.2.1 The AIB Hub is responsible for distribution of messages and acknowledgements between registries. The AIB Hub shall retain a continuous thread of activity for the messages. That is, the Hub recognises that a certificate transfer is in progress so that the returning AK/NAK can be matched with the original transfer. The AIB Hub:

- (a) Checks for incoming messages in a manner that ensures a timely response;
- (b) Verifies the message due to errors in the XML, unrecognised values in any of the routing fields, or invalid content in any other field;
- (c) In case the message is correct:
 - (i) sends Pending to Sender (only for WS SOAP communication)
 - (ii) sends the message to the Recipient;
- (d) In case the message is not correct:
 - (i) sends a negative acknowledgement to the Sender which is either:
 - (1) negative on the message (e.g. failure on check sum or format); or
 - (2) negative on the content (e.g. sending or receiving Account Holder ID does not exist or is not valid in the Account Holder database of the AIB Hub).
- (e) In case the message or answer delivery to registry is not clear or if there is found possible double counting situation or the same transfer is being send several times, the AIB Hub keeps the transfer in Waiting status to manually handle it after coordinating with registries.
- (f) Pass on positive or negative acknowledgements from the Recipient to the Sender.

4.3.3 Responsibilities of Recipient

4.3.3.1 The Recipient is responsible for the monitoring of all configured data submission ports and the correct handling and processing of data received. The Recipient:

- (a) Checks for incoming messages in a manner that ensures a timely response. For WS communication: On receiving of an import and after minimum validations it is recommended to answer with Pending status before further processing the file to avoid timeouts.
- (b) Extracts and validates message source from message;
- (c) Verifies the correctness of message contents within the appropriate timescale;
- (d) In case the message is correct:
 - (i) sends a positive acknowledgement to the Sender via the AIB Hub;

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- (e) In case the message is not correct:
 - (i) sends a negative acknowledgement to the Sender via the AIB Hub which is either:
 - (1) negative on the message (e.g. failure on check sum or format); or
 - (2) negative on the content (e.g. the Sending or Receiving Account Holder ID does not exist or is not valid in the Account Holder database of the Recipient registry).

4.4 Export and Import of Certificates

4.4.1 Introduction

4.4.1.1 Data exchange between EECS Registration Databases takes place based on the following procedures. The interface is designed for operation within an automated environment but may be implemented manually should circumstances dictate. Compliance with this specification does not depend upon a fully automated solution being used.

4.4.1.2 Some actions are not relevant to the operation of this interface and are included only for completeness of process.

4.4.2 Responsibilities of Sending Account Holder

4.4.2.1 The Sending Account Holder is responsible for the correct submission of a transfer notification to the Issuing Body operating the Sending Account Holder's account. The Sending Account Holder:

- (a) Specifies a transfer order which contains:
 - (i) the number of certificates;
 - (ii) which certificates; and
 - (iii) the Receiving Account Holder of the certificates (by his Account Holder ID number).
- (b) Is responsible for the correct content of the transfer order.

4.4.3 Responsibilities of Exporting Issuing Body

4.4.3.1 The Exporting Issuing Body is responsible for the correct handling of the order and submission of these details to the Importing Issuing Body. The Exporting Issuing Body:

- (a) Validates the details submitted by the Sending Account Holder;
- (b) Detects which Issuing Body will import the certificates;
- (c) Creates a transfer message conforming to the specification in ANNEX B - EECS Transfer Interface File Specification;
- (d) Sends the message to the Importing Issuing Body using the secure transport mechanism defined ANNEX C -EECS Transfer and Account Holders Interface Transport Specification
- (e) Sets the status of the certificates to "exported";
- (f) Waits for acknowledgement;
- (g) If a Pending acknowledgement is received, keep the status of the certificates as "exported"; (only applicable for WS SOAP communication)
- (h) When message is successfully written in the queue, keep the status of the certificates as "exported"; (only for AMQP communication)

- (i) If a positive acknowledgement is received, record that the export has been completed;
- (j) If a negative acknowledgement is received:
 - (i) negative on content: contacts Sending Account Holder and rectifies issue as appropriate. Resends data as a new file using a new Message ID as appropriate;
 - (ii) negative on message: review message generation process and rectify issues as appropriate. Resends data as a new file using a new Message ID as appropriate.

4.4.4 Responsibilities of the Importing Issuing Body

4.4.4.1 The Importing Issuing Body is responsible for the correct handling of the order, processing of these details and Acknowledgement to the Exporting Issuing Body. The Importing Issuing Body:

- (a) For WS (SOAP) communication, on receiving of an import and after minimum validations it is recommended to answer with Pending status before further processing the file to avoid timeouts.
- (b) In case the message is correct:
 - (i) sends a positive acknowledgement (using required security measures) to Exporting Issuing Body (see: ANNEX B - EECS Transfer Interface File Specification); and
 - (ii) stores certificates on the account of the Receiving Account Holder.
- (c) In case the message is not correct:
 - (i) sends a negative acknowledgement (using required security measures) to exporting Issuing Body (see: ANNEX B - EECS Transfer Interface File Specification);

which is either:

 - (1) negative on the message (e.g. failure on check sum or format); or
 - (2) negative on the content (e.g. Receiving Account Holder ID does not exist).

5 Requirements

5.1 Functional requirements

5.1.1.1 These requirements identify what the mechanism is to do:

- (a) **Transfer:** Each message is assumed to be transported from sender to recipient via the AIB Hub;
- (b) **Transparency:** Any failure of delivery must be discovered;
- (c) **Attributable:** The message must be clearly identifiable as having come from the intended sender;
- (d) **Accurate:** The message must arrive with a high confidence that it has not been altered in transit;
- (e) **Private:** The message must arrive with a high confidence that it will not be understood by any reasonably equipped third party.
- (f) **Idempotency:** For each retry, the original acknowledgment must be returned. (for AMQP communication channel)



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- 5.1.1.2 The business process shows an acknowledgement activity. This is part of the solution to the transparency requirement and should be considered a mandatory solution. The requirements transport and attributable apply to the acknowledgement.
- 5.1.1.3 The security related requirements (accurate and private) have been written as functional requirements even though they contain potentially quantitative concepts ('high confidence', and 'reasonably equipped'). This has been done because these concepts are expensive to measure, and the available solutions do not support the kind of variation which would be needed to properly address a quantitative analysis. In effect, solutions will be chosen on the basis of an investigation of risk.

6 Definitions

6.1 Glossary

AIB Hub	@The AIB Hub” as “The AIB Communications Hub, as defined in the EECS Rules”.
AIB Test Manager	The person appointed to be responsible for providing systems test reports required under SD07 Review Procedures and to carry out the tasks so described in this document.
Certificate Authority (CA)	<p>An organisation that produces Digital Certificates. The CA must be trusted by all parties involved.</p> <p>The CA will sign Digital Certificates using its own private key, and those who use the certificates must have a trusted copy of the CA’s own public key. In some cases, this trusted copy will be provided by another CA, creating a hierarchy of trust. This hierarchy normally terminates with a self-signed Digital Certificate.</p>
Digital Certificate	<p>A signed copy of someone’s public key and associated identification information. The key is normally signed by a Certificate Authority who warrants that the public key does indeed belong to the person identified in the certificate.</p> <p>A self-signed Digital Certificate is one which has been digitally signed by the person identified in the certificate.</p>
Digital Signature	A process of encrypting a message or document with a private key so that the recipient can verify that the message was sent by the owner of the private key and that the message has not been changed. The message may be sent in plain text with the digital signature attached as an extra data block.
EECS Certificate	a A unique electronic Certificate specifying and representing the quality and method of production of a specific quantity of Output, which is maintained on a EECS Registration Database and Issued in accordance with the provisions of the EECS Rules;
EECS Identifiers	Refer to EECS rules/AIB HPA
EECS Product	A Product supported by EECS.
EECS Registration Databases (Registry)	<p>A database operated by a Member, or operated by a CMO on behalf of a Member, for the purposes of EECS, comprising:</p> <p>(a) Transferable and Cancellation Accounts and the EECS Certificates in those Accounts;</p> <p>(b) details of Production Devices and information provided to the Member or its CMO in connection with the registration of those Production Devices with that Member or CMO; and</p> <p>(c) details of EECS Certificates which have been transferred out of that EECS Registration Database;</p>
EECS Scheme	Arrangements established by a Section of PART IV of the EECS Rules for the acceptance of Products in relation to a type of Output into EECS;



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Hub Web Service	This facility supports communication with the Hub via web services and enables energy certificates to be transferred to a recipient, returning a message detailing the success of the transfer.
PKI (Public Key Infrastructure)	The set of processes and systems used to manage a set of public keys. The term may apply to a single organisation, to a closed group of organisations, or to an open market. The term does not cover any specific technology or process.
Public Key Cryptography	<p>A set of encryption algorithms which support the use of two keys, one public and one private. One key, the public key, can be issued widely and used by any sender to encrypt a message. The message can only be decrypted by the matching private key.</p> <p>The process is symmetrical in that the private key can be used to encrypt messages which only the public key can decrypt. This form is used to support a Digital Signature.</p>
Receiving Account Holder	The Receiving Account Holder to whom the transfer is sent, also referred as Transferee.
Recipient	The Hub User who receives a transfer via the Hub
Sender	The Hub User who sends the transfer data via the Hub
Sending Account Holder	The Account Holder who initiates the transfer, also referred as Transferor
AMQP	<p>This facility supports communication with the Hub via the AMQP messaging protocol and enables energy certificates to be transferred asynchronously to a recipient Registry via the AIB Hub broker. The interface supports the exchange of transfer and acknowledgement messages, allowing the Hub to forward transfers and deliver acknowledgement messages detailing the processing result of the transfer.</p> <p>Within AIB Hub, AMQP is used for internal and external communication. Communication with registry is described as communication via “External Broker”.</p>
mTLS certificate	This certificate is used to authenticate the Registry when establishing a mutually authenticated TLS connection with the AIB Hub messaging infrastructure. It enables secure identification of the Registry and ensures that only authorised Registries can connect to the AIB Hub broker and exchange transfer and acknowledgement messages.
Signing Certificate	This certificate is used by the Registry and the AIB Hub to digitally sign transfer and acknowledgement messages exchanged via the messaging interface. It enables verification of the message origin and ensures message integrity and non-repudiation. Signing certificates are used to generate and verify digital signatures in accordance with the XML Digital Signature (XML-DSig) and JSON Web Signature (JWS) standards.



6.2 Abbreviations

AIB	Association of Issuing Bodies
CMO	Central Monitoring Office
EECS	European Energy Certificate Scheme
GIAI	Global Individual Asset Identifier
GO	Guarantee of Origin
GS1	Earlier EAN (International Article Numbering Association) and UCC (Uniform Code Council)
GSRN	Global Service Relation Number
IB	Issuing Body
UTC	Universal Coordinated Time

ANNEX A - EECS Identifiers

A1.1.1 Introduction

A1.1 Purpose

A1.1.2 The scope of this Interface Specification document is the definition of allowed identifiers for key entities used in the transfer of data between EECS Registration Databases.

A2 Coding Structures

A2.1 Introduction

A2.1.1 In order to ensure uniqueness of all data identifiers a methodology of coding has been implemented. For Registries, Certificates and Production Devices, the coding structure is based on the GS1 numbering structure.

A2.1.2 EECS Registration Databases must support the set of codes specified here.

A2.2 Coding of Registries

A2.2.1 Each registry must maintain at least one GS1 prefix to be used in accordance with the GS1 numbering structure. The registry Prefix forms an essential part of the coding for Production Devices and Certificates. A Company Prefix is a numeric identifier of between 6 and 13 digits in length.

A2.2.2 The Company Prefix is used as the registry ID. Where a registry maintains more than one prefix, one prefix may be chosen as the registry ID. The Company prefix can be retrieved by contacting to a local GS1 office.

Example Registry Company Prefixes are:

51234567 (8-digit Company Prefix)

598765432 (9-digit company prefix)

5425011229014 (13-digit company prefix)

A2.3 Coding of Certificates

A2.3.1 Certificates will be coded in accordance with Global Individual Asset Identifier (GIAI) (AI 8004), an element of the GS1 numbering structure. The certificate number is always exactly 30 digits long.

Format of the Element String				
	Global Individual Asset Identifier			
	GS1 Company Prefix for the registry	assigned by the registry	Individual Asset Reference	
	N ₁ ...	N _i	N _{i+1} ...	variable length N ₃₀

A2.3.2 *i* represents the length of the Company Prefix for the registry.

A2.3.3 The GIAI uses the GS1 Company Prefix of the registry assigning the Asset Reference. The structure and numbering of the Individual Asset Reference is determined by the relevant registry. Registries may adopt any numbering methodology appropriate to the coding structure, although it is recommended that sequential Individual Asset Reference numbers be assigned.

A2.3.4 Although the GS1 specification for GIAI allows the Individual Asset Reference to contain all characters contained in Table 1 of the International Standard ISO/IEC 646, for the purposes of Certificate coding only numeric characters are permitted.

Example GIAI-based Certificate Number:

51234567000000000000000000001234 (8-digit Company Prefix with 22-digit Individual Asset Reference)

A2.4 Coding of Production Devices

A2.4.1 Production Devices will be coded in accordance with Global Service Relation Number (GSRN) (AI 8018), an element of the GS1 numbering structure.

Format of the Element String																	
Global Service Relation Number																	
GS1 Company Prefix For the registry												Service Reference				Check Digit	
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈

A2.4.2 The GSRN uses the GS1 Company Prefix of the registry assigning the Service Reference. The Service Reference is assigned by the registry and relates to an individual Production Device. The structure and content of the Service Reference number is at the discretion of the registry.

A2.4.3 The Check Digit is calculated as shown below. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

Check Digit Calculation																	
Global Service Relation Number																	
GS1 Company Prefix For the registry												Service Reference				Check Digit	
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈
Multiply value of each position by																	
x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1
Accumulated results = 'sum'																	
Check digit = (nearest multiple of 10 ≥ 'sum') – 'sum'																	

Example Check Digit Calculation																	
Global Service Relation Number																	
GS1 Company Prefix For the registry												Service Reference				Check Digit	
Start number	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6
Multiply value of each position by																	
Interim	x3	x1	x3	x1	x3	x1	x3										
Interim	9	7	18	1	0	4	6	5	0	0	6	1	6	3	12	5	18
Accumulated results = 'sum'																	101
Check digit = (nearest multiple of 10 ≥ 'sum') – 'sum'																	110
																	-101
																	=9
Final number	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6

Example GSRN-based Production Device Numbers are:

512345670000012347 (8-digit Company Prefix with 9-digit Service Reference and single Check Digit)

598765432000001235 (9-digit Company Prefix with 8-digit Service Reference and single Check Digit)

A2.5 Coding of Account Holder IDs

A2.5.1 Each Account Holder shall be assigned a unique account reference by their host IB according to the following structure:

- IB_ID (2 numeric digits)
- X (single 'X' character)
- 6-character alphanumeric ID (0-9 and A-Z only)
- check character (see below)

An example Account Holder ID is 10XRWENETJ.

A check character is a character added to the end of the Account Holder ID that validates the authenticity of the code. A simple algorithm is applied to the other digits or letters of the code which yields the check character.

The last character of each of the Account Holder ID represents the check character that is calculated from the other characters using the following algorithm. An example of a Account Holder ID is 10XRWENETJ.

Calculation of the check character:

(i) The first 9 characters of the code are individualised as follows:

1	0	X	R	W	E	N	E	T
---	---	---	---	---	---	---	---	---

(ii) Where alphabetic characters are present, they are replaced by a numeric value with the value 10 for the letter « A »; 11 for the letter « B »; 12 for the letter « C », etc. and 35 for the letter « Z », as follows:

1	0	33	27	32	14	23	14	29
---	---	----	----	----	----	----	----	----

(iii) Then, the positions are again weighted, beginning with the greatest value to the left and ending with a one at the far right.

1	0	33	27	32	14	23	14	29
<i>10</i>	<i>9</i>	<i>8</i>	<i>7</i>	<i>6</i>	<i>5</i>	<i>4</i>	<i>3</i>	<i>2</i>

(iv) Each digit is multiplied by its position weight

10	0	264	189	192	70	92	42	58
----	---	-----	-----	-----	----	----	----	----

-
- (v) The products are then summed to give a total value: 917
 - (vi) A modulo 36 (which corresponds to the total number of characters available) is applied to the value 917 with the formula $(36 - \text{MOD}([\text{value}],36))$. This produces a numeric value in the range 1 to 36.

In the above example, the result is 19 which, since it is superior to 9 has to be converted to a letter using a similar mechanism as in Step 2. Number 0 is not an allowed output. Where the check character code is 36 this is represented as the character [.

Thus, the code for the above example is: 10XRWENETJ. With an account base of 11XYWZNET the check character would be [and the full account code would be 11XYWZNET[.

A2.6 Coding of Issuing Bodies, Competent Authorities, Energy sources, Technologies, Cogeneration GO Codes, Earmarks, Geographical Coordinate codes, EECS Scheme Members and EECS Products, Transfer Error codes

- A2.6.1 Permissible valid codes for
- A2.6.2 Issuing Bodies and Competent Authorities are found in AIB-EECS-FS04 (Member and Competent Authority Codes)
- A2.6.3 Types of Energy Sources and Technologies and their emission factors are found in AIB-EECS-FS05 (Types of Energy Inputs and Technologies)
- A2.6.4 Use of Heat Codes for Cogeneration GOs are found in AIB-EECS-FS11 (Cogeneration GO Codes)
- A2.6.5 Earmark flags are found in AIB-EECS-FS3 (Types of Public Support)
- A2.6.6 Coordinate Codes for Production Device Location are found in AIB-EECS-FS16 (Geographical Coordinates)
- A2.6.7 EECS Schemes and the Members of each EECS Product are found in AIB-EECS-FS17 (EECS Scheme Members and EECS Products)
- A2.6.8 Transfer Error Codes are found in AIB_EECS_FS18 (Transfer Error Codes).
- A2.6.9 Please consult the latest version of this list for details.

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B2 Introduction

B2.1 Purpose and Scope

B2.1.1 This annex describes the file structures for:

- transferring certificates between registries
- acknowledging the receipt of such transfers

B2.1.2 This interface specification annex addresses data transfer, including acknowledgement of transfer, between registries, specifically relating to certificates for EECS Electricity and Gas Schemes. The EECS Electricity and Gas Schemes are based on the Renewable Energy Directive (EU/2023/2413), the Energy Efficiency Directive (EU/2023/1791) and the Internal Markets Directives (EU/2019/944 and EU/2024/1788)

B2.1.3 The acceptability of certificates in certain markets is not a matter for this document. The data file is designed to allow certificates issued and processed under different rules to be distinguished from each other, even though the underlying data elements may be the same across a number of systems.

B2.1.4 File record specifications are defined for each data record relating to transfers of certificates between registries. Message content and management process are defined.

B3 Overview of Certificate Transfer File Structure

B3.1 Introduction

B3.1.1 The transfer data file is designed to handle EECS Certificates for a number of technologies, fuels and sources and Energy Carriers.

B3.2 Preamble

B3.2.1 The XML preamble describes the encoding and data schema that apply to the file. It takes the form. Note: the schema version used should be given as below (in below example the “exportenv80.xsd” version is used):

```
<?xml version="1.0" encoding="UTF-8"?>  
<r:Env xsi:schemaLocation="http://system.aib-net.org/exportenv80.xsd"  
xmlns:r="http://system.aib-net.org"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
```

B3.2.2 The hosting of the schema does not form part of this specification.

B3.2.3 The current supported schemas:

- (a) v80: ‘exportenv80.xsd’ is described in this standard and addresses the requirements for certificates issued under the EECS Electricity and Gas Scheme; This schema version will be valid until the end of October 2027.
- (b) v81: ‘exportenv81.xsd’ is described in this standard and addresses the requirements for certificates issued under the EECS Electricity and Gas Scheme; This schema version should be implemented by AIB Members latest by the end of October 2027. It will be available for AIB Members after its implementation in the AIB Hub in Q1/2026.

B3.2.4 Transformation rules between supported schemas:

- (a) During an upgrade from an old to a new message schema, each AIB Member is required to upgrade their EECS Registration Database and all EECS Certificates they hold in their database at the time of the upgrade, until the specified deadline. Throughout this Annex B, for each relevant element and attribute, there are “Transformation Rules” described which must be followed during such schema upgrade. This often requires format or value changes to the EECS Certificates held



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```

<r:Conversion tag="XNN"/>
<r:Product name="EECS:GO" legalStatus="LC">
  <r:Purpose>Disclosure</r:Purpose>
  <r:CompetentAuthority>XX01</r:CompetentAuthority>
  <r:ProductType type="driver">Source</r:ProductType>
  <r:ProductType type="driver">Technology</r:ProductType>
</r:Product>
<r:ProductionDeviceID>NNNNNNNNNNNNNNNNNNNN</r:ProductionDeviceID>
<r:ProductionDeviceName>Production Device A</r:ProductionDeviceName>
<r:DateOperational>2021-01-12</r:DateOperational>
<r:Capacity>
  <r:ElectricalCapacity>10000.000</r:ElectricalCapacity>
  <r:ThermalCapacity>10000.000</r:ThermalCapacity>
</r:Capacity>
<r:ProductionTechnology>XNNNNNNN</r:ProductionTechnology>
<r:EnergySource>XNNNNNNNN</r:EnergySource>
<r:SupportFlag>1</r:SupportFlag>
<r:ProductionSupportDescription>Production support.</r:ProductionSupportDescription>
<r:InvestmentSupportDescription>Investment support.</r:InvestmentSupportDescription>
<r:ProductionDeviceLocation>
  <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-
84"/></r:ProductionDeviceLocation>
<r:DisseminationLevel>02</r:DisseminationLevel>
<r:Cogeneration HECCriteriaMet="true">
  <r:UseOfHeat>a</r:UseOfHeat>
  <r:PercentagePrimaryEnergySaved>20.1</r:PercentagePrimaryEnergySaved>
  <r:AmountPrimaryEnergySaved>199.770</r:AmountPrimaryEnergySaved>
  <r:OverallPrimaryEnergySavings>34.1</r:OverallPrimaryEnergySavings>
  <r:UsefulHeat>10.030</r:UsefulHeat>
</r:Cogeneration>
<r:ElectricalEfficiency>97.1</r:ElectricalEfficiency>
<r:ThermalEfficiency>54.1</r:ThermalEfficiency>
<r:CalorificValue type="lower">123.123</r:CalorificValue>
<r:GHGEmissions GHGSavingsCriteriaMet="true">
  <r:GHGEmissionProduced
calculationMethod="XNNNNNNNN">234.123</r:GHGEmissionProduced>
  <r:AbsoluteGHGEmissionSaved
calculationMethod="XNNNNNNNN">123.123</r:AbsoluteGHGEmissionSaved>
</r:GHGEmissions>
<r:Sustainability sustainabilityCriteriaMet="true" certificationBody="XX">
  <r:RequirementReference>REDIIart.30</r:RequirementReference>
  <r:Scheme>ISCC</r:Scheme>
  <r:AuditReport>Reference to the report</r:AuditReport>
  <r:SustainabilityAdditionalInfo>More info</r:SustainabilityAdditionalInfo>
</r:Sustainability>
<r:Label>EKOENERGY</r:Label>
<r:Label>Another label</r:Label>

```




```

</r:Sustainability>
<r:Label>EKOENERGY</r:Label>
<r:Label>Another label</r:Label>
<r:AdditionalInfo>Example GAS with Sustainability</r:AdditionalInfo>
</r:Certificates>
</r:Body>

```

- B3.4.7 The original Account holder, and the new Account holder of the certificates are identified in elements 'r:SendingAccountID' and 'r:ReceivingAccountID' respectively.
- B3.4.8 The actual certificates are described in the 'r:Certificates' block (bundle). This refers to a contiguous set of certificates with serial numbers between StartCertificateNumber and EndCertificateNumber inclusive. If the transfer involves non-contiguous sets of certificates, then further 'r:Certificates' blocks can be included as required.
- B3.4.9 When handling the abovementioned certificate bundles, each EECS Registration Database must follow a no-stitching policy, meaning each certificate bundle may be further divided to smaller separate bundles, but shall never be grouped back to a larger bundle.
- B3.4.10 A single transfer file can only have one body element. This implies that:
 - (a) All the certificates are to be transferred from the same original holder;
 - (b) All the certificates are to be transferred to the same new holder.
- B3.4.11 A single transfer file can only contain certificates of one Energy Carrier.

B4 Certificate Transfer Message Definition

B4.1 Introduction

- B4.1.1 Data fields defined in the message schema are described in further detail in this section. Examples of application are presented in Section B3.
- B4.1.2 Where appropriate, details of field structure have been included.

B4.2 Optional and Mandatory Elements of EECS:GO Certificate v80

- B4.2.1 Below table gives the overview of the mandatory and optional fields in v80 for EECS:GO certificates per Energy Carrier. Electricity certificates are differentiated to non-High Efficiency Cogeneration (non-HEC) certificates and High Efficiency Cogeneration (HEC) certificates.

Element		PRODUCT: EECS:GO (Disclosure)			
		Energy Carrier:			
Hierarchy	Name in v80	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Header	Attribute: MessageTransmissionTime	M	M	M	M
Header	MessageID	M	M	M	M
Header	FromRegistry	M	M	M	M
Header	ToRegistry	M	M	M	M
Header	Context	M	M	M	M
Body	SendingAccountID	M	M	M	M
Body	ReceivingAccountID	M	M	M	M
Body	NumberOfCertificates	M	M	M	M
Body	Message	O	O	O	O



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Element		PRODUCT: EECS:GO (Disclosure)			
		Energy Carrier:			
Hierarchy	Name in v80	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Certificates	Attribute: faceValue	M	M	M	M
Certificates	StartCertificateNumber	M	M	M	M
Certificates	EndCertificateNumber	M	M	M	M
Certificates	IssuingBody	M	M	M	M
Certificates	CountryOfIssue	M	M	M	M
Certificates	DateOfIssue	M	M	M	M
Production Period	Attributes: start end	M	M	M	M
Certificates	EnergyCarrier	M	M	M	M
Certificates	Conversion	M	M	M	M
Conversion	Attribute: tag	M	M	M	M
Conversion	Attribute: preConversionSupportFlag	N	N	O	O
Certificates	Storage ³⁾	x ³⁾	x ³⁾	x ³⁾	x ³⁾
Storage	Attribute: tag	X	X	X	X
Certificates	Product	M	M	M	M
Product	Attribute: name	M	M	M	M
Product	Attribute: legalStatus	M	M	M	M
Product	Purpose	M	M	M	M
Product	CompetentAuthority	M	M	M	M
Product	ProductType	M	M	M	M
ProductType	Attribute: type	M	M	M	M
Certificates	ProductionDeviceID	M	M	M	M
Certificates	ProductionDeviceName	O	O	O	O
Certificates	DateOperational	M	M	M	M
Capacity	ElectricalCapacity	M	M	N	N
Capacity	MechanicalCapacity	O	O	O	O
Capacity	ThermalCapacity	O	M	O	O
Capacity	GasProductionCapacity	N	N	M	M
Module	ModuleCapacity	O	O	O	O
Module	ModuleDateOperational	O	O	O	O
Module	ModuleDescription	O	O	O	O
Certificates	ProductionTechnology	M	M	M	M
Certificates	EnergySource	M	M	M	M
EnergySource	Attribute: advancedBiomassFeedstock	N	N	O	O

Element		PRODUCT: EECS:GO (Disclosure)			
		Energy Carrier:			
Hierarchy	Name in v80	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Certificates	SourceShares	N	N	O	O
Certificates	SupportFlag	M	M	M	M
Certificates	ProductionSupportDescription	O	O	O	O
Certificates	InvestmentSupportDescription	O	O	O	O
ProductionDevice Location	Coordinates ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾
ProductionDevice Location	Address ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾
Certificates	DisseminationLevel	M	M	M	M
Certificates	Cogeneration	O	M	N	N
Cogeneration	Attribute: HECCriteriaMet	O	M	N	N
Cogeneration	UseOfHeat	O	M	N	N
Cogeneration	PercentagePrimaryEnergySaved	O	M	N	N
Cogeneration	AmountPrimaryEnergySaved	O	O	N	N
Cogeneration	OverallPrimaryEnergySavings	O	O	N	N
Cogeneration	UsefulHeat	O	M	N	N
Certificates	ElectricalEfficiency	O	M	N	N
Certificates	ThermalEfficiency	O	M	N	N
Certificates	Gas	N	N	M	M
Gas	Attribute: type	N	N	M	M
Gas	CompositionPurity	N	N	O	O
Gas	GasCompositionCriteria	N	N	O	O
Gas	GasUsage	N	N	O	O
Certificates	CalorificValue	N	M	Only attribute mandatory, value not	Only attribute mandatory, value not
CalorificValue	Attribute: type	N	M	M	M
CalorificValue	Attribute: unit	N	M	M	M
Certificates	GHGEmissions	O	O	O	O
GHGEmissions	Attribute: GHGSavingsCriteriaMet	N	N	O	O
GHGEmissions	GHGEmissionProduced	O	O	O	O
GHGEmissionProduced	Attribute: unit	O	O	O	O
GHGEmissionProduced	Attribute: calculationMethod	X	X	X	X
GHGEmissions	AbsoluteGHGEmissionSaved	O	O	O	O
AbsoluteGHGEmissionSaved	Attribute: unit	O	O	O	O
AbsoluteGHGEmissionSaved	Attribute: calculationMethod	X	X	X	X

Element		PRODUCT: EECS:GO (Disclosure)			
		Energy Carrier:			
Hierarchy	Name in v80	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Certificates	RadioactiveWasteProduced	0	0	0	0
RadioactiveWasteProduced	Attribute: calculationMethod	0	0	0	0
Certificates	Sustainability	0	0	0	0
Sustainability	Attribute: sustainabilityCriteriaMet	0	0	0	0
Sustainability	Attribute: certificationBody	0	0	0	0
Sustainability	RequirementReference	0	0	0	0
Sustainability	Scheme	0	0	0	0
Sustainability	AuditReport	0	0	0	0
Sustainability	SustainabilityAdditionalInfo	0	0	0	0
Certificates	Label	0	0	0	0
Certificates	AdditionalInfo	0	0	0	0

- M Mandatory element (Note, if an attribute is set to Mandatory, it is Mandatory only if the Element itself is set to Mandatory)
- O Optional element ²⁾
- N Not applicable (cannot be given to the type of certificate)
- X Conditionally mandatory element, see notes. If X used for an attribute, the attribute is mandatory if the Element itself is given.

Notes:

- 1) Each certificate must contain at least the ProductionDeviceCoordinates or the ProductionDeviceAddress and may contain both.
- 2) Optional means that it is optional to give it on issuing, but after a certificate is being issued, it is compulsory to keep the information in imports and exports. There are exceptions to this rule where data loss is allowed to specific data fields in case it is done as part of transformation between v71 and v80 and according to the rules introduced for each element in the B4.6 Data Field Definitions – Certificate Transfer File Certificates. (ref EECS Rules A3 IMMUTABILITY)
- 3) Storage element is mandatory if the Storage Tag to be related to the Certificate does not correspond to the default value “S0100” in the Fact Sheet Conversion Track.

B4.3 Optional and Mandatory Elements of EECS:GO Certificate v81

B4.3.1 Below table gives the overview of the mandatory and optional fields in v81 for EECS:GO certificates per Energy Carrier. Electricity certificates are differentiated to non-High Efficiency Cogeneration (non-HEC) certificates and High Efficiency Cogeneration (HEC) certificates.

Yellow highlighted are attributes and elements which were changed between v80 and v81 and require attention during v81 implementation.

Element		Energy Carrier			
Hierarchy	Name in v81	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Header	Attribute: MessageTransmissionTime	M	M	M	M
Header	MessageID	M	M	M	M



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Element		Energy Carrier			
Hierarchy	Name in v81	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Header	FromRegistry	M	M	M	M
Header	ToRegistry	M	M	M	M
Header	Context	M	M	M	M
Body	SendingAccountID	M	M	M	M
Body	ReceivingAccountID	M	M	M	M
Body	NumberOfCertificates	M	M	M	M
Body	Message	O	O	O	O
Certificates	Attribute: faceValue	O	O	O	O
Certificates	StartCertificateNumber	M	M	M	M
Certificates	EndCertificateNumber	M	M	M	M
Certificates	IssuingBody	M	M	M	M
Certificates	CountryOfIssue	M	M	M	M
Certificates	DateOfIssue	M	M	M	M
Certificates	ProductionPeriod (Attributes: start, end, length)	M	M	M	M
Certificates	EnergyCarrier	M	M	M	M
Certificates	Conversion	M	M	M	M
Conversion	Attribute: tag	M	M	M	M
Conversion	Attribute: preConversionCancellationStatement	O	O	O	O
Conversion	PreConversionProductionPeriod (Attributes: start, end, length)	O	O	O	O
Conversion	PreConversionProductionDevice (Attributes: ID, name, technology, dateOperational, capacity, label, supportFlag)	O	O	O	O
Conversion	PreConversionPDCoordinates (Attributes: Longitude, Latitude, CoordinateCode)	O	O	O	O
Conversion	PreConversionPDAddress (Attributes: Country, City, PostCode, StreetName, StreetNumber)	O	O	O	O
Conversion	PreConversionEmissions (Attribute: calculationMethod)	O	O	O	O
Conversion	PreConversionRadioactiveWaste (Attribute: calculationMethod)	O	O	O	O
Certificates	Storage	M	M	M	M
Storage	Attribute: tag	M	M	M	M
Storage	Attribute: efficiencyFactor	O	O	O	O
Storage	Attribute: cancellationStatement	O	O	O	O
Storage	Attribute: cancellationIssuingBody	O	O	O	O
Storage	StorageSystemCoordinates (Attributes: Longitude, Latitude, CoordinateCode)	O	O	O	O



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HUB USER COMPLIANCE DOCUMENT
(AIB-EECS-SD03: EECS Registration Databases)



Element		Energy Carrier			
Hierarchy	Name in v81	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Storage	StorageSystemAddress (Attributes: Country, City, PostCode, StreetName, StreetNumber)	O	O	O	O
Storage	PreStorageProductionPeriod (Attributes: start, end, length)	O	O	O	O
Certificates	Product	M	M	M	M
Product	Attribute: name	M	M	M	M
Product	Attribute: legalStatus	M	M	M	M
Product	Purpose	M	M	M	M
Product	CompetentAuthority	M	M	M	M
Product	ProductType	M	M	M	M
ProductType	Attribute: type	M	M	M	M
Certificates	ProductionDeviceID	M	M	M	M
Certificates	ProductionDeviceName	O	O	O	O
Certificates	DateOperational	M	M	M	M
Capacity	ElectricalCapacity	M	M	N	N
Capacity	MechanicalCapacity	O	O	O	O
Capacity	ThermalCapacity	O	M	O	O
Capacity	GasProductionCapacity	N	N	M	M
Module	ModuleCapacity	O	O	O	O
Module	ModuleDateOperational	O	O	O	O
Module	ModuleDescription	O	O	O	O
Certificates	ProductionTechnology	M	M	M	M
Certificates	EnergySource	M	M	M	M
EnergySource	Attribute: advancedBiomassFeedstock	N	N	O	O
Certificates	SourceShares	N	N	O	O
Certificates	SupportFlag	M	M	M	M
Certificates	ProductionSupportDescription	O	O	O	O
Certificates	InvestmentSupportDescription	O	O	O	O
ProductionDevice Location	Coordinates (Attributes: Longitude, Latitude, CoordinateCode) ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾
ProductionDevice Location	Address (Attributes: Country, City, PostCode, StreetName, StreetNumber) ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾	x ¹⁾
Certificates	DisseminationLevel	M	M	M	M
Certificates	Cogeneration	O	M	N	N
Cogeneration	Attribute: HECCriteriaMet	O	M	N	N
Cogeneration	UseOfHeat	O	M	N	N

Element		Energy Carrier			
Hierarchy	Name in v81	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Cogeneration	PercentagePrimaryEnergySaved	O	M	N	N
Cogeneration	AmountPrimaryEnergySaved	O	O	N	N
Cogeneration	OverallPrimaryEnergySavings	O	O	N	N
Cogeneration	UsefulHeat	O	M	N	N
Certificates	ElectricalEfficiency	O	M	N	N
Certificates	ThermalEfficiency	O	M	N	N
Certificates	Gas	N	N	M	M
Gas	Attribute: type	N	N	M	M
Gas	Attribute: fossilAuxiliaryDeducted	N	N	O	O
Gas	CompositionPurity	N	N	O	O
Gas	GasCompositionCriteria	N	N	O	O
Gas	GasUsage	N	N	O	O
Gas	GasCriterion	N	N	O	O
Gas	ETSESREligibility	N	N	O	O
Certificates	CalorificValue	O	M	Only attribute mandatory, value not	Only attribute mandatory, value not
CalorificValue	Attribute: type	O	M	M	M
CalorificValue	Attribute: unit	O	M	M	M
Certificates	GHGEmissions	O	O	O	O
GHGEmissions	Attribute: GHGSavingsCriteriaMet	N	N	O	O
GHGEmissions	GHGEmissionProduced	O	O	O	O
GHGEmission Produced	Attribute: unit	O	O	O	O
GHGEmission Produced	Attribute: calculationMethod	X	X	X	X
GHGEmissions	AbsoluteGHGEmissionSaved	O	O	O	O
AbsoluteGHG EmissionSaved	Attribute: unit	O	O	O	O
AbsoluteGHG EmissionSaved	Attribute: calculationMethod	X	X	X	X
Certificates	RadioactiveWasteProduced	O	O	O	O
RadioactiveWaste Produced	Attribute: calculationMethod	O	O	O	O
Certificates	Sustainability	O	O	O	O
Sustainability	Attribute: sustainabilityCriteriaMet	O	O	O	O
Sustainability	Attribute: certificationBody	O	O	O	O
Sustainability	RequirementReference	O	O	O	O
Sustainability	Scheme	O	O	O	O
Sustainability	AuditReport	O	O	O	O

Element		Energy Carrier			
Hierarchy	Name in v81	Electricity (non-HEC)	Electricity (HEC)	Energy Gas	Hydrogen
Sustainability	SustainabilityAdditionalInfo	O	O	O	O
Certificates	Label	O	O	O	O
Certificates	AdditionalInfo	O	O	O	O
Certificates	BiddingZone (Attributes: zone90percentageRES, zoneLowEmission)	N	N	O	O
Certificates	RedispatchingCriteriaMet	N	N	O	O
Certificates	PowerPurchaseAgreement (Attributes: startDate, endDate, buyerID)	N	N	O	O

- M Mandatory element (Note, if an attribute is set to Mandatory, it is Mandatory only if the Element itself is set to Mandatory)
- O Optional element ²⁾
- N Not applicable (cannot be given to the type of certificate)
- X Conditionally mandatory element, see notes. If X used for an attribute, the attribute is mandatory if the Element itself is given.

Notes:

- 1) Each certificate must contain at least the ProductionDeviceCoordinates or the ProductionDeviceAddress and may contain both.
- 2) Optional means that it is optional to give it on issuing, but after a certificate is being issued, it is compulsory to keep the information in imports and exports. There are exceptions to this rule where data loss is allowed to specific data fields in case it is done as part of transformation between v80 and v81 and according to the rules introduced for each element in the B4.6 Data Field Definitions – Certificate Transfer File Certificates. (ref EECS Rules A3 IMMUTABILITY).

B4.4 Data Field Definitions – Certificate Transfer File Header

B4.4.1 Message Transmission Time

Timestamp for message file. The recipient may validate the format of this field but may not reject the message if the date is beyond some arbitrary limit in the past. It is the responsibility of the Sender to monitor the total turnaround time of the transaction to ensure that an AK message is received within the required time.

Attribute	MessageTransmissionTime
Type	DateTime
Length	Not applicable
Format	The date and time in UTC (Z) time zone. Use of local time zones (e.g. +1:00) is not permitted for this element.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSZ
Unit	DateTime
Example	2022-01-15T12:24:00Z

B4.4.2 Message ID

Message ID for transfer message.

Element Name	MessageID
Type	Long
Length	15 digits
Format	15 digits fixed length number
Occurrence	1 (per Header element of transfer message) NOTE: Unique identification number for a transfer
Structure	IB code (2 digits) & YYYYMMDD & sequential number (5 digits)
Unit	Not applicable
Example	042002101800001

B4.4.3 From Registry

Identifier for Sending Registry.

This field may be validated for agreement with the XML specification. The recipient may not reject the message based on the content.

Element Name	FromRegistry
Type	Token ¹
Length	6-13
Format	GS1 GLN number
Occurrence	1 (per Header element)
Structure	See section A2.2
Example	6420616413223
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	GS1

B4.4.4 To Registry

Identifier for Receiving Registry.

¹ Token: A string with no leading or trailing white space, no tabs, no linefeeds, and not more than one consecutive space.

This field may be validated for agreement with the XML specification. The recipient may not reject the message based on the content.

Element Name	ToRegistry
Type	Token
Length	6-13
Format	GS1 GLN number
Occurrence	1 (per Header element)
Structure	See section A2.2
Example	6420616413223
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	GS1

B4.4.5 Context

Processing context to assist file routing.

Element Name	Context
Type	Token
Length	1-20
Format	No default value. Currently only one value is allowed.
Occurrence	1 (per Header element)
Business rules	Allowed values: <ul style="list-style-type: none"> • Transfer

B4.5 Data Field Definitions – Certificate Transfer File Body

B4.5.1 Original Holder

Account ID for the sender of the certificates.

Element Name	SendingAccountID
Type	Token
Length	9 + 1 check digit
Format	Combination of characters and digits. See section A2.5 for details.
Occurrence	1 (per Body element)
Structure	See section A2.5

Unit	Not applicable
Example	<r:SendingAccountID cS="eecs">10XRWENETJ</r:SendingAccountID>
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eecs

B4.5.2 New Holder

Account ID for the receiver of the certificates.

Element Name	ReceivingAccountID
Type	Token
Length	9 + 1 check digit
Format	Combination of characters and digits. See section A2.5 for details.
Occurrence	1 (per Body element)
Structure	See section A2.5
Unit	Not applicable
Example	<r:ReceivingAccountID cS="eecs">10XRWENETJ</r:ReceivingAccountID>
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eecs

B4.5.3 Number of Certificates

Number of certificates transferred in the message.

Element Name	NumberOfCertificates
Type	Positive Integer
Length	1-11
Format	Number
Occurrence	1 (per Body element)
Structure	N...[N]

Unit	Not applicable
Example	682

B4.5.4 Message

Free text Message which can be used to communicate information from sender to receiver.

Element Name	Message
Type	String
Length	1-1024
Format	Free text
Occurrence	0 or 1 (per Body element)
Structure	Not applicable
Unit	Not applicable
Example	“Transfer in accordance with order nr ... dated ...”

B4.5.5 Certificates

Each transfer may have one or more “Certificates” elements.

See information about maximum number of “Certificates” elements from 2.3.5.4 To ensure the performance of the AIB Hub a transfer may not contain more certificate bundles than a cap configured in the AIB Hub. This limit is currently set to 5000 on WS (SOAP) communication and 15000 on AMQP communication. A certificate bundle starts:

WS (SOAP) - with the tag `<r:Certificates>` and ends with the tag `</r:Certificates>`.

- (a) AMQP XML - with the tag `<r:Certificates>` and ends with the tag `</r:Certificates>`.
- (b) AMQP JSON – with "certificates": [{ ...certificateBundle }]

More details about a certificate bundle can be found in paragraph B3.4.8.

Element Name	Certificates
Type	Element with an attribute and sub elements
Occurrence	1 to 5000 The upper limit may be increased in the future if needed. Member registries can set their own upper limit in their registry configuration inside the AIB Hub to limit receiving transfers with more certificate bundles than they can handle. But choosing a lower upper limit than others may lead to transfers being blocked as the AIB Hub will stop them.
Attribute	faceValue
Description	Face Value in accordance with the Section of PART IV of the EECS Rules establishing the EECS Scheme in respect of the relevant Output.
Length	1-8
Default value	MWh

Occurrence	Optional
Structure	Currently only certificates with the default value (MWh) are supported by the AIB Hub.
Example	<r:Certificates faceValue="MWh">...</r:Certificates>

B4.6 Data Field Definitions – Certificate Transfer File Certificates

B4.6.1 Start Certificate Number

The number of the first certificate in the block of certificates to be transferred.

Element Name	StartCertificateNumber
Type	Non-negative Integer
Length	30
Format	30-digit fixed length number
Occurrence	1 (per Certificates element)
Structure	See section A2.3.1 <i>N</i> -digit Company Prefix with <i>N</i> -digit Individual Asset Reference, total 30 digits
Example	<r:StartCertificateNumber cS="eecs"> 871686799993800000000001267377 </r: StartCertificateNumber>
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eecs

B4.6.2 End Certificate Number

The number of the last certificate in the block of certificates to be transferred.

Element Name	EndCertificateNumber
Type	Non-negative Integer
Length	30
Format	30-digit fixed length number
Occurrence	1 (per Certificates element)
Structure	See also section A2.3.1 <i>N</i> -digit Company Prefix with <i>N</i> -digit Individual Asset Reference, total 30 digits

Example	<r:EndCertificateNumber cS="eecs"> 871686799993800000000001267377 </r:EndCertificateNumber>
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eecs

B4.6.3 Issuing Body

The ID of the Issuing Body which issued the certificate.

Element Name	IssuingBody
Type	Token
Length	2
Format	NN
Occurrence	1 (per Certificates element)
Structure	2-character numeric, leading zero if required. See Fact sheet 4 "Member & Competent Authority Codes" for possible values
Example	07

B4.6.4 Country of Issue

The country in which the certificate was issued.

Element Name	CountryOfIssue
Type	Token
Length	2
Format	XX
Occurrence	1 (per Certificates element)
Structure	2 characters to mark the country of issuance according to the ISO 3166-1 alpha-2 code list.
Example	FI

B4.6.5 Certificate Issue Date

The date on which the certificate was issued.

Element Name	DateOfIssue
Type	Date
Length	Not applicable

Format	Date is according to the local time zone in the domain of issuance, not UTC. Minimum value 2004-03-17.
Occurrence	1 (per Certificates element)
Structure	YYYY-MM-DD
Example	2025-05-31

B4.6.6 Production Period

Start, end and interval length of actual generation of the Output represented by the certificate. The period is defined by three mandatory attributes.

Element Name	ProductionPeriod
Type	An element having 3 attributes
Occurrence	1 (per Certificates element)
Example v80	<r:ProductionPeriod start="2022-01-01T00:00:00+01:00" end="2022-01-31T23:59:59+01:00"/>
Example v81	<r:ProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>
Structure	Both the start and the end attributes are inclusive, meaning the production period of the certified energy spans from the start to the end date/time of the interval, including the first and the last second.
Attribute	start
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute	end
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute v81	length
Type	Token
Length	1-20

Format	New attribute for schema v81. Mandatory. Allowed values are described in Fact Sheet 25 “Production Period Identifiers”.
Occurrence	Required
Structure	<p>One of the allowed values. To pass the Hub validation the following criteria must be met:</p> <ul style="list-style-type: none"> • “month” <ul style="list-style-type: none"> ○ Attributes Production Period start and end must fall within the same calendar month. • “day” <ul style="list-style-type: none"> ○ Attributes Production Period start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime changes. • “hour” <ul style="list-style-type: none"> ○ Attribute Production Period start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour. • “30min” <ul style="list-style-type: none"> ○ Attributes Production Period start and end times must be one of the following combinations: <ul style="list-style-type: none"> ○ TXX:00:00 – TXX:29:59 ○ TXX:30:00 – TXX:59:59 ○ Duration must be exactly 30 minutes. • “15min” <ul style="list-style-type: none"> ○ Attributes Production Period start and end times must be one of the following combinations: <ul style="list-style-type: none"> ○ TXX:00:00 – TXX:14:59 ○ TXX:15:00 – TXX:29:59 ○ TXX:30:00 – TXX:44:59 ○ TXX:45:00 – TXX:59:59 ○ Duration must be exactly 15 minutes. <p>See Fact Sheet 25 “Production Period Identifiers” for details.</p>
Transformation rules	
from v80 to v81	<p>Hub will transform all incoming v80 GOs to v81 GOs by adding the appropriate value to the “length” attribute based on the abovementioned criteria.</p> <p>Member registries upgrading their database from v80 to v81 shall assign the “length” attribute value based on the abovementioned criteria.</p>

	In case of v80 GOs issued with production period spanning over multiple calendar months, and only to enable transformation of such GOs to v81 format, it is recommended to change the production period “start” to the beginning of the calendar month of the production period “end”, to enable assigning the “length” attribute value = month.
from v81 to v80	The “length” attribute will be lost.

B4.6.7 Energy Carrier

Energy Carrier for which the EECS the certificates have been issued.

Element Name	EnergyCarrier
Type	Token
Length	1-20
Format	Text field
Occurrence	1 (per Certificates element)
Example	<EnergyCarrier>Electricity</EnergyCarrier>
Business Rules	Allowed values: <ul style="list-style-type: none"> • Electricity • EnergyGas • Hydrogen One transfer can only contain Certificates of the same Energy Carrier.

B4.6.8 Conversion Information

Group of elements to provide information whether the Certificate was issued as a consequence of EECS Certificate Conversion, and additional related non-mandatory data as per EECS Rules section C3.6.2.

Element Name	Conversion
Type	Element with two attributes and 6 child elements
Occurrence	1 (per Certificates element)
Attribute	tag
Type	Token
Length	3
Occurrence	Mandatory
Description	An indication whether or not the Certificate was issued following EECS Certificate Conversion (EECS Rules section C3.6).
Structure	One of the Conversion Tags from Fact Sheet 23 “Storage and Conversion Tracking”

Attribute v81	preConversionCancellationStatement
Type	Token
Length	1-150
Format	Text field
Occurrence	0 or 1 (per Conversion element)
Structure	ID of the cancellation statement used for proving the attributes of the energy charged into the storage system.
Example v80	<code><r:Conversion tag="C02" preConversionSupportFlag="1"/></code>
Example v81	<pre> <r:Conversion tag="C02" preConversionCancellationStatement="CS12345 6789"> <r:PreConversionProductionPeriod start="2025- 03-01T00:00:00+01:00" end="2025-03- 31T23:59:59+02:00" length="month"/> <r:PreConversionProductionDevice ID="506003453000000275" name="Central Hidroeléctrica" technology=" T030200" dateOperational="2021-01-12" capacity="10.999" label="EKOENERGY" supportFlag="1"/> <r:PreConversionPDCoordinates Longitude="448 92 N" Latitude="115 778 E" CoordinateCode="WGS-84"/> <r:PreConversionAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/> <r:PreConversionEmissions calculationMethod=""E010000000">234.000</r: PreConversionEmissions> <r:PreConversionRadioactiveWaste calculationMethod=""E020000000">12.000</r: PreConversionRadioactiveWaste> </r:Conversion> </pre>
Transformation rules	
from v80 to v81	<p>The old preConversionSupportFlag attribute will be removed (was never used in practice yet, so no information will be lost).</p> <p>No other (new) optional attributes or child elements will be added.</p>
from v81 to v80	All new optional attributes and child elements will be lost.

a) Pre-conversion Production Period

An optional child element to specify the production period of the pre-conversion energy.

Element Name v81	PreConversionProductionPeriod
Type	Element with 3 attributes
Occurrence	0 or 1 (per Conversion element)
Attribute	start
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute	end
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute	length
Type	Token
Length	1-20
Format	Required. Allowed values are described in Fact Sheet 25 "Production Period Identifiers".
Occurrence	Required
Structure	One of the allowed values. The following criteria must be met: <ul style="list-style-type: none"> • "month" <ul style="list-style-type: none"> ○ Attributes start and end must fall within the same calendar month. • "day" <ul style="list-style-type: none"> ○ Attributes start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime time zone offset changes. • "hour"

	<ul style="list-style-type: none"> ○ Attribute start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour. • “30min” <ul style="list-style-type: none"> ○ Attributes start and end times must be one of the following combinations: ○ TXX:00:00 – TXX:29:59 ○ TXX:30:00 – TXX:59:59 ○ Duration must be exactly 30 minutes. • “15min” <ul style="list-style-type: none"> ○ Attributes start and end times must be one of the following combinations: ○ TXX:00:00 – TXX:14:59 ○ TXX:15:00 – TXX:29:59 ○ TXX:30:00 – TXX:44:59 ○ TXX:45:00 – TXX:59:59 ○ Duration must be exactly 15 minutes. <p>See Fact Sheet 25 “Production Period Identifiers” for details.</p>
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b) Pre-conversion Production Device

An optional child element to specify the identity of the pre-conversion production device.

Element Name v81	PreConversionProductionDevice
Type	Element with 7 attributes
Occurrence	0 or 1 (per Conversion element)
Attribute	ID
Type	Long
Length	18
Format	18 digits
Occurrence	Optional
Structure	See section A2.4
Attribute	name
Type	Token
Length	1-255
Format	Text field
Occurrence	Optional
Structure	Free text
Attribute	technology

Type	Token
Length	1-20
Format	TNNNNNN, GNNNNNN or QNNNNNN
Occurrence	Optional
Structure	One of the Technology codes from EECS Rules Fact Sheet 5 “Types of Energy Inputs and Technologies”.
Attribute	dateOperational
Type	Date
Format	YYYY-MM-DD
Occurrence	Optional
Structure	Date according to the local time zone, not UTC.
Attribute	capacity
Type	Decimal(11,3)
Occurrence	Optional
Structure	Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Unit	kW
Attribute	label
Type	Token
Length	1-20
Occurrence	Optional
Structure	See EECS Fact Sheet 17 “EECS Scheme Members and Products” for possible values
Attribute	supportFlag
Type	Token
Length	1-2
Occurrence	Optional
Structure	One of the codes listed in EECS Rules Fact Sheet 3 “Types of Public Support”.

c) Pre-conversion Production Device Coordinates

An optional child element to use in case the pre-conversion production device location is specified with geographical coordinates. The element has no value associated with it. The coordinates and the code are defined by three mandatory attributes.

Element Name v81	PreConversionPDCoordinates
Type	Element with 3 attributes
Occurrence	0 or 1 (per Conversion element)
Attribute	Longitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	Latitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	CoordinateCode
Type	Token
Length	1-20
Format	Coordinate code in accordance with the EECS Rules Fact Sheet 16 "Geographical Coordinates".
Structure	Required

d) Pre-conversion Production Device Address

An optional child element to use in case the pre-conversion production device location is specified as an address. The element has no value associated with it. The address is defined by three mandatory and two optional attributes.

Element Name v81	PreConversionPDAddress
Type	Element with 5 attributes
Occurrence	0 or 1 (per Conversion element)
Attribute	Country
Type	Token
Length	2
Format	2 characters to mark the country of issuance according to the ISO 3166-1 alpha-2 code list.
Structure	Required

Attribute	City
Type	Token
Length	1-150
Format	Text field
Structure	Required
Attribute	PostCode
Type	Token
Length	1-10
Format	Text field
Structure	Required
Attribute	StreetName
Type	Token
Length	1-150
Format	Text field
Structure	Optional, no default value
Attribute	StreetNumber
Type	Token
Length	1-10
Format	Text field
Structure	Optional, no default value

e) Pre-conversion Emissions

A quantification of the carbon footprint related to the pre-conversion energy, taking into account the energy efficiency of such conversion, together with a reference to the methodology used.

Element Name v81	PreConversionEmissions
Type	Decimal(11,3) Always 3 decimals Minimum value 0.000 Maximum value 99999999.999
Occurrence	0 or 1 (per Conversion element).
Unit	g/MWh
Attribute	calculationMethod
Type	Token

Occurrence	Optional
Length	11
Format	ENNNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Code structure from Fact Sheet 24 “Methodology for carbon footprint info on GO”

- f) **Pre-conversion Radioactive Waste**
A quantification of the radioactive waste related to the energy pre-conversion, taking into account the energy efficiency of such conversion, together with a reference to the methodology used.

Element Name v81	PreConversionRadioactiveWaste
Type	Decimal(11,3) Always 3 decimals Minimum value 0.000 Maximum value 99999999.999
Occurrence	0 or 1 (per Conversion element).
Unit	g/MWh
Attribute	calculationMethod
Type	Token
Occurrence	Optional
Length	11
Format	Code from Fact Sheet “Methodologies for environmental impact of production”

B4.6.1 Storage

Group of elements to provide information whether the Certificate was issued following release from a Storage System in accordance with the provisions of EECS Rules section C3.2.4, and related additional specifications.

Element Name	Storage
Type	Element with attributes and child elements
Occurrence	1 (per Certificates element)
Structure v81	Storage attributes are defining whether or not the certificate was issued for energy released from storage and provide some additional specifications (efficiency factor and related cancellation details). Additionally, Storage has child elements to provide more details – location of the storage system and original production period of the represented energy.

Attribute	tag
Type	Token
Length v80	5
Length v81	1-20
Default v80	S0100
Occurrence	Mandatory
Description	An indication whether the Certificate was issued following release from a Storage System in accordance with the provisions of EECS Rules section C3.2.4
Structure	One of the values for Storage Tags from Fact Sheet 23 “Storage and Conversion Tracking”
Attribute v81	efficiencyFactor
Type	Decimal(4,1) Always 1 decimal Maximum value 100.0 Minimum value 0.1
Occurrence	0 or 1 (per Storage element)
Unit	%
Structure	The efficiency factor expresses the remaining energy after deducting storage losses, as a percentage of the original energy that was charged into the Storage System
Attribute v81	cancellationStatement
Type	Token
Length	1-150
Format	Text field
Occurrence	0 or 1 (per Storage element)
Structure	ID of the cancellation statement used for proving the attributes of the energy charged into the storage system.
Attribute v81	cancellationIssuingBody
Type	Token
Length	2
Format	NN
Occurrence	0 or 1 (per Storage element)

Structure	Code of the Issuing Body who executed and registered the cancellation of the certificates that prove the attributes of the energy charged into the Storage System. 2-character numeric, leading zero if required. See Fact Sheet 4 “Member & Competent Authority Codes” for possible values.
Example v80	<r:Storage tag="S0100"/>
Example v81	<r:Storage tag="S0200010101" efficiencyFactor="78.6" cancellationStatement="CS123456789" cancellationIssuingBody="22"> <r:StorageSystemCoordinates Longitude="448 92 N" Latitude="115 778 E" CoordinateCode="WGS-84"/> <r:StorageSystemAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/> <r:PreStorageProductionPeriod start="2025-03- 01T00:00:00+01:00" end="2025-03- 31T23:59:59+02:00" length="month"/> </r:Storage>
Transformation rules	
from v80 to v81	In case the value of Storage tag attribute was missing, the value “S0100000000” will be added. In other cases, the old value Storage tag attribute will be extended with additional “000000” at the end of the code to mark the “Unspecified” category. No other (new) optional attributes or child elements will be added.
from v81 to v80	Last 6 digits from the Storage tag attribute will be lost, e.g. “S0200020203” to “S0200”. All other (new) optional attributes and child elements will be lost.

a) Storage System Coordinates

An optional child element to use in case the storage system location is specified with geographical coordinates. The element has no value associated with it. The coordinates and the code are defined by three mandatory attributes.

Element Name v81	StorageSystemCoordinates
Type	Element with 3 attributes
Occurrence	0 or 1 (per Storage element)

Example	<r:StorageSystemCoordinates Longitude="448 92 N" Latitude="115 778 E" CoordinateCode="WGS-84"/>
Attribute	Longitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	Latitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	CoordinateCode
Type	Token
Length	1-20
Format	Coordinate code in accordance with the EECS Rules Fact Sheet 16 "Geographical Coordinates".
Structure	Required

b) Storage System Address

An optional child element to use in case the storage system location is specified as an address. The element has no value associated with it. The address is defined by three mandatory and two optional attributes.

Element Name v81	StorageSystemAddress
Type	Element with 5 attributes
Occurrence	0 or 1 (per Storage element)
Example	<r:StorageSystemAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>
Attribute	Country
Type	Token
Length	2
Format	2 characters to mark the country of issuance according to the ISO 3166-1 alpha-2 code list.
Structure	Required
Attribute	City

Type	Token
Length	1-150
Format	Text field
Structure	Required
Attribute	PostCode
Type	Token
Length	1-10
Format	Text field
Structure	Required
Attribute	StreetName
Type	Token
Length	1-150
Format	Text field
Structure	Optional, no default value
Attribute	StreetNumber
Type	Token
Length	1-10
Format	Text field
Structure	Optional, no default value

- c) Pre-storage Production Period
 An optional child element to specify the original production period of the represented energy before it was stored.

Element Name v81	PreStorageProductionPeriod
Type	Element with 3 attributes
Occurrence	0 or 1 (per Storage element)
Example	<r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>
Attribute	start
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required

Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute	end
Type	DateTime
Format	Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer. Minimum value 2004-03-17T00:00:00+00:00.
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM
Attribute	length
Type	Token
Length	1-20
Format	Required. Allowed values are described in Fact Sheet 25 "Production Period Identifiers".
Occurrence	Required
Structure	<p>One of the allowed values. The following criteria must be met:</p> <ul style="list-style-type: none"> • "month" <ul style="list-style-type: none"> ○ Attributes start and end must fall within the same calendar month. • "day" <ul style="list-style-type: none"> ○ Attributes start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime time zone offset changes. • "hour" <ul style="list-style-type: none"> ○ Attribute start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour. • "30min" <ul style="list-style-type: none"> ○ Attributes start and end times must be one of the following combinations: <ul style="list-style-type: none"> ○ TXX:00:00 – TXX:29:59 ○ TXX:30:00 – TXX:59:59 ○ Duration must be exactly 30 minutes. • "15min" <ul style="list-style-type: none"> ○ Attributes start and end times must be one of the following combinations: <ul style="list-style-type: none"> ○ TXX:00:00 – TXX:14:59

	<ul style="list-style-type: none"> ○ TXX:15:00 – TXX:29:59 ○ TXX:30:00 – TXX:44:59 ○ TXX:45:00 – TXX:59:59 ○ Duration must be exactly 15 minutes. <p>See Fact Sheet 25 “Production Period Identifiers” for details.</p>
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B4.6.2 Product

Element to group Product related information.

Element Name	Product
Type	Element with attributes and child elements
Length	1-20 chars
Format	Text field. Values according to the Fact Sheet 17 “EECS Scheme Members and EECS Products”.
Occurrence	1 or more (per Certificates element)
Structure	<p>Product with attributes defining the name of the Product, and its legal status. Product has child elements to further describe the Product. Each child element is described separately later in the document:</p> <ul style="list-style-type: none"> • Purpose • CompetentAuthority (required when the legalStatus-attribute is “LC”) • ProductType <p>Note: Certificate may represent several Products and this logic can keep together the information related to a specific Product.</p>
Attribute	name
Type	Token
Length	1-20
Occurrence	Mandatory
Format	“EECS:GO” or “ICS:EECS Disclosure” or other Product name defined in FS17: EECS Scheme Members and EECS Products
Attribute	legalStatus
Type	Token
Length	1-20
Occurrence	Mandatory
Format	One of below: <ul style="list-style-type: none"> • “LC”, meaning Legal Certificate

	<ul style="list-style-type: none"> “NGC”, meaning Non-Governmental Certificate
Example	<p>GO:</p> <pre><r:Product name="EECS:GO" legalStatus="LC"> <r:Purpose>Disclosure</r:Purpose> <r:CompetentAuthority>CA01 </r:CompetentAuthority> <r:ProductType type="driver">Source</r:ProductType> <r:ProductType type="driver">Technology</r:ProductType> </r:Product></pre> <p>ICS being non-governmental certificate:</p> <pre><r:Product name="ICS:XXX" legalStatus="NGC"> <r:Purpose>Disclosure</r:Purpose> <r:ProductType type ="XX">AAA</r:ProductType> <r:ProductType type ="XX">BBB</r:ProductType> <r:ProductType type ="YY">CCC</r:ProductType> </r:Product></pre>

(a) Purpose

The Purpose for which the certificates have been issued.

Element Name	Purpose
Type	Token
Length	1-20
Format	Text field.
Occurrence	1 or more (per Certificates element)
Structure	Not applicable
Unit	Not applicable
Example	<pre><Purpose>Disclosure</Purpose> <Purpose>Support</Purpose></pre>
Business Rules	<p>The Purpose or Purposes for which the Certificate has been issued. Purpose(s) must be within the Purposes defined for the Product for which the certificate is being issued.</p> <p>One or more of below:</p> <ul style="list-style-type: none"> Disclosure Support Target

(b) Competent Authority ID

The ID of the Competent Authority responsible for the EECS Product of the certificates being transferred.

Element Name	CompetentAuthority
Type	Token
Length	4
Format	XXNN
Occurrence	0 or more (per Product element). If the legalStatus attribute is "LC", then at least one Competent Authority is mandatory.
Structure	Country code + 2-digit See Fact Sheet 4 "Member & Competent Authority Codes" for possible values.
Example	<CompetentAuthority>NO01</CompetentAuthority> <CompetentAuthority>NO02</CompetentAuthority>

(c) Product Type

Element for describing Product.

Element Name	ProductType
Type	Token
Length	1-20
Format	Element with attribute
Occurrence	1 or more (per Product element)
Attribute	type
Type	String
Length	1-20
Occurrence	Mandatory
Format	One of below: <ul style="list-style-type: none"> • driver • targetType • targetScheme
Example	<r:ProductType type="driver">Source</r:ProductType> <r:ProductType type="driver">Technology</r:ProductType>
Business Rules	When type-attribute is: <ul style="list-style-type: none"> • "driver": where the Certificate is a Guarantee of Origin, or Support Certificate, whether it is issued driven by the energy

	<p>source for the Output to which it relates and/or the technology type used in producing such Output. Possible values:</p> <ul style="list-style-type: none"> ○ Source and/or ○ Technology • “typeOfTarget”: where the Certificate is a Target Certificate, the type of Target it relates to • “targetScheme”: where the Certificate is a Target Certificate, a reference to the relevant target accounting scheme
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B4.6.3 Production Device ID

The ID of the Production Device of the issued certificates.

Element Name	ProductionDeviceID
Type	Long
Length	18
Format	18 digits
Occurrence	1 (per Certificates element)
Structure	See section A2.4
Unit	Not applicable
Example	506003453000000275
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive. See chapter A2.4 Coding of Production Devices for details.
Default	GS1

B4.6.4 Production Device Name

Name of the originating Production Device.

Element Name	ProductionDeviceName
Type	Token
Length	1-255
Format	Text field
Occurrence	0 or 1 (per Certificates element)
Structure	Free text

Unit	Not applicable
Example	<r:ProductionDeviceName>Central Hidroeléctrica de Nunes</r:ProductionDeviceName>

B4.6.5 Date Operational

The date on which the Production Device became operational in accordance with national legislation.

Element Name	DateOperational
Type	Date
Length	Not applicable
Format	Date is according to the local time zone, not UTC. Minimum value 1800-01-01.
Occurrence	1 (per Certificates element)
Structure	YYYY-MM-DD
Unit	Date
Example	<r:DateOperational>2003-05-21</r:DateOperational>

B4.6.6 Capacity

Each Certificate requires at least one Capacity child element.

Element Name	Capacity
Type	Element with child elements
Occurrence	1 (per Certificates element)
Structure	<r:Capacity> <r:ElectricalCapacity>10.999</r:ElectricalCapacity> <r:ThermalCapacity>20.999</r:ThermalCapacity> </r:Capacity>

(a) Electrical Capacity

Production Device Electrical Capacity in kW.

Element Name	ElectricalCapacity
Type	Decimal(11,3)
Occurrence	1 (per Capacity element) Only applicable for Energy Carrier "Electricity".
Structure	Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Unit	kW
Example	<r:ElectricalCapacity>78.050</r:ElectricalCapacity>

(b) Mechanical Capacity

Production Device Mechanical Capacity in kW.

Element Name	MechanicalCapacity
Type	Decimal(11,3)
Occurrence	0 or 1 (per Capacity element)
Structure	Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Unit	kW
Example	<r:MechanicalCapacity>10.785</r:MechanicalCapacity>

(c) Thermal Capacity

Production Device Thermal Capacity in kW.

Element Name	ThermalCapacity
Type	Decimal(11,3)
Occurrence	0 or 1 (per Capacity element) Mandatory for High Efficiency Cogeneration Certificates, when HECCriteriaMet-attribute has value "true" Only applicable for Energy Carrier "Electricity"
Structure	Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Unit	kW
Example	<r:ThermalCapacity>185.200</r:ThermalCapacity>

(d) Gas Production Capacity

Production Device Gas Production Capacity in kW.

Element Name	GasProductionCapacity
Type	Decimal(11,3)
Occurrence	0 or 1 (per Capacity element) Only applicable and mandatory for Energy Carriers "EnergyGas" and "Hydrogen".
Structure	Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Unit	kW

Example	<r:GasProductionCapacity>78.050</r:GasProductionCapacity>
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B4.6.7 Module

Module description and date-operational, in case the Production Device consists of separate modules. For example:

- 1) where there is a plant which upgrades the gas quality, the date on which the plant(s) that produced the raw gas became operational and its/their capacity.
- 2) where the Production Device has added new capacity later: the capacity and date operational of the new module.

Element Name	Module
Type	Element with child elements
Occurrence	0 or 1 (per Certificates element)
Structure	<pre><r:Module> <r:ModuleCapacity>10.999</r:ModuleCapacity> <r:ModuleDateOperational>2022-01-01 </r:ModuleDateOperational> <r:ModuleDescription>Element1 </r:ModuleDescription> </r:Module></pre>

(a) **Module Capacity**

Element Name	ModuleCapacity
Type	Decimal(11,3)
Occurrence	1 (per Module element)
Structure	Always 3 decimals. Maximum value 99999999.999 Minimum value 0.001 Type of capacity is the same as the overall capacity element.
Unit	kW
Example	185.200

(b) **Module Date Operational**

The date on which the relevant production module became operational in accordance with national legislation.

Element Name	ModuleDateOperational
Type	Date

Length	Not applicable
Format	Minimum value 1800-01-01
Occurrence	0 or 1 (per Module element)
Structure	YYYY-MM-DD
Unit	Date
Example	2002-10-15

(c) Module Description

Description of Module. Free text description.

Element Name	ModuleDescription
Type	String
Length	1-255
Format	Free text
Occurrence	0 or 1 (per Module element)
Example	"PD123 extension from 2002"

B4.6.8 Production Technology

Technology of the Originating Production Device.

Element Name	ProductionTechnology
Type	Token
Length	1-20
Format	According to the allowed values from EECS Rules Fact Sheet 5 "Types of Energy Inputs and Technologies". Starting with a letter (T, G or Q, depending on the Energy Carrier), followed by 6 digits: TNNNNNN, GNNNNNN or QNNNNNN
Occurrence	1 (per Certificates element)
Structure	One of the Technology codes from EECS Rules Fact Sheet 5 "Types of Energy Inputs and Technologies". Combination of Production Technology and Energy Source for a Certificate must be a valid combination defined in the Fact Sheet 5.
Example	T030200
Attribute	cS
Type	String
Format	Currently only the default value is allowed.

	Not case sensitive.
Default	eecs

B4.6.9 Energy Source and Advanced Biomass Feedstock

Energy Source from which the Output was produced.

Element Name	EnergySource
Type	Token
Length	1-20
Format	According to the allowed values from EECS Rules Fact Sheet 5 “Types of Energy Inputs and Technologies”. Starting with a letter F, followed by 8 digits: FNNNNNNNN
Occurrence	1 (per Certificates element)
Structure	One of the Fuel (energy source) codes from EECS Rules Fact Sheet 5 “Types of Energy Inputs and Technologies”. Combination of Production Technology and Energy Source for a Certificate must be a valid combination defined in the Fact Sheet 5.
Example	F01050203
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eecs
Attribute	advancedBiomassFeedstock
Type	Boolean
Description	Where the Energy Source is of biological origin, this attribute indicates whether this Energy Source originates from an Advanced Biomass Feedstock, according to the feedstocks listed in Annex IX of the Renewable Energy Directive.
Format	true or false
Occurrence	Optional. Only applicable for Energy Carriers “EnergyGas” and “Hydrogen”.

B4.6.10 Source Shares

If Output is produced from a mixture of Inputs, consisting of other than only the Input from the Energy source: in addition to the recorded EnergySource for which the corresponding Certificate was Issued, information on those Inputs, EnergySource, and their share in total energy Input. This share shall be determined in accordance with the Energy Input Factor;

Element Name	SourceShares
Type	String
Length	1-255
Format	Free text
Occurrence	0 or 1 (per Certificate element) Only applicable for Energy Carriers "EnergyGas" and "Hydrogen".
Example	"F01010101: 10%, F01010201: 90%"

B4.6.11 Support Flag

Support Flag denoting whether the relevant Production Device and/or its Output have benefited or will benefit from Support.

Element Name	SupportFlag
Type	byte (Schema)
Length	8
Format	Depends on setting of cS attribute
Occurrence	1 (per Certificates element)
Structure	The allowed codes are listed in EECS Rules Fact Sheet 3 "Types of Public Support".
Example	1
Attribute	cS
Type	String
Format	Currently only the default value is allowed. Not case sensitive.
Default	eeCS

B4.6.12 Production Support Description

Description of Production Support Scheme. Free text description based on values in EECS Rules Fact Sheet 3 "Types of Public Support".

Element Name	ProductionSupportDescription
Type	String
Length	1-1024
Format	Free text

Occurrence	0 or 1 (per Certificates element)
Example	"GSC-Be"

B4.6.13 Investment Support Description

Description of Investment Support Scheme.

Element Name	InvestmentSupportDescription
Type	String
Length	1-1024
Format	Free text
Occurrence	0 or 1 (per Certificates element)
Example	"FZOEU"

B4.6.14 Production Device Location

ProductionDeviceLocation element is required for a Certificates element, and it should contain element(s) Coordinates and/or Address which are described below. In case of small aggregated production devices (in accordance with EECS Rules section C3.5.8), the Fact Sheet 16 elaborates, what the mentioned address or geo-location code refers to.

Element Name	ProductionDeviceLocation
Type	Element with child elements
Occurrence	1 (per Certificates element)
Structure	<pre><r:ProductionDeviceLocation> <r:Coordinates Longitude="448 92 N" Latitude="115 778 E" CoordinateCode="WGS-84"/> <r:Address PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/> </r:ProductionDeviceLocation></pre>

(a) Coordinates

Location of the Production Device described with geographical coordinates. This element has no data associated with it. The coordinates and the code are defined by three mandatory attributes.

Element Name	Coordinates
Type	Element with 3 attributes
Occurrence	0 or 1 (per ProductionDeviceLocation element) Note: either Coordinates and/or Address is required
Example	<r:Coordinates Longitude="448 92 N" Latitude="115 778 E" CoordinateCode="WGS-84"/>

Attribute	Longitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	Latitude
Type	Token
Length	1-20
Format	Depends on Coordinate Code
Structure	Required
Attribute	CoordinateCode
Type	Token
Length	1-20
Format	Coordinate code in accordance with the EECS Rules Fact Sheet 16 "Geographical Coordinates".
Structure	Required

(b) Production Device Address

Location of the Production Device described with 3 mandatory attributes (country, city, and postal code) and 2 optional attributes (street name and number). This element has no data associated with it. The address is defined by the attributes.

Element Name	Address
Type	Element with 5 attributes
Occurrence	0 or 1 (per ProductionDeviceLocation element) Note: either Coordinates and/or Address is required
Example	<r:Address PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>
Attribute	Country
Type	Token
Length	2
Format	2 characters to mark the country of issuance according to the ISO 3166-1 alpha-2 code list.
Structure	Required
Example	FI

Attribute	City
Type	Token
Length	1-150
Format	Text field
Structure	Required
Attribute	PostCode
Type	Token
Length	1-10
Format	Text field
Structure	Required
Attribute v81	StreetName
Type	Token
Length	1-150
Format	Text field
Structure	Optional, no default value
Attribute v81	StreetNumber
Type	Token
Length	1-10
Format	Text field
Structure	Optional, no default value
Transformation rules	
from v80 to v81	StreetName and StreetNumber are not added as the attributes are only optional.
from v81 to v80	Information will be lost.

B4.6.15 Dissemination level

The dissemination level of the Output for which an EECS Certificate is issued, in accordance with EECS Rules section C3.5.4. (t).

Element Name	DisseminationLevel
Type	Token
Length	1-2
Occurrence	1 (per Certificates element).

Structure	Refer to EECS Fact Sheet 20 “Dissemination Level”. Note that the DisseminationLevel code must match the Energy Carrier according to the Fact Sheet 20.
Unit	Not applicable.
Example	<r:DisseminationLevel>2a</r:DisseminationLevel>
Transformation rules	
from v80 to v81	<p>No transformation for codes 1, 5, 6 and 7.</p> <p>For codes 2, 3 and 4 a letter will be added to the code based on the Energy Carrier on the Certificate:</p> <ul style="list-style-type: none"> • a (Electricity) • b (EnergyGas) • c (Hydrogen) <p>Code 4d is not used in these transformation rules as the information is not given in v80 details.</p> <p>For code 8 there will be no mandatory transformation as the value will be supported in both schemas to facilitate Hub transfers of previously issued certificates. But code 8 cannot be used for newly issued certificates in registries that already implemented v81.</p>
from v81 to v80	<p>In case of the new codes (including a letter), the value will be reduced to only the number.</p> <p>In other cases, no transformation needed.</p>

B4.6.16 Cogeneration

Element containing fields specific to thermal and electrical energy cogeneration (also called CHP – combined heat and power)

Element Name	Cogeneration
Type	Element with an attribute and child elements
Occurrence	0-1 (per Certificate element) Only applicable for Energy Carrier “Electricity”
Business rules	<p>For Certificates where the HECCriteriaMet-attribute is “true” and ProductType is “Technology”: whether the energy unit has met the primary energy savings criteria of the Directive on Energy Efficiency 2012/27/EU Annex II.</p> <p>Where these primary energy savings criteria for High-Efficiency Cogeneration (HEC) are met, this Certificate can be considered to be a High-Efficiency Cogeneration Certificate, and the related mandatory attributes are to be included in the Certificate.</p>
Attribute	HECCriteriaMet
Type	Boolean

Occurrence	Required
Structure	Allowed values: <ul style="list-style-type: none"> • true • false
Business rules	<p>true: For Certificates where the ProductType is Technology: whether the energy unit has met the primary energy savings criteria of the Directive on Energy Efficiency 2012/27/EU Annex II. The below fields are compulsory:</p> <ul style="list-style-type: none"> • UseOfHeat • PercentagePrimaryEnergySaved • AmountPrimaryEnergySaved • OverallPrimaryEnergySavings • UsefulCogenerationHeat • ElectricalEfficiency • ThermalEfficiency • CalorificValue • ThermalCapacity • ProductType driver =Technology <p>false: the above criteria not met.</p>
Example	<r:Cogeneration HECCriteriaMet="true">...</r:Cogeneration>

(a) Use of Heat

Use of heat being one of the values identified in Fact Sheet 11 “Cogeneration GO Codes” under “Uses of Heat”

Element Name	UseOfHeat
Type	Token
Length	1-20
Format	Text field
Occurrence	0 or 1 (per Cogeneration element). Mandatory when HECCriteriaMet has value “true” Only applicable for Energy Carrier “Electricity”
Default	-
Structure	One of the values identified in the EECS Rules Fact Sheet 11 “Cogeneration GO Codes” under “Uses of Heat”
Example	a

(b) Percentage Primary Energy Saved

The primary energy saved expressed as a percentage according to Annex II of the Energy Efficiency Directive

Element Name	PercentagePrimaryEnergySaved
Type	Decimal(4,1) Always 1 decimal Maximum value 100.0 Minimum value 0.1
Occurrence	0 or 1 (per Cogeneration element). Mandatory when HECCriteriaMet has value "true" Only applicable for Energy Carrier "Electricity"
Unit	%
Example	98,0

(c) Amount Primary Energy Saved

The actual amount of primary energy saved expressed in megajoules per MWh

Element Name	AmountPrimaryEnergySaved
Type	Decimal(11,3) Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Occurrence	0 or 1 (per Cogeneration element). Mandatory when HECCriteriaMet has value "true" Only applicable for Energy Carrier "Electricity"
Unit	MJ/MWh
Example	10.200

(d) Overall Primary Energy Savings

The overall primary energy savings expressed as a percentage based on the total energy input and output flows of a Cogeneration unit

Element Name	OverallPrimaryEnergySavings
Type	Decimal(4,1) Always 1 decimal Maximum value 100.0 Minimum value 0.1
Occurrence	0 or 1 (per Cogeneration element). Mandatory when HECCriteriaMet has value "true" Only applicable for Energy Carrier "Electricity"
Unit	%
Example	17.0

(e) Useful Cogeneration Heat

Useful Heat production from Cogeneration correlating to 1 MWh of High-Efficiency Cogeneration electricity production.

Element Name	UsefulHeat
Type	Decimal (11,3) Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Occurrence	0 or 1 (per Cogeneration element). Mandatory when HECCriteriaMet has value "true" Only applicable for Energy Carrier "Electricity"
Unit	GJ/MWh
Example	10.030

B4.6.17 Electrical Efficiency

The electrical efficiency of a production device expressed as a percentage.

Element Name	ElectricalEfficiency
Type	Decimal(4,1) Always 1 decimal Maximum value 100.0 Minimum value 0.1
Occurrence	0 or 1 (per Certificates element). Mandatory when HECCriteriaMet has value "true". Only applicable for Energy Carrier "Electricity"
Unit	%
Example	67.0

B4.6.18 Thermal Efficiency

The thermal efficiency of a production device expressed as a percentage.

Element Name	ThermalEfficiency
Type	Decimal(4,1) Always 1 decimal Maximum value 100.0 Minimum value 0.1
Occurrence	0 or 1 (per Certificates element). Mandatory when HECCriteriaMet has value "true". Only applicable for Energy Carrier "Electricity"
Unit	%
Example	67.0

B4.6.19 Gas

This element and its child elements are applicable and required only for Energy Carriers Energy Gas and Hydrogen. For other Energy Carriers those are not applicable.

Element Name	Gas
Type	Element with two attributes and 5 child elements
Occurrence	0 or 1 (per Certificates element) Only applicable and required for certificates where Energy Carrier is “EnergyGas” or “Hydrogen”
Attribute	type
Type	Token
Length	5
Occurrence	Required
Description	Type of Gas, referring to the chemical composition of the produced gas.
Format	Code from Fact Sheet 22 “Type of Gas”
Attribute v81	fossilAuxiliaryDeducted
Type	Token
Length	1-20
Occurrence	Mandatory
Structure	Allowed values: <ul style="list-style-type: none"> • true • false • unspecified
Business rules	EECS Rules section O7.1.3 c) Whether or not auxiliary energy from non-renewable sources have been deducted from the net Output in the energy eligible for GO issuing. The attribute values true or false are mandatory for newly issued EECS Certificates in v81 message schema. It can be set to “unspecified” only during transformation from v80 to v81.
Example v81	<pre><r:Gas type="Y0101" fossilAuxiliaryDeducted="true"> <r:CompositionPurity>99.50 </r:CompositionPurity> <r:GasCompositionCriteria>C0100 </r:GasCompositionCriteria> <r:GasUsage>YNNNN</r:GasUsage></pre>

	<pre><r:GasCriterion>Low-Carbon Gas </r:GasCriterion> <r:ETSESREligibility>A0100 </r:ETSESREligibility> </r:Gas></pre>
Transformation rules	
from v80 to v81	The new attribute (fossilAuxiliaryDeducted) can be set to “unspecified” during transformation from v80. It is mandatory to use values true or false for newly issued v81 EECS Certificates.
from v81 to v80	The new attribute (fossilAuxiliaryDeducted) and child elements (GasCriterion and ETSESREligibility) will be lost.

(a) **Composition Purity**

An indication of the purity of the composition of the Gas that constitutes the Output for which the EECS Certificate is issued.

Element Name	CompositionPurity
Type	Token
Length	1-20
Format	According to the Fact Sheet 22 “Type of Gas”. RNNNN (code for a range) or NN.NN (specific percentage value with exactly 2 decimals).
Occurrence	0 or 1 (per Gas element)
Business Rules	It can be given optionally for Energy Carriers “EnergyGas” and “Hydrogen”. For other Energy Carriers it is not applicable.

(b) **Gas Composition Criteria Reference**

Where the Output complies with specific criteria relating to the physical composition of the produced gas, a reference to the relevant criteria, as mentioned on the EECS Fact Sheet Type of Gas.

Element Name	GasCompositionCriteria
Type	Token
Length	2-5
Format	From Fact Sheet 22 “Type of Gas”
Occurrence	0 or 1 (per Gas element)
Business Rules	It can be given optionally for Energy Carriers “EnergyGas” and “Hydrogen”. For other Energy Carriers it is not applicable.
Example	CNNNN

(c) Gas Usage

End-use of the Gas, as set out in Fact Sheet 21 “Use of Gas Codes”

Element Name	GasUsage
Type	Token
Length	1-5
Occurrence	0 or 1 (per Gas element)
Structure	Code from EECS Rules Fact Sheet 21 “Use of Gas Codes”.
Example	<r:GasUsage>a</r:GasUsage>
Business Rules	It can be given optionally for Energy Carriers “EnergyGas” and “Hydrogen”. For other Energy Carriers it is not applicable.

(d) Gas Criterion

As per EECS Rules O8.1.1 (n): Whether the Output to which the EECS Certificate relates, complies with criteria, where the possible contents of this data field are identified in Fact Sheet 22 “Type of Gas”.

Element Name v81	GasCriterion
Type	String
Length	1-1024
Occurrence	0 or 1 (per Gas element)
Structure	As per instructions in the EECS Rules Fact Sheet 22 “Type of Gas”.

(e) ETS/ESR Eligibility

As per EECS Rules O8.1.1 (m): An indication whether the reduction of greenhouse gas emissions, associated with the production of the Output to which the EECS Gas Certificates relates, qualifies for accounting under an Emission Trading System or an Effort Sharing Regulation, and the reference to the framework of qualification.

Element Name v81	ETSESREligibility
Type	Token
Length	2-5
Format	From Fact Sheet 22 “Type of Gas”
Occurrence	0 or 1 (per Gas element)
Example	ANNNN

B4.6.20 Calorific Value

For electricity certificates (Energy Carrier being “Electricity”), the Calorific Value relates to the Input fed into the Production Device. For gaseous certificates, with Energy Carrier “EnergyGas” or “Hydrogen”, the Calorific Value relates to the Output for which EECS Certificates are issued.

Element Name	CalorificValue
Type	Decimal (11,3) Always 3 decimals Maximum value 99999999.999 Minimum value 0.001
Occurrence	0 or 1 (per Certificates element). Mandatory for Highly Efficient Cogeneration electricity certificates (HECCriteriaMet="true") the attribute "type" must be "lower" and numeric value for the element must be filled in. Optional for non-HEC electricity certificates. For Energy Carriers "EnergyGas" and "Hydrogen" the "type"- attribute is mandatory, but the element value is optional to fill in.
Example	For High-Efficiency Cogeneration certificates: <CalorificValue type="lower" unit="MJ/kg">11.120</CalorificValue> For EnergyGas certificates when there is no specific value given, only type: <CalorificValue type="lower"/>
Attribute	type
Type	String
Occurrence	Required
Format	One of: <ul style="list-style-type: none"> • lower • higher Note: when the certificate is a High Efficient Cogeneration certificate (ProductType contains "Technology" and HECCriteriaMet= "true"), then the attribute type should be "lower".
Attribute	unit
Type	Token
Length	1-20
Format	One of below: <ul style="list-style-type: none"> • MJ/kg • MJ/m³ • MJ/l • Unspecified (only for Transformation use) or other unit approved time to time.
Default	<ul style="list-style-type: none"> • MJ/kg

B4.6.21 GHG emissions

Greenhouse gas emissions intensity of the output.

Element Name	GHGEmissions
Type	Element with an attribute and child elements
Occurrence	0 or 1 (per Certificates element)
Attribute	GHGSavingsCriteriaMet
Type	Boolean
Occurrence	Optional
Format	true or false, in relation with article 29 of the Renewable Energy Directive
Example	<pre><r:GHGEmissions GHGSavingsCriteriaMet="true"> <r:GHGEmissionProduced calculationMethod="E010000000">234.000</r:GHG EmissionProduced><r:AbsoluteGHGEmissionSaved calculationMethod="E010000000">123.000</r:Absol uteGHGEmissionSaved></r:GHGEmissions></pre> <p>Example when the minimum information given: <pre><r:GHGEmissions><r:GHGEmissionProduced calculationMethod="E010000000">234.000</r:GHGE missionProduced></r:GHGEmissions></pre></p>

(a) GHG Emission Produced

The GHG emissions produced

Element Name	GHGEmissionProduced
Type	Decimal(11,3) Always 3 decimals Minimum value -99999999.999 Maximum value 99999999.999
Occurrence	0 or 1 (per GHGEmissions element)
Attribute	calculationMethod
Type	Token
Length	11
Occurrence	Required
Format	ENNNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Fact Sheet 24 "Methodology for carbon footprint info on GO"
Attribute	unit
Type	Token

Length	1-20
Format	Kg CO2eq/MWh or other unit approved from time to time.
Default	Kg CO2eq/MWh

(b) Absolute GHG emissions saved

Absolute GHG emissions saved in kilo grams per MWh compared with the best available and economically justifiable technology for separate production of heat and electricity using the same fuels; and which was on the market in the year of construction of the CHP unit, as defined in Annex II(f)(2) of the Energy Efficiency Directive

Element Name	AbsoluteGHGEmissionSaved
Type	Decimal(11,3) Always 3 decimals Minimum value 0.000 Maximum value 99999999.999
Occurrence	0 or 1 (per GHGEmissions element).
Attribute	calculationMethod
Type	Token
Length	11
Occurrence	Required
Format	ENNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Code structure from Fact Sheet 24 "Methodology for carbon footprint info on GO"
Attribute	unit
Type	Token
Length	1-20
Format	Kg/MWh or other unit approved time to time.
Default	Kg/MWh

B4.6.22 Radioactive waste produced

Where the source type relates to nuclear energy, a quantification of the radioactive waste produced per MWh of Output to which that EECS Certificate relates, and it may provide a reference to the methodology used for this quantification.

Element Name	RadioactiveWasteProduced
Type	Decimal(11,3) Always 3 decimals Minimum value 0.000 Maximum value 99999999.999
Occurrence	0 or 1 (per Certificates element).
Unit	g/MWh
Attribute	calculationMethod
Type	Token

Occurrence	Optional
Length	11
Format	Code from Fact Sheet “Methodologies for environmental impact of production”
Example	<r:RadioactiveWasteProduced calculationMethod="XYZ">4.030</r:RadioactiveWasteProduced>

B4.6.23 Sustainability

Element with child elements to describe additional optional sustainability information.

Element Name	Sustainability
Type	Element with attributes and child elements
Occurrence	0 or 1 (per Certificates element) Note, in the future there might be several Sustainability elements allowed.
Attribute	sustainabilityCriteriaMet
Type	Boolean
Occurrence	Optional
Attribute	certificationBody
Type	String
Length	1-20
Format	Free text
Occurrence	Optional
Example	<r:Sustainability sustainabilityCriteriaMet="true" certificationBody="XX"> <r:RequirementReference>REDIIart.29</r:RequirementReference> <r:Scheme>ISCC</r:Scheme> <r:AuditReport>https://example.ex/report.pdf</r:AuditReport> <r:SustainabilityAdditionalInfo>This is a text example</r:SustainabilityAdditionalInfo> </r:Sustainability>

(a) **Sustainability Requirement Reference**

A reference to the relevant legislative or other source that sets sustainability requirements

Element Name	RequirementReference
Type	String

Length	1-20
Format	Free text
Occurrence	0 or 1 (per Sustainability element)

(b) Sustainability Scheme

A reference to the relevant sustainability certification scheme(s).

Element Name	Scheme
Type	String
Length	1-20
Format	Free text
Occurrence	0 or 1 (per Sustainability element)
Example	<r:Scheme>ISCC</r:Scheme>

(c) Sustainability Audit Report

Reference to the relevant reports, certificates or other documents produced by the abovementioned certification body under the abovementioned sustainability certification scheme.

Element Name	AuditReport
Type	String
Length	1-255
Format	Free text
Occurrence	0 or 1 (per Sustainability element)

(d) Sustainability Additional Information

Additional information on sustainability in free text.

Element Name	SustainabilityAdditionalInfo
Type	String
Length	1-255
Format	Free text
Occurrence	0 or 1 (per Sustainability element)
Structure	Not applicable
Unit	Not applicable

B4.6.24 Label

The Label indicates whether the Certificate conforms to an Attribute on a Certificate reflecting that the Output and/or Production Device and/or Input to which a Certificate relates, conforms to a specific set of qualities defined in a Label Scheme, following an agreement between the Authorised Issuing Body and the corresponding Label.

Element Name	Label
Type	Token
Length	1-20 chars
Occurrence	0 or more (per Certificates element)
Structure	See EECS Fact Sheet 17 "EECS Scheme Members and Products" for possible values
Example	<r:Label>Naturemade</r:Label> <r:Label>GREENENERGY</r:Label >

B4.6.25 Additional Information

Additional information on certificates as free text.

Element Name	AdditionalInfo
Type	String
Length	1-255
Format	Free text
Occurrence	0 or 1 (per Certificates element)
Example	Hello, World!

B4.6.26 Bidding Zone

As per EECS Rules N6.6.6 (a-c): An identification of the Bidding Zone in which the network is located to which the Output was injected; whether the Bidding Zone in which the Output was injected equalled or exceeded 90% average renewable energy production during the preceding calendar year; whether the Bidding Zone in which the Output was injected had an emission intensity less than 18 gCO₂eq/MJ during the preceding calendar year.

Element Name v81	BiddingZone
Type	Token
Length	1-20
Format	EECS Rules N6.6.6 (a) An identification of the Bidding Zone in which the network is located to which the Output was injected. ENTSO-E Bidding Zone Area EIC code or the display name of the Bidding Zone. The list of approved codes, instructions and a map can be found at: https://www.entsoe.eu/data/energy-identification-codes-eic/
Occurrence	0 or 1 (per Certificates element)

Example	<r:BiddingZone zone90percentageRES="true" zoneLowEmission="true">10Y1001A1001A46L</r:BiddingZone>
Attribute v81	zone90percentageRES
Type	Boolean
Occurrence	Optional
Description	EECS Rules N6.6.6 (b) Whether the Bidding Zone in which the Output was injected equalled or exceeded 90% average renewable energy production during the preceding calendar year.
Format	true or false
Attribute v81	zoneLowEmission
Type	Boolean
Occurrence	Optional
Description	EECS Rules N6.6.6 (c) Whether the Bidding Zone in which the Output was injected had an emission intensity less than 18 gCO ₂ eq/MJ during the preceding calendar year.
Format	true or false

B4.6.27 Redispatching Criteria

As per EECS Rules N6.6.6 (d): Whether the Downwards Redispatching criteria (RFNBO DA Art. 4.3) were met during the imbalance settlement period.

Element Name v81	RedispatchingCriteriaMet
Type	Boolean
Format	EECS Rules N6.6.6 (d) Whether the Downwards Redispatching criteria (RFNBO DA Art. 4.3) were met during the imbalance settlement period.
Occurrence	0 or 1 (per Certificates element)
Example	<r:RedispatchingCriteriaMet>true</r:RedispatchingCriteriaMet>

B4.6.28 Power Purchase Agreement

As per EECS Rules N6.6.6 (e): Whether the Output to which the EECS Certificate relates is subject to a Power Purchase Agreement, including identification of the start and end date of such a contract, and including an identification of the buyer.

Element Name v81	PowerPurchaseAgreement
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Format	EECS Rules N6.6.6 (e) Whether the Output to which the EECS Certificate relates is subject to a Power Purchase Agreement, including identification of the start and end date of such a contract (preferably formatted in UTC time zone), and including an identification of the buyer (e.g., the company registration number).
Occurrence	0 or 1 (per Certificates element)
Example	<r:PowerPurchaseAgreement startDate="2025-01-01" endDate="2029-12-31" buyerID="12ABC"/>
Attribute v81	startDate
Type	Date
Occurrence	Required
Structure	YYYY-MM-DD
Attribute v81	endDate
Type	Date
Occurrence	Required
Structure	YYYY-MM-DD
Attribute v81	buyerID
Type	Token
Length	1-150
Occurrence	Required
Format	Text field. Usually the company registration number, but in some cases the company name or VAT number is used.

B5 Account Holders

A parent element for keeping all the individual Account Holder elements. Each Account holder file may have one or more "AccountHolder" elements which are described in the B5.1.1 Account Holder.

Element Name	AccountHolders
Type	Element to hold one or more Account Holder elements
Length	No restrictions
Format	Hold one or more Account Holder child elements
Occurrence	1 (per Account holder file)
Structure	Not applicable
Unit	Not applicable

Example	<pre> <AccountHolders> <AccountHolder> <IssuingBodyCode>43</IssuingBodyCode> <AccountNumber>43X0EXMP1B</AccountNumber> <CompanyName>Company 1</CompanyName> <Country>BE</Country> <PostCode>01234</PostCode> <City>ExampleCity1</City> <ValidFrom>2018-01-01</ValidFrom> <ValidTo>2099-12-31</ValidTo> <VATNumber>BE0000000000001</VATNumber> <ModifiedOn>2018-02-23</ModifiedOn> </AccountHolder> <AccountHolder> <IssuingBodyCode>43</IssuingBodyCode> <AccountNumber>43X0EXMP29</AccountNumber> <CompanyName>Company 2</CompanyName> <Country>CZ</Country> <ValidFrom>2016-01-01</ValidFrom> <ValidTo>2099-12-31</ValidTo> </AccountHolder> </AccountHolders> </pre>
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B5.1.1 Account Holder

Element for keeping individual Account Holder information

Element Name	AccountHolder
Type	Element to hold information of one Account holder
Length	Not applicable
Format	Not applicable
Occurrence	minimum 1 maximum not defined, but at the moment 10 000 should be supported.
Structure	Not applicable
Unit	Not applicable
Example	<p>With all the fields filled in:</p> <pre> <AccountHolder> <IssuingBodyCode>43</IssuingBodyCode> <AccountNumber>43X0EXMP1B</AccountNumber> <CompanyName>Company 1</CompanyName> <Country>BE</Country> <PostCode>01234</PostCode> <City>ExampleCity1</City> <ValidFrom>2018-01-01</ValidFrom> <ValidTo>2099-12-31</ValidTo> <VATNumber>BE0000000000001</VATNumber> <ModifiedOn>2018-02-23</ModifiedOn> </AccountHolder> </pre>

	With only compulsory fields filled in: <AccountHolder> <IssuingBodyCode>43</IssuingBodyCode> <AccountNumber>43X0EXMP29</AccountNumber> <CompanyName>Company 2</CompanyName> <Country>CZ</Country> <ValidFrom>2016-01-01</ValidFrom> <ValidTo>2099-12-31</ValidTo> </AccountHolder>
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B5.1.2 Issuing Body Code

Code of the Issuing Body to whom the Account holder belongs.

Element Name	IssuingBodyCode
Type	Token
Length	2
Format	NN
Occurrence	1 (per AccountHolder element)
Structure	2-character numeric, leading zero if required. See Fact sheet 4 "Member & Competent Authority Codes" for possible values
Unit	Not applicable
Example	43

B5.1.3 Account Number

Account ID of the Account Holder

Element Name	AccountNumber
Type	Token
Length	See section A2.5.9 + 1 check digit
Format	Depends on the type, see section A2.5
Occurrence	1 (per AccountHolder element) AccountNumber should be unique within the IssuingBody.
Structure	See section A2.5
Unit	Not applicable
Example	43X0EXMP1B

B5.1.4 Company Name

Name of the Account Holder.

Element Name	CompanyName
Type	Token
Length	0-100
Format	Text field
Occurrence	1 (per AccountHolder element)
Structure	Free text
Unit	Not applicable
Example	Example Company 1

B5.1.5 Country

The Country of originating Account Holder (this might be different than the country of Issuing body).

Element Name	Country
Type	String
Length	2
Format	XX
Occurrence	1 (per AccountHolder element)
Structure	2-characters' code according to the ISO 3166-1 country code list
Unit	Not applicable
Example	BE

B5.1.6 Post Code

Post Code of the Account Holder

Element Name	PostCode
Type	String
Length	0-10
Format	Text
Occurrence	0-1 (per AccountHolder element)
Structure	0-10 characters
Unit	Not applicable
Example	01234

B5.1.7 City

City of the Account Holder

Element Name	City
Type	String
Length	0-150
Format	Not applicable
Occurrence	0-1 (per AccountHolder element)
Structure	0-10 characters
Unit	Not applicable
Example	Example City 1

B5.1.8 Valid From

The date from which the Account Holder got valid and from which date it is ok to transfer certificates to the Account Holder:

Element Name	ValidFrom
Type	Date
Length	Not applicable
Format	Date is according to local time, not UTC
Occurrence	1 (per AccountHolder element)
Structure	YYYY-MM-DD
Unit	Not applicable

Example	2018-01-01
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B5.1.9 Valid To

The date to which the Account Holder is valid. If the date is in the past, the account holder is seen as deactivated and it is not possible to transfer certificates to it anymore:

Element Name	ValidTo
Type	Date
Length	Not applicable
Format	Date is according to local time, not UTC
Occurrence	1 (per AccountHolder element)
Structure	YYYY-MM-DD
Unit	Not applicable
Example	2099-12-31

B5.1.10 VAT Number

VAT number of the Account Holder

Element Name	VATNumber
Type	String
Length	0-15
Format	Not applicable
Occurrence	0-1 (per AccountHolder element)
Structure	0-15 characters
Unit	Not applicable
Example	BE0000000000001

B5.1.11 Modified On

The date when the Account Holder was modified in the registry:

Element Name	ModifiedOn
Type	Date
Length	Not applicable
Format	Date is according to local time, not UTC
Occurrence	0-1 (per AccountHolder element)
Structure	YYYY-MM-DD
Unit	Not applicable
Example	2018-02-23

B6 Statistics Elements Description

This Annex describes all the elements in the XML file.

B6.1 General

B6.1.1 Hub User should deliver statistics in monthly bases. The Hub User have to deliver statistics for the completed previous month and possible corrections and updates for the previously reported months up to 24 months backwards. Those statistics can be delivered in one file with several monthly periods in it, or in several files (e.g. divided to monthly files).

B6.1.2 Statistics contain values collected based on Production Period and Transaction Date:

B6.1.3 PRODUCTION PERIOD BASED STATISTICS (Production date):

Relates to when the energy associated with the GO was produced. The reporting Domain should identify, for every reported month, the certificates having Production Period To date belonging to the specific month and report all the actions done to those certificates within the Domain (regardless the time when the action was done). These statistics give indication of how much active certificates (active certificates = Issue – Cancel – Expiry – possible Withdrawals) there are in the market from that specific period. After a year the volume should be close to zero in the AIB level (not in the single Domain level due imports and exports):

1. Issue: The quantity of GOs issued by the reporting Domain (for energy production within the reporting Domain only)
2. Cancel: The quantity of GOs cancelled by the reporting Domain, including also GOs cancelled to other Domains (regardless of where the GOs were issued)
3. Expire: The quantity of GOs expired by the reporting Domain (regardless of where the GOs were issued)

B6.1.4 TRANSACTION DATE BASED STATISTICS:

Relates to when the GO itself was issued, transferred, cancelled or expired (action based). The reporting Domain should identify, for each reported calendar month, the quantity of GOs issued, transferred, imported, expired, withdrawn or cancelled:

1. Issue: The quantity of GOs that has been issued by the reporting Domain in the specific calendar month
2. Transfer: The quantity of GOs transferred between Account Holders on the reporting Domain in the specific calendar month
3. Export: The quantity of GOs transferred from reporting Domain to accounts in another Domain in the specific calendar month
4. Import: The quantity of GOs transferred from accounts in another Domain to the reporting Domain in the specific calendar month
5. Expire: The quantity of GOs expired in the reporting Domain in the specific calendar month and including information on the Production Domain (in case the expired GOs were issued in a different than reporting Domain)
6. Withdraw: The quantity of GOs withdrawn in the reporting Domain in the specific calendar month. This item is only optional to report. Consider on taking this amount into account when reporting other values. E.g. if there was a withdrawal due to wrongly issued certificates, then quantity reported on issued GOs should be reduced.
7. Cancel:
 - a. The quantity of GOs cancelled to certify consumption in the reporting Domain per Consumption Year, Cancellation Category and including information on the Production Domain (in case the cancelled GOs were issued in a different than reporting Domain). These cancellations don't include the so-called ex-domain cancellations.
 - b. The quantity of GOs cancelled to certify consumption out of the reporting Domain per Consumption Year, Cancellation Category, including information on the Production Domain (in case the cancelled GOs were issued in a different than reporting Domain) and Consumption Domain (so-called ex-domain cancellations).

B6.1.5 Interface Files for Statistics follow the schema defined in **Error! Reference source not found. Error! Reference source not found.**

B6.1.6 Example of Statistics file

```
<?xml version="1.0" encoding="UTF-8"?>
<Statistics MessageTransmissionTime="2020-02-11T16:00:00Z" Type="EECS-
Electricity">
  <DomainCode>DK</DomainCode>
  <IssuingBodyCode>02</IssuingBodyCode>
  <Period YearMonth="2018-03">
    <Item TypeOfInstallation="T050000" EnergySource="F01000000">
      <ProductionDate>
        <Issue>1</Issue>
        <Cancel>2</Cancel>
        <Expire>0</Expire>
      </ProductionDate>
      <TransactionDate>
        <Issue>10</Issue>
        <Transfer>20</Transfer>
        <Export>30</Export>
        <Import>40</Import>
        <Expire>50</Expire>
        <Expire ProductionDomainCode="DE">2</Expire>
        <Withdraw>0</Withdraw>
        <Cancel>50</Cancel>
        <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
        <Cancel CancellationCategory="Storage">4</Cancel>
        <Cancel ProductionDomainCode="BEW"
ConsumptionDomainCode="PL" ConsumptionYear="2022"
CancellationCategory="Conversion">5</Cancel>
      </TransactionDate>
    </Item>
  </Period>
</Statistics>
```

B6.2 Header

B6.2.1 The Statistics file contains the below header lines to identify to which Domain and the Issuing Body the Statistics belongs to (the Registry is identified based on the selected Registry in the User interface or in case of Webservice based on the client certificate of the Sending Registry).

```
<?xml version="1.0" encoding="UTF-8"?>
<Statistics MessageTransmissionTime="2020-02-11T16:00:00Z" Type="EECS-
Electricity">
  <DomainCode>DK</DomainCode>
  <IssuingBodyCode>02</IssuingBodyCode>
```

B6.2.2 Message Transmission Time - attribute

B6.2.3 (a) Timestamp for when the statistics were retrieved from the original database. Shows from which moment the data was taken from the registry (that might be different than the one to insert the data to AIB Hub and might help on identifying possible problems).

Attribute	MessageTransmissionTime
Type	DateTime
Length	Not applicable
Format	UTC (Z). Use of referential time zones (e.g. +1:00) is not permitted
Occurrence	Required
Structure	YYYY-MM-DDTHH:MM:SSZ
Unit	DateTime
Example	2019-10-15T12:24:00Z

B6.2.4 Type -element

B6.2.5 Type of statistics contained in the report

Attribute	Type
Type	xs-token
Length	1-20
Format	Possible values: <ul style="list-style-type: none"> • EECS-Electricity • National-Electricity • EECS-EnergyGas • National-EnergyGas • EECS-Hydrogen • National-Hydrogen NOTE: later there might be more types to come. See related master data in the AIB Hub
Occurrence	Required
Structure	Not applicable
Unit	Not applicable
Example	EECS-Electricity

B6.2.6 Domain Code - element

B6.2.7 Represents the Domain to whom the statistics are reported:

Element Name	DomainCode
Type	xs:token
Length	2-3
Format	2 to 3 digits
Occurrence	1 (per statistics file)
Structure	Refer to Domain Code in FS04 Domain code in Master data of AIB Hub
Unit	Not applicable
Example	BEF, FI

B6.2.8 Issuing Body Code - element

B6.2.9 Represents the Issuing Body to whom the statistics are reported:

Element Name	IssuingBodyCode
Type	xs:token

Length	2
Format	2 digits
Occurrence	1 (per statistics file)
Structure	2-character numeric, leading zero if required. See Fact sheet 4 "Member & Competent Authority Codes" for possible values
Unit	Not applicable
Example	29

B6.3 Period -element

B6.3.1 General Description

B6.3.2 Each Statistics file may have one or more "Period" elements. Maximum number of period elements in one file is 24 and Period should not be older than 24 months.

B6.3.3 One period holds statistics of a specific one-month period.

B6.3.4 Each Period may contain one or more "Item"-element which are described later

B6.3.5 Year Month -attribute

B6.3.6 Period has an attribute "YearMonth" which the given statistics belongs to.

Attribute	YearMonth
Type	xs:gYearMonth
Length	7
Format	YYYY-MM
Occurrence	Required once per Period element. Must be unique within the Statistics XML. Maximum occurrence of Period element per Statistics XML is 24.
Structure	Minimum value: 24 months from the running date. Maximum value: Running month Should be unique within the Statistics XML.
Unit	Not applicable
Example	2019-01

B6.3.7 Example of a Period with two Items:

```

<Period YearMonth="2018-03">
  <Item TypeOfInstallation="T050000" EnergySource="F01000000">
    <ProductionDate>
      <Issue>0</Issue>
      <Cancel>0</Cancel>
      <Expire>0</Expire>
    </ProductionDate>
    <TransactionDate>
      <Issue>0</Issue>
      <Transfer>0</Transfer>
      <Export>40000</Export>
      <Import>20000</Import>
      <Expire>0</Expire>
  </Item>
</Period>
```

```

        <Withdraw>0</Withdraw>
    </TransactionDate>
</Item>
<Item TypeOfInstallation="T050000" EnergySource="F01010101">
    <ProductionDate>
        <Issue>19519</Issue>
        <Cancel>0</Cancel>
        <Expire>0</Expire>
    </ProductionDate>
    <TransactionDate>
        <Issue>18551</Issue>
        <Transfer>0</Transfer>
        <Export>0</Export>
        <Import>0</Import>
        <Expire>0</Expire>
        <Withdraw>0</Withdraw>
        <Cancel>50</Cancel>
        <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
    </TransactionDate>
</Item>
</Period>

```

B6.4 Item -element

B6.4.1 General Description

One Item holds statistics of a specific one-month period and of a specific Type of Installation and Energy Source combination.

Each "Period" element may have one or more "Item" elements. Maximum number of Item elements in one period is the number of unique TypeOfInstallation and EnergySource combinations. At least one Item is required per each Period.

Combination of TypeOfInstallation and EnergySource within a "Period" must be unique.

Examples of Items:

```

<Item TypeOfInstallation="T050000" EnergySource="F01000000">
    <ProductionDate>
        <Issue>0</Issue>
        <Cancel>0</Cancel>
        <Expire>0</Expire>
    </ProductionDate>
    <TransactionDate>
        <Issue>0</Issue>
        <Transfer>0</Transfer>
        <Export>40000</Export>
        <Import>20000</Import>
        <Expire>0</Expire>
        <Withdraw>0</Withdraw>
    </TransactionDate>

```

```

</Item>
<Item TypeOfInstallation="T050000" EnergySource="F01010101">
  <ProductionDate>
    <Issue>19519</Issue>
  </ProductionDate>
  <TransactionDate>
    <Export>40</Export>
    <Import>50</Import>
    <Expire>0</Expire>
    <Withdraw>0</Withdraw>
    <Cancel>50</Cancel>
    <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
  </TransactionDate>
</Item>

```

B6.4.2 Type of Installation -attribute

Type of Installation for which the given statistics belongs. NOTE: it is recommended to report the statistics in the level those are in the certificates.

Attribute	TypeOfInstallation
Type	Token
Length	7
Format	TNNNNNN where the T could be also another letter and N represent a number from 0-9.
Occurrence	Required (once per Item element)
Structure	One of the Technology codes from EECS Rules Fact Sheet 5 "Types of Energy Inputs and Technologies Combination of "Type of Installation" and "Energy Source" must be unique for a Period Combination of "Type of Installation" and "Energy Source" must be a valid combination in EECS Rules Fact Sheet 5
Unit	Not applicable
Example	T030200

B6.4.3 Energy Source -attribute

Energy Source for which the given statistics belongs. NOTE: it is recommended to report the statistics in the level those issued.

Attribute	EnergySource
Type	Token
Length	9
Format	FNNNNNNNN, where N represent a number from 0-9
Occurrence	Required (once per Period element)
Structure	One of the Energy Source codes from EECS Rules Fact Sheet 5 "Types of Energy Inputs and Technologies

	Combination of "Type of Installation" and "Energy Source" must be unique for a Period Combination of "Type of Installation" and "Energy Source" must be a valid combination in EECS Rules Fact Sheet 5
Unit	Not applicable
Example	F01040100

B6.5 ProductionDate -element

B6.5.1 General Description

Each "Item" element has one "ProductionDate" element.

ProductionDate element contains statistics collected based on the Certificate Production Period End.

ProductionDate element must contain at least one of the following elements: Issue, Cancel or Expire

Example of a ProductionDate -element:

```

<ProductionDate>
  <Issue>0</Issue>
  <Cancel>0</Cancel>
  <Expire>0</Expire>
</ProductionDate>
```

B6.5.2 Production Date > Issue -element

Quantity of all the Certificates issued in the reporting Domain where the Certificate Production Period (Production Period End) belongs to the given Period, and where Energy Source and Type of Installation is as given in the attributes of the Item.

Element Name	Issue
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per ProductionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWh is the size of one certificate)
Example	1000000

B6.5.3 Production Date > Cancel -element

Quantity of all the certificates Cancelled in the reporting Domain (including cancelled to external domain) and where the Certificate Production Period (Production Period End) belongs to the given Period, and where Energy Source and Type of Installation is as given in the attributes of the Item.

Element Name	Cancel
Type	xs:nonNegativeInteger
Length	1-10

Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per ProductionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.5.4 Production Date > Expire -element

Quantity of all the Certificates expired in the reporting Domain and where the Certificate Production Period (Production Period End) belongs to the given Period and Energy Source and Type of Installation is as given in the attributes of the Item.

Element Name	Expire
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per ProductionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.6 Transaction Date -element

B6.6.1 General description

Each "Item" element has one "ProductionDate" element and that is followed by one "TransactionDate" element.

TransactionDate element contains statistics collected based on the Transaction Date, and it must contain at least one of the following elements: Issue, Transfer, Export, Import, Expire, Withdraw or Cancel.

Example of a TransactionDate element:

```

<TransactionDate>
  <Issue>0</Issue>
  <Transfer>0</Transfer>
  <Export>40000</Export>
  <Import>20000</Import>
  <Expire>0</Expire>
  <Expire ProductionDomainCode="DE">2</Expire>
  <Withdraw>0</Withdraw>
  <Cancel>50</Cancel>
  <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
  <Cancel CancellationCategory="Storage">4</Cancel>

```

```
<Cancel ProductionDomainCode="BEW" ConsumptionDomainCode="HU"
ConsumptionYear="2022" CancellationCategory="Conversion">5</Cancel>
</TransactionDate>
```

B6.6.2 Transaction Date > Issue -element

Issuing statistics for the related Period collected based on the Issuing transaction date

Element Name	Issue
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per TransactionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.6.3 Transaction Date > Transfer -element

Transfer statistics for the related Period collected based on the Transfer transaction date

Element Name	Transfer
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per TransactionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.6.4 Transaction Date > Export -element

Export statistics for the related Period collected based on the Export transaction date

Element Name	Export
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per TransactionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)

Example	1000000
---------	---------

B6.6.5 Transaction Date > Import -element

Import statistics for the related Period collected based on the Import transaction date

Element Name	Import
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per TransactionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.6.6 Transaction Date > Expire -element

Expire statistics for the related Period collected based on the Expire transaction date

Element Name	Expire
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required There might be more than one Expire-element in a TransactionDate-element if those all have unique ProductionDomainCode. If not given, the value in the AIB Hub is kept.
Structure	See below the definition of the attributes
Unit	Certificates (1 MWH is the size of one certificate)
Example	<Expire>0</Expire> <Expire ProductionDomainCode="DE">2</Expire>
Attribute	ProductionDomainCode
Type	Token
Length	2-3
Format	Fact Sheet 04 - Domain Code
Occurrence	Not required. If not given, it is expected that all the reported volume was issued in the reporting domain.
Structure	Fact Sheet 04 - Domain Code. Master data table in AIB Hub is used to validate this.
Unit	Not applicable
Example	BEW, FI, DE

B6.6.7 Transaction Date > Withdraw -element

Withdraw statistics for the related Period collected based on the Withdraw transaction date.

Element Name	Withdraw
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required Maximum one per TransactionDate -element. If not given, the value in the AIB Hub is kept.
Structure	-
Unit	Certificates (1 MWH is the size of one certificate)
Example	1000000

B6.6.8 Transaction Date > Cancel -element

Cancel statistics for the related Period collected based on the Cancel transaction date. There might be more than one Cancel-element in a TransactionDate-element if those all have unique combination of ConsumptionDomainCode, ProductionDomainCode, CancellationCategory and ConsumptionYear.

Element Name	Cancel
Type	xs:nonNegativeInteger
Length	1-10
Format	Minimum value: 0 Maximum value: 1000000000 (billion)
Occurrence	Not required There might be more than one Cancel-element in a TransactionDate-element if those all have unique combination of ConsumptionDomainCode and ConsumptionYear. If not given, the value in the AIB Hub is kept.
Structure	See below the definition of the attributes
Unit	Certificates (1 MWH is the size of one certificate)
Example	<Cancel>50</Cancel> <Cancel ConsumptionDomainCode="HU" ConsumptionYear="2018">50</Cancel>
Attribute	ConsumptionDomainCode
Type	Token
Length	2-3
Format	FS04 Domain code or ISO 3166-01
Occurrence	Not required. If not given, it is expected that all the reported volume is being cancelled to the reporting domain.

Structure	Fact sheet 04. Domain Code, if cancelled outside of AIB Members, then ISO 3166-01 Country code. Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present. Master data table in AIB Hub is used to validate this.
Unit	Not applicable
Example	BEW, FI, MA
Attribute	ConsumptionYear
Type	Token
Length	4
Format	YYYY
Occurrence	Not required. If not given, it is expected that all the reported volume is being cancelled to the year of the reported period.
Structure	YYYY
Unit	Not applicable
Example	2018
Attribute	ProductionDomainCode
Type	Token
Length	2-3
Format	FS04 Domain Code
Occurrence	Not required. If not given, it is expected that all the reported volume was issued in the reporting domain.
Structure	Fact Sheet 04 - Domain Code. Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present. Master data table in AIB Hub is used to validate this.
Unit	Not applicable
Example	BEW, FI, DE
Attribute	CancellationCategory
Type	Token
Length	1-20
Format	Possible values (according to the EECS Rules section C7.2.1 (e): <ul style="list-style-type: none"> • Support • Disclosure • Target

	<ul style="list-style-type: none"> • Conversion • Storage • Issuance under another Certification Scheme • Other <p>NOTE: There might be more possible values added later through the AIB Hub master data.</p>
Occurrence	<p>Not required.</p> <p>If not given, it is expected that all the reported volume was cancelled for Disclosure purpose.</p>
Structure	Not applicable
Unit	Not applicable
Example	Storage

B7 XML Schema Definitions (XSD)

The complete schema definitions are available and can be downloaded from the following AIB website as separate XSD files:

<https://www.aib-net.org/eeecs/cmo-cmo-schemes>

The following list of XSD files is currently maintained and supported by the AIB Hub, following specifications described in previous chapters:

- Message Schema for EECS Certificates Transfers
 - v80 (exportenv80.xsd)
 - v81 (transfers_v81.xsd)
- Acknowledgments Schema
 - v80 (answers_v80.xsd)
 - v81 (answers_v81.xsd)
- Statistics Schema
 - v80 (statistics_v80.xsd)
 - v81 (statistics_v81.xsd)
- Account Holders Schema
 - v80 (accounts_v80.xsd)
 - v81 (accounts_v81.xsd)

ANNEX C - EECS Transfer and Account Holders Interface Transport Specification

C1 Introduction

C1.1 Purpose

- C1.1.1 This annex details the message transport aspects of the Interface Specification for communication between EECS Registration Databases.
- C1.1.2 The scope of this Interface Specification annex is the definition of all interfaces between EECS Registration Databases using the AIB Hub. Interfaces between individual database operators and other national or participant systems unique to a specific domain are not part of this annex and are therefore not included.

C1.2 Approach

- C1.2.1 This annex takes the requirements outlined in the main document, AIB-EECS -SD03, and specifies a protocol for transferring files and a method of providing public/private security keys.

C1.3 File transfer protocols

- C1.3.1 Web service connection between Registries and the AIB Hub

The AIB Hub web service is exposed by the AIB Hub to receive messages and acknowledgements from the Registry via https connection. The AIB Hub expects the Registry operator to expose its registry web service to the AIB Hub to receive those messages and acknowledgements. The web services are described in C2.

- C1.3.2 AMQP connection between Registries and AIB Hub

The AIB Hub messaging interface uses the AMQP 1.0 protocol and a RabbitMQ message broker to exchange messages and acknowledgements with the Registry. The AIB Hub is responsible for provisioning and exposing the broker infrastructure, including the creation and management of the required queues or topics. The Registry operator connects to the external broker to publish and consume messages accordingly. The messaging interfaces are described in C2.

C1.4 WS (SOAP) Protocol Specification

- C1.4.1 **Signed:** messages can be digitally signed by the Sender. This option must be selected in the "Registry Configuration". The AIB Hub validates the digital signature on receipt and digitally signs the message before it is sent to the recipient. The recipient validates the digital signature from the Hub on receipt. The signature format is X509 as incorporated into the SSL (Secure Sockets Layer) protocol.
- C1.4.2 Use of a signature addresses the **attributable** and **accurate** requirements. X509 is supported by Microsoft and the openssl project and is available on suitably up to date versions of Windows and Unix. This form of the signature therefore supports the **immediate**, **delivery**, and **cost** requirements.
- C1.4.3 **Encrypted:** all messages are encrypted after signature. The encrypted message conforms to the S/MIME message structure.
- C1.4.4 Encryption addresses the **private** requirement. S/MIME is supported by Microsoft and the openssl project and is available on suitably up to date versions of Windows and Unix. This form of encryption therefore supports the **immediate**, **delivery**, and **cost** requirements.
- C1.4.5 **Acknowledgement:** on receipt of a message the recipient is required to validate the signature and confirm that the message conforms to the expected structure and that the data content is of the correct type and falls within expected ranges. The recipient must

generate an AK message if the message is acceptable and a NAK message otherwise. This acknowledgement is then signed and returned to the return address via the Hub given on the incoming message. The original Sender should look for a valid acknowledgement. If there is no response within the defined **AK-time**, or if a NAK is received, the original Sender should attempt to resolve the problem by direct contact with the original recipient and thereafter the Hub.

- C1.4.6 The use of an acknowledgement response in this way addresses the **transparency** requirement. The need to validate the original message before transmitting the acknowledgement introduces a process within the receiving registry which is outside the scope of this annex. It is therefore not possible to say what impact the acknowledgement activity will have on the **AK-time** requirement. It is left to each individual registry operator to devise appropriate procedures to address this.

C1.5 AMQP Protocol Specification

- C1.5.1 **Signed:** Use of message-level digital signatures addresses the attributable and accurate requirements. Signatures are mandatory for all messages exchanged through the AMQP channel and are verified by the Hub and registries on receipt. Detached XML-DSig or JWS signatures are used depending on payload format, based on widely supported industry standards available across modern platforms. This approach supports the immediate, delivery, and cost requirements.
- C1.5.2 **Encrypted transport:** all AMQP communication is performed over mutually authenticated TLS connections (mTLS). Encryption is applied at the transport layer using TLS version 1.2 or higher, ensuring confidentiality and integrity of messages exchanged between registries and the Hub.
- C1.5.3 **Transport-layer encryption** addresses the private requirement. TLS and PKI-based authentication are widely supported across operating systems and client libraries and therefore support the immediate, delivery, and cost requirements.
- C1.5.4 **Acknowledgement:** message delivery and business acknowledgement are handled through asynchronous feedback dataflows. Upon receipt, the recipient validates the signature, message structure, and payload content. The recipient generates a feedback message indicating acceptance or rejection, signs it, and submits it via the messaging channel. The Hub forwards acknowledgements to the originating registry. The sender monitors acknowledgement responses and resolves missing or negative responses through retry procedures or operational escalation.
- C1.5.5 The use of asynchronous acknowledgement messaging addresses the transparency requirement. Validation and processing steps within registries occur outside the scope of this annex, and processing duration may vary depending on registry implementation. Retry handling, at-least-once delivery, and idempotent processing ensure reliable exchange despite timing variability.

C1.6 Management of certificates

- C1.6.1 **mTLS certificate protocol:** Each Registry generates its own private key and Certificate Signing Request (CSR) for the mTLS client certificate. The AIB Hub issues the mTLS certificate based on the submitted CSR. The Registry retains sole control of its private key and uses the issued certificate to authenticate to the AIB Hub messaging broker.
- C1.6.2 **Signing certificate protocol:** Each Registry must obtain a signing certificate issued by a trusted public Certificate Authority supported by the AIB Hub. The Registry must upload its public signing certificate to the AIB Hub to enable signature verification of messages exchanged via the AMQP messaging interface.
- C1.6.3 Each Registry is responsible for securely generating, storing, and protecting its private keys and certificates. Private keys must not be shared and must remain under the exclusive control of the Registry.

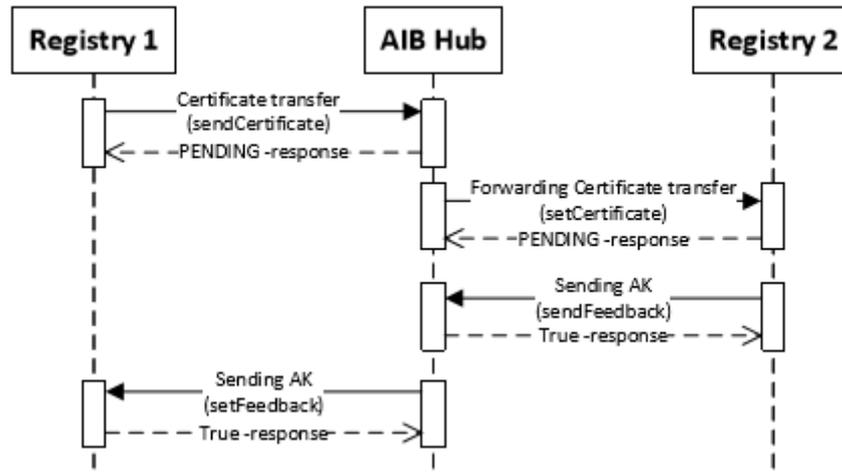


- C1.6.4 Each Registry Operator is responsible for managing its messaging client, maintaining valid certificates, and ensuring continuous ability to connect to the AIB Hub messaging infrastructure and process incoming and outgoing messages.
- C1.6.5 It is the responsibility of individual Registries to manage certificate lifecycle operations, including certificate renewal, replacement, and revocation, and to ensure that valid certificates are configured for secure communication with the AIB Hub.

C2 AIB HUB Web Service and AMQP Interface Description

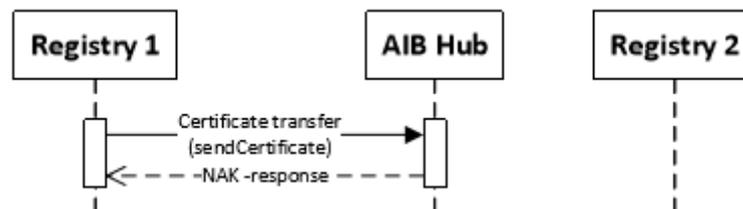
C2.1 Where an EECS Registration Database is connected to the AIB Hub through the AIB Hub web service, then it must use the definitions set out in this appendix.

- C2.1.1 General requirements for the web services:
- C2.1.2 The AIB Hub will communicate with your Web Service via the specified URL defined in the Registry configuration (in the AIB Hub web interface).
- C2.1.3 A HTTP secure connection is required to exchange certificates through the AIB Hub by a web service (https).
- C2.1.4 The registry must authenticate to the AIB Hub Web Service via a client certificate. AIB Hub will not authenticate via a client certificate. The description of the certificates used in the communication can be found from separate documentation: "AIB Hub Connection guide".
- C2.1.5 The transfer XML encryption is described later in this document.
- C2.1.6 It is recommended that the registry restricts the access to its Web Service to the IP address of the AIB Hub server.
- C2.1.7 The Registry Web Service should support SOAP 1.1 standard, and that it conforms to the WSDL description given in this document. The namespaces for the SOAP messages are described later in Appendix C.
- C2.1.8 The time-out for the Web Service connections to AIB Hub is 2 minutes and the same timeout is recommended for the Registry as well. The timeout setting can be revisited time to time by AIB. For avoiding manual work for Registries Operators and AIB Hub Superuser it is recommended to take all the possible actions to avoid timeout in the communications.
- C2.1.9 If timeout anyway happens it is highly recommended to check manually what is the real situation of it in the AIB Hub and in the counter registry.
- C2.1.10 The maximum length of an input and output requests are reflected by the maximum limit of the certificate bundles per transfer (ref: 2.3.5.4). NOTE: encryption of a file increases the size of a request relatively much in top of the plain transfer XML size.
- C2.1.11 Necessary preventions on exposing the Web Service are to be taken care by the AIB for the Hub and by the Registries Operators connected into it.
- C2.1.12 The registry Web Service should handle receiving several simultaneous requests from AIB Hub.
- C2.1.13 Below are basic flows of communication between registries and AIB Hub.
- C2.1.14 Deliver a transfer XML from Registry1 to Registry2. It consists of four separate Web Service requests as shown below (each of those have 2 minutes' timeout from Hub end).



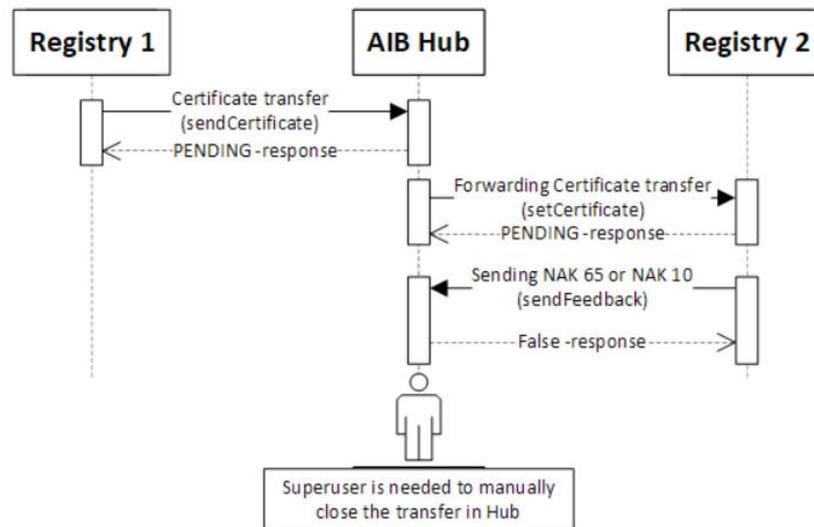
- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.
 - AIB Hub validates the request and replies to Registry1 with **SendCertificateResponse** (PENDING) to notify the request was received and to close the connection to Registry1.
- AIB Hub forwards the transfer to Registry2 using **SetCertificate** request of Registry2 Web Service.
 - Registry2 takes the request for processing and replies to Hub with **SetCertificateResponse** (PENDING) to notify the request was received and to close the connection to AIB Hub. Meanwhile Registry2 will further process the request.
- Registry2 gives the final answer to AIB Hub using **SendFeedback** request (AK/NAK) of AIB Hub Web Service.
 - AIB Hub replies to Registry2 with **SendFeedbackResponse=**True to notify the request was received and to close the connection to Registry2.
- AIB Hub forwards the answer to Registry1 using **SetFeedback** request (AK/NAK) of Registry1 Web Service.
 - Registry1 replies to AIB Hub with **SetFeedbackResponse=**True to notify the request was received and to close the connection to AIB Hub.

C2.1.15 Deliver a transfer from Registry1 to Registry2 in case AIB Hub finds the transfer message or content of the message being invalid.



- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.
 - Hub replies to Registry1 with **SendCertificateResponse** with NAK answer to close the connection to Registry1. There will not be connection to Registry2 at all.
- (a) Special handling of NAK 65 and NAK 10 error codes. When AIB Hub receives NAK 65 (double counting) or NAK 10 (the same transfer was sent already) from the

Registry 2, it does not forward it to Registry1. Those both might be related to certificate double counting situation. The transfer is kept open in AIB Hub. After investigation of the reason behind the error, the transfer can be closed from AIB Hub user interface by a Superuser.



- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.
 - AIB Hub validates the request and replies to Registry1 with **SendCertificateResponse** (PENDING) to notify the request was received and to close the connection to Registry1.
 - NOTE: if it would be AIB Hub which finds that there is Double counting or that the same transfer was already sent, then the Hub would not forward the message to Registry2 at all, but instead keep the transfer open to wait for Superuser action.
 - AIB Hub forwards the transfer to Registry2 using **SetCertificate** request of Registry2 Web Service.
 - Registry2 takes the request for processing and replies to Hub with **SetCertificateResponse** (PENDING) to notify the request was received and to close the connection to AIB Hub. Meanwhile Registry2 will further process the request.
 - Registry2 gives the final answer to AIB Hub using **SendFeedback** request (NAK 65 or NAK 10) of AIB Hub Web Service.
 - AIB Hub replies to Registry2 with **SendFeedbackResponse=False** to notify to the receiver to close the connection to Registry2, but to say that the NAK is not forwarded. AIB Hub does not forward the NAK 65 nor NAK 10 to Registry. For closing the transfer in the AIB Hub (and possible in Registry1), Superuser manual action is needed.
- (b) Some other cases when the transfer is not completed in the AIB Hub and needs special manual attention from Superuser to close the transfer in the AIB Hub and possible in the registries:
- (i) In case the Registry 1 gives false-response or other non-valid response for the setFeedback call, transfer is closed as “completed” with error A94. It is responsibility of the sending registry to monitor such errors and confirm the transfer is closed as completed on their side.

- (ii) In case Registry2 gives soap-error or other non-valid response to the setCertificate-call, Superuser can resend transfer after confirmation from receiving registry.
- (c) In case Superuser action is needed to close a transaction manually, there is needed a communication between Superuser, Registry1 and Registry2 to find out the correct status of the transfer and decide what is the correct action to follow. There are three possibilities:
 - (i) Superuser can close the transfer in AIB Hub by sending NAK to Registry1 from the User interface of AIB Hub
 - (ii) Superuser can close the transfer in AIB Hub by sending AK to Registry1 from the User interface of AIB Hub
 - (iii) Superuser can close the transfer in AIB Hub without sending any answer to Registry1, in case the transfer is already completed in the Registry1 and with correct status.

C2.2 Where an EECS Registration Database is connected to the AIB Hub through the AIB Hub AMQP channel, it must use the definitions set out in this section.

C2.2.1 General requirements for the AMQP channel:

C2.2.2 The Registry shall connect to the AIB Hub external broker using the broker endpoints defined for the relevant environment (TEST/PROD) and configured in the Registry system.

C2.2.3 A secure AMQP connection over TLS (amqps, port 5671) is required for all certificate exchanges through the AIB Hub AMQP channel.

C2.2.4 The Registry must authenticate to the AIB Hub broker using mutual TLS (mTLS) with a client certificate issued by an approved AIB Hub Certification Authority. The certificate trust chain must be installed and hostname verification enabled on the client side.

C2.2.5 Digital signatures at message level are mandatory. All messages exchanged via the AMQP channel must be digitally signed using the Registry's signing certificate. The signature must be provided as a detached signature in the AMQP application-properties. Signature validation rules are described later in this document.

C2.2.6 The Registry must ensure that access to the AMQP broker is restricted to authorised systems only. Appropriate firewall rules and network security controls shall be implemented on the Registry side.

C2.2.7 The Registry must use an AMQP 1.0 compliant client implementation supporting TLS, flow control, explicit settlement, and durable messaging as defined in this document.

C2.2.8 The Registry must implement heartbeat and session timeout handling according to broker configuration (recommended heartbeat 30–60 seconds). Automatic reconnect with exponential backoff and link re-establishment is required to ensure resilient connectivity.

C2.2.9 In case of connectivity interruption or missing acknowledgement within the expected timeframe, the Registry should verify the transfer status in the AIB Hub and apply the defined retry procedures.

C2.2.10 The maximum message size is defined by the broker configuration (default limit 128 MB). Registries must ensure that payload size, including signature, remains within this limit. Message size considerations must include potential growth due to encoding and signature metadata.

C2.2.11 Necessary security measures for broker connectivity, certificate lifecycle management, and message validation must be implemented by both the AIB Hub and the connected Registries.

C2.2.12 The Registry AMQP client must support concurrent message processing and handle redelivery scenarios in accordance with the at-least-once delivery model defined in this document.

C2.2.13 Example of basic flows of communication between registries and AIB Hub is described in chapter 4.2

C2.3 Web Services exposed by the AIB Hub to Registries

C2.3.1 This interface describes the Web Service input interface of the AIB Hub. Registries will use this interface for communicating with the AIB Hub. The interface is responsible for receiving the transfer messages and acknowledgements (AK/NAK/PENDING) from Registries. The AIB Hub will forward the request to another registry using the output interface described in C2.4.1. The web service request can contain one of following contents:

- (d) One transfer message with certificates from the Sender Registry web service (**SendCertificate**)
- (e) Acknowledgement (AK/NAK/PENDING) message from the Receiving Registry web service. (**SendFeedback**)

C2.3.2 SendCertificate: Request for sending a transfer

C2.3.3 When the **SendCertificate** of the AIB Hub Web Service is imposed by a Sending Registry, the AIB Hub will validate the request and its content against the set of rules and master data and log the details of the transfer into the AIB Hub database and possibly convert the message to another XML Schema where relevant.

C2.3.4 If all the validations are passed in the AIB Hub, then the AIB Hub will respond with **SendCertificateResponse** with **ReturnCode** PENDING (ref. C2.3.8) to close the Web Service call for time being and forward the transfer to Receiving Registry by using the **SetCertificate** method of the Receiving Registry (ref. C2.4.2).

C2.3.5 If the validation would fail in the AIB Hub, then the AIB Hub will respond with **SendCertificateResponse** with **ReturnCode** NAK (ref. C2.3.8) to close the Web Service call to Sending Registry and no connection to Receiving Registry will be established.

C2.3.6 **SendCertificate** elements are described below:

- (i) **sCertificateMime** (xs:string, mandatory):
 - A string containing the transfer xml (the xml format is described in ANNEX B -).
 - UTF-8 encoding must be used.
 - There are three possibilities how the **sCertificateMime** parameter can be filled:
 1. XML message in an encrypted and signed form (NOTE: If the Registry Operator has enabled the "Signed mime" option in the registry configuration in the AIB Hub, the mime message should be signed.)
 2. XML message in an encrypted form without signature.
 3. Plain XML message.

Encryption and signature is done primarily in a native way by web service technologies (client PKI certificate and HTTPS protocol). Encryption and signature of the **sCertificateMime** (XML message) itself is only an optional feature. AIB Hub identifies these options on the fly during the web service request processing. The description of certificates to be used for encryption and decryption can be found from additional document "AHUB-Connection Guide.

C2.3.7 XML example of **SendCertificate**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendCertificate xmlns="http://system.aibhub.net/">
<sCertificateMime>Content-Disposition: attachment; filename=smime.p7m Content-Transfer-
Encoding: base64 Content-Type: application/x-pkcs7-mime; name=smime.p7m
MIJ0JgYJKoZIhvcNAQc....
</sCertificateMime>
<bTest>>true</bTest>
</SendCertificate>
</soap:Body>
</soap:Envelope>
```

C2.3.8 **SendCertificateResponse**: output for **SendCertificate** request

C2.3.9 When Sending Registry is using the **SendCertificate** method of the AIB Hub, the AIB Hub is expected to respond to the Sending Registry with a **SendCertificateResponse** as an output within timeout limit given in C2.1.

C2.3.10 If a valid **SendCertificateResponse** is not given as output for a **SendCertificate** request (timeout, invalid answer), it is recommended that the Registry Operator keeps the transfer open in their registry to avoid possible double counting and check with Superuser and the Receiving Registry the status of the transfer. Similarly, the AIB Hub keeps the transfer in Waiting for AK status, if Receiving Registry is not replying with this answer into the **SetCertificate** call.

C2.3.11 The valid **SendCertificateResponse** contains **SendCertificateResult**, which is type of **ReturnMessage**.

C2.3.12 **ReturnMessage** elements are described below:

- (ii) **ReturnCode (xs:string, mandatory)**: defines if the transfer was accepted or not by the receiver. The possible values for **ReturnCode** are:
 - 1 "NAK": the transfer validation failed either in AIB Hub or in the Receiving Registry (Negative acknowledgement)
 - 2 "AK": the transfer validation was successful in the AIB Hub and the transfer was delivered and accepted by the Receiving Registry (Positive acknowledgement)
 - 3 "PENDING": this response is only for WS. The transfer validation was successful in the AIB Hub, and the transfer has been taken for further progressing. The AK or NAK will be returned later.
- (iii) **Id (xs:string, mandatory)**: The unique id of the message to which the answer belongs to. (ref. B4.4.2) NOTE: Id can contain leading zero and hence it is defined as a string.

- (iv) **ErrorCode (xs:int, mandatory)**: The valid value for **ErrorCode** depends on the value of **ReturnCode**:
 - 1 In case **ReturnCode** = "NAK": **ErrorCode** > 0 and is one of the error codes given in the Fact Sheet 18.
 - 2 In case **ReturnCode** = "AK": **ErrorCode** = 0
 - 3 In case **ReturnCode** = "PENDING": **ErrorCode** = 0
- (v) **ErrorMessage (xs:string, optional)**: Error message given (recommended value is the description from Fact Sheet 18).
- (vi) **DestinationVersion (string, optional)**: The field will be filled with the XML version of the transfer, which has been used by the AIB Hub to send the transfer to the Receiving Registry.
- (vii) **AdditionalInfo (string, optional)**: Contains additional information about the error occurred.
- (viii) **SignatureMime (string, optional)**: If the mime message signature is enabled for the registry configuration, this property will contain a signed mime body with the **ReturnCode** + **Id**, signed with the client certificate. For example, if the **ReturnCode** is a "NAK" and the **Id** is 992017010100001, then the text in the mime body is "NAK992017010100001", which is signed with the client certificate.

C2.3.13 XML example of **SendCertificateResponse**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <SendCertificateResponse xmlns="http://system.aibhub.net/">
      <SendCertificateResult>
        <ReturnCode>NAK</ReturnCode>
        <Id>992017010100001</Id>
        <ErrorCode>1</ErrorCode>
        <ErrorMessage>Not correct signed</ErrorMessage>
        <AdditionalInfo>The registry configuration for your authentication is in productive mode, but the file you have sent was sent in test mode!</AdditionalInfo>
      </SendCertificateResult>
    </SendCertificateResponse>
  </soap:Body>
</soap:Envelope>
```

- C2.3.14 **SendFeedback**: Request for sending an AK or a NAK answer to a transfer asynchronously
- C2.3.15 **SendFeedback** method allows the Receiving Registry to send a NAK or an AK answer to a received transfer if PENDING was given as a reply for the **SendCertificateResponse (C2.3.10)**.
- C2.3.16 When AIB Hub receives **SendFeedback** request, the request is being validated and Hub will give **SendFeedbackResponse** as an output (C2.3.19). If the validations were passed, the request is forwarded to the Sending Registry using **SetFeedback** (ref. C2.4.10). If the validations were not passed, then the transfer is being kept in "Waiting for AK" status and the answer is not forwarded to the Sending Registry.
- C2.3.17 **SendFeedback** method contains **FeedbackMessage** (mandatory). **FeedbackMessage** element then contains **ReturnMessage** similar than was described in C2.3.12 with below differences:

- (ix) As a **ReturnCode** only “AK” and “NAK” are allowed.
- (x) The decision whether the **SignatureMime** is filled in is up to the Registry Operator. If it is given, AIB Hub is validating it.

C2.3.18 XML example of **SendFeedback**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
  <SendFeedback xmlns="http://system.aibhub.net/">
    <FeedbackMessage>
      <ReturnCode>NAK</ReturnCode>
      <Id>992017010100001</Id>
      <ErrorCode>5</ErrorCode>
      <ErrorMessage>File was not encrypted</ErrorMessage>
      <DestinationVersion />
      <AdditionalInfo />
    </FeedbackMessage>
  </SendFeedback>
</soap:Body>
</soap:Envelope>
```

C2.3.19 **SendFeedbackResponse**: Output for **SendFeedback** request

C2.3.20 When the Receiving Registry is using the **SendFeedback** method of the AIB Hub, the AIB Hub is expected to respond to the Receiving Registry with **SendFeedbackResponse** as an output within timeout limit given in C2.1.

C2.3.21 Below is described the elements required for that message:

- (xi) **SendFeedbackResponse** (mandatory, Boolean) being either True or False:
 - 1 True: the delivery of the answer was successful. If AIB Hub receives this answer, then the status of the transfer in Hub will be set to completed and will not accept further answers to the transfer.
 - 2 False: the delivery of the answer was not successful; if AIB Hub will receive this answer, then it will keep the transfer in “Waiting for Acknowledgement” status and hence Superuser can complete the transfer from User interface manually. The same happens if the **SendFeedBackResponse** is not sent on time.

C2.3.22 XML example of **SendFeedbackResponse**

```
<?xml version="1.0" encoding="utf-8"?> <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
  <SendFeedbackResponse xmlns=http://system.aibhub.net/>
    <SendFeedbackResult>>false</SendFeedbackResult>
  </SendFeedbackResponse>
</soap:Body>
</soap:Envelope>
```

C2.3.23 **SendAccountHolders**: Request for sending Account Holders to AIB Hub

C2.3.24 It is recommended to call the method daily as a maximum and to send the uploads of the Account Holders of the Registry before midnight UTC to coordinate with the downloads of the other Registries.

C2.3.25 When **SendAccountHolders** of AIB Hub Web Service is imposed by a Registry, the AIB Hub will validate the request and its content against the set of rules and master data and

log the details of the request into the AIB Hub database and if the validation was ok, update the Account Holders sent in the request.

C2.3.26 AIB Hub will answer to this call using **SendAccountHoldersResponse**, which is described in C2.3.29.

C2.3.27 **SendAccountHolders** elements are described below:

(xii) **AccountHoldersMime** (xs:string, mandatory):

- A string containing the Account Holders xml (the xml schema is described in ANNEX B -)
- When sending Account Holders, all the active Account Holders of the Registry should be included into the XML (the ones not included will be set inactive in the AIB Hub with ValidTo -date as the date of sending the file).
- Account Holders are transferred in MIME format (similar to certificate transfers) and encrypted with registry_WEB public certificate.
- UTF-8 encoding must be used.
- There are three possibilities how the **AccountHoldersMime** parameter can be filled:
 1. XML message in an encrypted and signed form (NOTE: If the Registry Operator has enabled the "Signed mime" option in the registry configuration in the AIB Hub, the **AccountHoldersMime** must be signed with Registry PKI certificate REGISTRY_AUTH)
 2. XML message in an encrypted form without signature.
 3. Plain XML message.

Encryption and signature is done primarily in a native way by web service technologies (client PKI certificate and HTTPS protocol). Encryption and signature of the **AccountHoldersMime** (XML message) itself is only an optional feature. AIB Hub identifies these options on the fly during the web service request processing. The description of certificates to be used for encryption and decryption can be found from additional document "AHUB-Connection Guide.

C2.3.28 XML example of SendAccountHolders:

```

<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendAccountHolders xmlns="http://system.aibhub.net/">
  <AccountHoldersMime>
    Content-Type: application/x-pkcs7-mime; name="smime.p7m"; smime-type="enveloped-
data"
    Content-Disposition: attachment; filename="smime.p7m"
    Content-Transfer-Encoding: base64
MIIltgYJKoZIhvcNAQcDoIILpzCCC6MCAQAxxgKuMIICqgIBADCBkTCBhTElMAkGA1UEBhMCQkUx
GzAZBgNVBAgTEkJSVWhFTExFUEY1DQVBJVEFMRTESMBAGA1UEBxMjQnJ1eGVsbGVzMSwwKgYDVQ
QKEyNBU1NPQ0IBVEIPTiBPRiBJU1NVSU5HIEJPREIFUyBBSVNCTDEXMBUGA1UEAxM0d3d3LmFpYm
h1
    ...
  </AccountHoldersMime>
</SendAccountHolders>
</soap:Body>
</soap:Envelope>

```

- (xiii) Example of “plain-text” decrypted form of previous WS call – the first example has all fields filled, and the second only the compulsory:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <SendAccountHolders xmlns="http://system.aibhub.net/">
      <AccountHoldersMime>
        <?xml version="1.0" encoding="UTF-8"?>
          <AccountHolders>
            <AccountHolder>
              <IssuingBodyCode>43</IssuingBodyCode>
              <AccountNumber>43X0EXMP1B</AccountNumber>
              <CompanyName>Company 1</CompanyName>
              <Country>BE</Country>
              <PostCode>01234</PostCode>
              <City>ExampleCity1</City>
              <ValidFrom>2018-01-01</ValidFrom>
              <ValidTo>2099-12-31</ValidTo>
              <VATNumber>BE0000000000001</VATNumber>
              <ModifiedOn>2018-02-23</ModifiedOn>
            </AccountHolder>
            <AccountHolder>
              <IssuingBodyCode>43</IssuingBodyCode>
              <AccountNumber>43X0EXMP29</AccountNumber>
              <CompanyName>Company 2</CompanyName>
              <Country>CZ</Country>
              <ValidFrom>2016-01-01</ValidFrom>
              <ValidTo>2099-12-31</ValidTo>
            </AccountHolder>
          </AccountHolders>
        </AccountHoldersMime>
      </SendAccountHolders>
    </soap:Body>
  </soap:Envelope>
```

- C2.3.29 SendAccountHoldersResponse: output for SendAccountHolders request
- C2.3.30 When a Registry is using the **SendAccountHolders** method of the AIB Hub, the AIB Hub is expected to respond to the Sending Registry with **SendAccountHoldersResponse** as an output within timeout limit given in C2.1.
- C2.3.31 If valid **SendAccountHoldersResponse** is not given as an output for **SendAccountHolders** request (timeout, invalid answer), it is recommended that the Registry Operator would check from the AIB Hub user interface if the file was processed fine before resending the request.
- C2.3.32 The valid SendAccountHoldersResponse contains SendAccountHoldersResult, which is type of SendAccountHoldersReturnMessage.
- C2.3.33 SendAccountHoldersReturnMessage elements are described below:

- (xiv) **Result (xs:boolean, minOccurs="1", maxOccurs="1")**: defines if the request was accepted or not:
 - 1 "TRUE": The request validation was successful in the AIB Hub and the Account Holders were updated in the Account Holder database
 - 2 "FALSE": The request validation was not successful; the errors is described in the **ErrorMessage**.
- (xv) **ErrorMessage (xs:string, minOccurs="1", maxOccurs="1")**: If there was errors on the sent file, AIB Hub will give the errors in this field: If all was ok, this will be empty.

C2.3.34 XML example of SendAccountHoldersReturnMessage:

(xvi) **Result = True:**

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <SendAccountHoldersResponse xmlns=>
      <SendAccountHoldersResult>
        <Result>>true</Result>
        <ErrorMessage></ErrorMessage>
      </SendAccountHoldersResult>
    </SendAccountHoldersResponse>
  </soap:Body>
</soap:Envelope>
```

(xvii) **Result = False:**

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <SendAccountHoldersResponse xmlns="http://system.aibhub.net/">
      <SendAccountHoldersResult>
        <Result>>false</Result>
        <ErrorMessage>Error on line 4: 02 – Non-existing Country Code</ErrorMessage>
      </SendAccountHoldersResult>
    </SendAccountHoldersResponse>
  </soap:Body>
</soap:Envelope>
```

- C2.3.35 **GetAccountHolders**: Request for receiving Account Holders XML from AIB Hub
- C2.3.36 It is recommended to call the method daily as a maximum and to download the Account Holders after midnight UTC to coordinate with uploads of other Registries.
- C2.3.37 When **GetAccountHolders** of the AIB Hub Web Service is imposed by a Registry, the AIB Hub will validate the request and its content against the set of rules and master data and log the details of the request into the AIB Hub database. If the validation was ok, it will send back the Account Holders list matching to the given filters. NOTE: both active and in-active Account Holders will be returned as there is no filter for the validity period of the Account Holders.
- C2.3.38 AIB Hub will answer to this call using **GetAccountHoldersResponse**, which is described in C2.3.42GetAccountHoldersResponse: output for GetAccountHolders request.
- C2.3.39 **GetAccountHolders** elements are described below:

- (xviii) **IssuingBodyCode** (type="xs:string", minOccurs="1", maxOccurs="1"):
 - Max length: 2 chars (Refer: Fact Sheet 04 (Member code))
 - Default value: Null – No special filter against Issuing Body is done. Account Holders of all the Issuing Bodies will be returned. NOTE: That includes also the Account Holders of your own Registry.
 - If value is given, only the Account holders of the given Issuing Body are returned.
- (xix) **AccountNumber** (type="xs:string", minOccurs="1", maxOccurs="1")
 - Default value: Null – No special filter against Account Number is done. All Account Holders will be returned.
 - If value given, the records where Account Number match to the given Account Number will be returned.
 - Max length: 13 chars
- (xx) **DateFrom** (type="xs:dateTime", minOccurs="1", maxOccurs="1")
 - Format: "YYYY-MM-DDThh:mm:ss"
 - Default value: Null – No special filter against Account Holder modified date is done. All Account Holders are returned.
 - If value given, only the records, where Account Holder was modified after the given datetime, will be returned (including Account Holders which were inactivated after the given timestamp).

C2.3.40 Couple of examples how to filter the results:

- (xxi) Get all Account Holders in the Account Holder database IssuingBodyCode is null or empty, AccountNumber is null or empty and DateFrom is null or empty.
- (xxii) Get all Account Holders assigned to the given IssuingBodyCode: IssuingBodyCode is the given IssuingBodyCode, AccountNumber is null or empty and DateFrom is null or empty.
- (xxiii) Get the Account Holder based on the given AccountNumber: IssuingBodyCode is null or empty, AccountNumber is the given AccountNumber and DateFrom is null or empty.
- (xxiv) Get all Account Holders which were changed since specified DateTime: IssuingBodyCode is null or empty, AccountNumber is null or empty, DateFrom is the DateTime in the format "YYYY-MM-DDThh:mm:ss". That will return all Account Holders which were changed since the given timestamp. NOTE: that will include also the inactivated Account Holders if those were changed after the given timestamp.

C2.3.41 XML example of GetAccountHolders:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <GetAccountHolders xmlns="http://system.aibhub.net/">
      <IssuingBodyCode>43</IssuingBodyCode>
      <AccountNumber></AccountNumber>
      <DateFrom>2016-01-01T21:30:00</DateFrom>
    </GetAccountHolders>
  </soap:Body>
</soap:Envelope>
```

C2.3.42 GetAccountHoldersResponse: output for GetAccountHolders request

- C2.3.43 When a Registry is using the **GetAccountHolders** method of AIB Hub, AIB Hub is expected to respond to the Sending Registry with **GetAccountHoldersResponse** as an output within timeout limit given in C2.1.
- C2.3.44 If a valid **GetAccountHoldersResponse** is not given as an output for **GetAccountHolders** request (but instead e.g. timeout, invalid answer), the Registry can try to repeat the request, but it is recommended not to do it more than three times. If even the third time did not give results, check the situation in AIB Hub user interface and contact AIB Hub Superuser.
- C2.3.45 The valid GetAccountHoldersResponse contains GetAccountHoldersResult, which is type of GetAccountHoldersReturnMessage.
- C2.3.46 GetAccountHoldersReturnMessage elements are described below:

- (xxv) **AccountHoldersMime** (xs:string, minOccurs="1", maxOccurs="1"):
- AIB Hub will return the Account Holders in MIME format (similar to certificate transfers) and encrypted with registry_WEB public certificate.

C2.3.47 XML example of GetAccountHoldersResponse:

(xxvi) **Mime**

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<GetAccountHoldersResponse xmlns="http://system.aibhub.net/">
  <GetAccountHoldersResult>
    <AccountHoldersMime>
      Content-Type: application/x-pkcs7-mime; name="smime.p7m"; smime-type="enveloped-
data"
      Content-Disposition: attachment; filename="smime.p7m"
      Content-Transfer-Encoding: base64
      MIIltgYJKoZIhvcNAQcDoIIlpzCCC6MCAQAxggKuMIICqgIBADCBkTCBhTElMAkGA1UEBhMCQkUx
GzAZBgNVBAgTEkJSVWhFTExFUy1DQVBJVEFMRTE5MBAGA1UEBxMJQnJ1eGVsbGVzMSwwKgYDEyN
BU1NPQ0IBVEIPTiBPRiBJU1NVSU5HIEJPREIFUyBBSVNCTDEXMBUGA1UEAxMOD3d3LmFpYmh1
      ...
      ...
    </AccountHoldersMime>
  </GetAccountHoldersResult>
</GetAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```

(xxvii) Example of "plain-text" decrypted form of previous WS call:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<GetAccountHoldersResponse xmlns="http://system.aibhub.net/">
  <GetAccountHoldersResult>
    <AccountHoldersMime>
      <AccountHolder>
        <IssuingBodyCode>43</IssuingBodyCode>
        <AccountNumber>43X0EXMP1B</AccountNumber>
        <CompanyName>Company 1</CompanyName>
        <Country>BE</Country>
        <PostCode>01234</PostCode>
        <City>ExampleCity1</City>
        <ValidFrom>2018-01-01</ValidFrom>
      </AccountHolder>
    </AccountHoldersMime>
  </GetAccountHoldersResult>
</GetAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```



AIB-HPA-A2-HubCOM
HUB USER COMPLIANCE DOCUMENT
(AIB-EECS-SD03: EECS Registration Databases)



```

    <ValidTo>2099-12-31</ValidTo>
    <VATNumber>BE0000000000001</VATNumber>
    <ModifiedOn>2018-02-23</ModifiedOn>
  </AccountHolder>
  <AccountHolder>
    <IssuingBodyCode>43</IssuingBodyCode>
    <AccountNumber>43X0EXMP29</AccountNumber>
    <CompanyName>Company 2</CompanyName>
    <Country>CZ</Country>
    <PostCode>12345</PostCode>
    <City>ExampleCity2</City>
    <ValidFrom>2016-01-01</ValidFrom>
    <ValidTo>2099-12-31</ValidTo>
    <VATNumber>BE0000000000002</VATNumber>
    <ModifiedOn>2018-02-23</ModifiedOn>
  </AccountHolder>
  <AccountHoldersMime>
</GetAccountHoldersResult>
</GetAccountHoldersResponse>
</soap:Body>
</soap:Envelope>

```

C2.4 Web Services exposed by Registries to the AIB Hub

C2.4.1 This interface describes the Web Service output interface of AIB Hub which should be implemented in the Registry and which the AIB Hub uses for the communication with the Registry. This interface is responsible for forwarding of the message to the web service of the receiving registry and on returning the acknowledgement (AK/NAK/PENDING) messages to the AIB Hub.

C2.4.2 SetCertificate: Request for receiving a transfer from the AIB Hub into the Receiving Registry.

C2.4.3 AIB Hub calls **SetCertificate** method for forwarding the transfer from Sending Registry to the Receiving Registry after the Sending Registry has been invoking the **SendCertificate** of the AIB Hub Web Service and after AIB Hub has validated the request.

C2.4.4 When **SetCertificate** of the Receiving Registry Web Service is imposed by the AIB Hub, it is expected that the Receiving Registry will process the request and perform required validations and give **SetCertificateResponse** as an output to AIB Hub following description in C2.4.7.

C2.4.5 Elements for **SetCertificate** are identical to the ones for **SendCertificate** (ref C2.3.6) expect below notifications:

(xxviii) There are two possibilities how the parameter **sCertificateMime** is filled:

- 1 If the Receiving Registry configuration has an option "Use signed mime" checked, the parameter **sCertificateMime** is encrypted and signed.
- 2 If the Receiving Registry configuration has an option "Use signed mime" not checked, the parameter **sCertificateMime** is only encrypted.

C2.4.6 XML example of **SetCertificate**:

```

<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <SetCertificate xmlns="http://system.aibhub.net/">
      <sCertificateMime>Content-Disposition: attachment; filename=smime.p7m
Content-Transfer-Encoding: base64
Content-Type: application/x-pkcs7-mime;

```

```
name=smime.p7m MIIGfgYJKoZI...
</sCertificateMime>
<bTest>>true</bTest>
</SetCertificate>
</soap:Body>
</soap:Envelope>
```

C2.4.7 SetCertificateResponse: output for SetCertificate request

- (f) **SetCertificate** method expects **SetCertificateResponse** as an output to the request, the reply should be given before the timeout given in C2.1. If the **SetCertificateResponse** is not given on time or is invalid, AIB Hub keeps the transfer in "Waiting for AK" status.

C2.4.8 The valid **SetCertificateResponse** contains **SetCertificateResult**, which is type of **ReturnMessage** described in the C2.3.12)

- (i) It is recommended that the registry would answer always with **ReturnCode** PENDING when receiving this request to avoid timeout situation.

C2.4.9 XML example of SetCertificateResponse:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetCertificateResponse xmlns="http://system.aibhub.net/">
<SetCertificateResult>
<ReturnCode>NAK</ReturnCode>
<Id>123456789012345</Id>
<ErrorCode>5</ErrorCode>
<ErrorMessage>File was not encrypted</ErrorMessage>
<DestinationVersion>v71</DestinationVersion>
<AdditionalInfo>This is just a test</AdditionalInfo>
<SignatureMime />
</SetCertificateResult>
</SetCertificateResponse>
</soap:Body>
</soap:Envelope>
```

C2.4.10 **SetFeedback**: request for sending an AK or a NAK answer to a transfer

C2.4.11 AIB Hub will use this method for delivering an answer to a Sending Registry.

C2.4.12 When Receiving Registry receives **SetFeedback** request from AIB Hub, **SetFeedbackResponse** output is to be given as an output (ref. C2.4.15). If the **True** response is not given before timeout, the transfer will be kept in 'Waiting for AK' status in AIB Hub.

C2.4.13 The content of **SetFeedback** is identical to the **SendFeedback**: C2.3.17

C2.4.14 XML example of **SetFeedback**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetFeedback xmlns="http://system.aibhub.net/">
<FeedbackMessage>
<ReturnCode>NAK</ReturnCode>
<Id>082010070905512</Id>
<ErrorCode>22</ErrorCode>
<ErrorMessage>To cS, receiving registry, @1 is unknown CMO</ErrorMessage>
```

```
<DestinationVersion />
<AdditionalInfo />
</FeedbackMessage>
</SetFeedback>
</soap:Body>
</soap:Envelope>
```

C2.4.15 SetFeedbackResponse: output for SetFeedback request

C2.4.16 When the AIB Hub is using the **SetFeedback** method of a Sending Registry, the Sending Registry is expected to respond to AIB Hub with **SetFeedbackResponse** as an output within timeout limit given in C2.1.

C2.4.17 Below are described the parameters required for that message:

(ii) **SetFeedbackResponse** (mandatory, Boolean) being either False or True:

- 1 **True:** the delivery of the answer was successful. If AIB Hub receives this answer, then the status of the transfer in AIB Hub will be set to “completed” and will not accept further answer to the transfer.
- 2 **False:** the delivery of the answer was not successful; if AIB Hub will receive this answer, then the transfer will be kept in “Waiting for Acknowledgement” status in AIB Hub and hence Superuser can complete the transfer from AIB Hub manually.

C2.4.18 XML example of SetFeedbackResponse

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetFeedbackResponse xmlns="http://system.aibhub.net/">
<SetFeedbackResult>true</SetFeedbackResult>
</SetFeedbackResponse>
</soap:Body>
</soap:Envelope>
```

C2.5 WSDL of the Web Service (Web Services Description Language (WSDL))

C2.5.1 WSDL Definition of AIB Hub Web Service including Account Holder database methods:
<https://www.aibhub.org/ws/blue?wsdl>

```
<?xml version='1.0' encoding='UTF-8'?>
<wsdl:definitions xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/" xmlns:tns="http://system.aibhub.net/"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:ns1="http://schemas.xmlsoap.org/soap/http" name="ServiceSoapService"
targetNamespace="http://system.aibhub.net/">
<wsdl:types>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:tns="http://system.aibhub.net/" elementFormDefault="qualified"
targetNamespace="http://system.aibhub.net/" version="1.0">
<xs:element name="GetAccountHolders">
<xs:complexType>
<xs:sequence>
<xs:element name="IssuingBodyCode" type="xs:string"/>
<xs:element name="AccountNumber" type="xs:string"/>
<xs:element name="DateFrom" type="xs:dateTime"/>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="GetAccountHoldersResponse">
```

```

    <xs:complexType>
      <xs:sequence>
        <xs:element name="GetAccountHoldersResult"
type="tns:GetAccountHoldersReturnMessage"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendAccountHolders">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="AccountHoldersMime" type="xs:string"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendAccountHoldersResponse">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="SendAccountHoldersResult"
type="tns:SendAccountHoldersReturnMessage"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendCertificate">
    <xs:complexType>
      <xs:sequence>
        <xs:element minOccurs="0" name="sCertificateMime" type="xs:string"/>
        <xs:element name="bTest" type="xs:boolean"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendCertificateResponse">
    <xs:complexType>
      <xs:sequence>
        <xs:element minOccurs="0" name="SendCertificateResult" type="tns:ReturnMessage"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendFeedback">
    <xs:complexType>
      <xs:sequence>
        <xs:element minOccurs="0" name="FeedbackMessage" type="tns:ReturnMessage"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SendFeedbackResponse">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="SendFeedbackResult" type="xs:boolean"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:complexType name="ReturnMessage">
    <xs:sequence>
      <xs:element minOccurs="0" name="ReturnCode" type="xs:string"/>
      <xs:element minOccurs="0" name="Id" type="xs:string"/>
      <xs:element name="ErrorCode" type="xs:int"/>
      <xs:element minOccurs="0" name="ErrorMessage" type="xs:string"/>
      <xs:element minOccurs="0" name="DestinationVersion" type="xs:string"/>
      <xs:element minOccurs="0" name="AdditionalInfo" type="xs:string"/>
      <xs:element minOccurs="0" name="SignatureMime" type="xs:string"/>
    </xs:sequence>
  
```

```
</xs:complexType>
<xs:complexType name="GetAccountHoldersReturnMessage">
  <xs:sequence>
    <xs:element name="AccountHoldersMime" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="SendAccountHoldersReturnMessage">
  <xs:sequence>
    <xs:element name="Result" type="xs:boolean"/>
    <xs:element name="ErrorMessage" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>
</wsdl:types>
<wsdl:message name="SendAccountHoldersResponse">
  <wsdl:part element="tns:SendAccountHoldersResponse" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="GetAccountHoldersResponse">
  <wsdl:part element="tns:GetAccountHoldersResponse" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="GetAccountHolders">
  <wsdl:part element="tns:GetAccountHolders" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="SendCertificateResponse">
  <wsdl:part element="tns:SendCertificateResponse" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="SendAccountHolders">
  <wsdl:part element="tns:SendAccountHolders" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="SendFeedbackResponse">
  <wsdl:part element="tns:SendFeedbackResponse" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="SendFeedback">
  <wsdl:part element="tns:SendFeedback" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:message name="SendCertificate">
  <wsdl:part element="tns:SendCertificate" name="parameters"></wsdl:part>
</wsdl:message>
<wsdl:portType name="ServiceSoap">
  <wsdl:operation name="SendFeedback">
    <wsdl:input message="tns:SendFeedback" name="SendFeedback"></wsdl:input>
    <wsdl:output message="tns:SendFeedbackResponse"
name="SendFeedbackResponse"></wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="GetAccountHolders">
    <wsdl:input message="tns:GetAccountHolders" name="GetAccountHolders"></wsdl:input>
    <wsdl:output message="tns:GetAccountHoldersResponse"
name="GetAccountHoldersResponse"></wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="SendCertificate">
    <wsdl:input message="tns:SendCertificate" name="SendCertificate"></wsdl:input>
    <wsdl:output message="tns:SendCertificateResponse"
name="SendCertificateResponse"></wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="SendAccountHolders">
    <wsdl:input message="tns:SendAccountHolders"
name="SendAccountHolders"></wsdl:input>
    <wsdl:output message="tns:SendAccountHoldersResponse"
name="SendAccountHoldersResponse"></wsdl:output>
  </wsdl:operation>
</wsdl:portType>
```

```

<wsdl:binding name="ServiceSoapServiceSoapBinding" type="tns:ServiceSoap">
  <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <wsdl:operation name="SendFeedback">
    <soap:operation soapAction="http://system.aibhub.net/SendFeedback" style="document"/>
    <wsdl:input name="SendFeedback">
      <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="SendFeedbackResponse">
      <soap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="GetAccountHolders">
    <soap:operation soapAction="http://system.aibhub.net/GetAccountHolders"
style="document"/>
    <wsdl:input name="GetAccountHolders">
      <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="GetAccountHoldersResponse">
      <soap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="SendCertificate">
    <soap:operation soapAction="http://system.aibhub.net/SendCertificate" style="document"/>
    <wsdl:input name="SendCertificate">
      <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="SendCertificateResponse">
      <soap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="SendAccountHolders">
    <soap:operation soapAction="http://system.aibhub.net/SendAccountHolders"
style="document"/>
    <wsdl:input name="SendAccountHolders">
      <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="SendAccountHoldersResponse">
      <soap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
</wsdl:binding>
<wsdl:service name="ServiceSoapService">
  <wsdl:port binding="tns:ServiceSoapServiceSoapBinding" name="ServiceSoapPort">
    <soap:address location="https://www.aibhub.org/ws/hub"/>
  </wsdl:port>
</wsdl:service>
</wsdl:definitions>

```

C2.5.2 Example of a Registry WSDL

```

<WL5G3N0:definitions xmlns:WL5G3N0="http://schemas.xmlsoap.org/wsdl/"
xmlns:WL5G3N1="http://system.aibhub.net/"
xmlns:WL5G3N2="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:WL5G3N3="http://schemas.xmlsoap.org/wsdl/soap12/"
targetNamespace="http://system.aibhub.net/">
  <WL5G3N0:types>
    <s:schema xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"

```

```

xmlns:tm="http://microsoft.com/wsdl/mime/textMatching/"
xmlns:tns="http://system.aibhub.net/" xmlns:wsi="http://schemas.xmlsoap.org/wsdl/"
elementFormDefault="qualified" targetNamespace="http://system.aibhub.net/"
  <s:element name="SetCertificate">
    <s:complexType>
      <s:sequence>
        <s:element maxOccurs="1" minOccurs="0" name="sCertificateMime" type="s:string"/>
        <s:element maxOccurs="1" minOccurs="1" name="bTest" type="s:boolean"/>
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="SetCertificateResponse">
    <s:complexType>
      <s:sequence>
        <s:element maxOccurs="1" minOccurs="0" name="SetCertificateResult"
type="tns:ReturnMessage"/>
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:complexType name="ReturnMessage">
    <s:sequence>
      <s:element maxOccurs="1" minOccurs="0" name="ReturnCode" type="s:string"/>
      <s:element maxOccurs="1" minOccurs="0" name="Id" type="s:string"/>
      <s:element maxOccurs="1" minOccurs="1" name="ErrorCode" type="s:int"/>
      <s:element maxOccurs="1" minOccurs="0" name="ErrorMessage" type="s:string"/>
      <s:element maxOccurs="1" minOccurs="0" name="DestinationVersion" type="s:string"/>
      <s:element maxOccurs="1" minOccurs="0" name="AdditionalInfo" type="s:string"/>
      <s:element maxOccurs="1" minOccurs="0" name="SignatureMime" type="s:string"/>
    </s:sequence>
  </s:complexType>
  <s:element name="SetFeedback">
    <s:complexType>
      <s:sequence>
        <s:element maxOccurs="1" minOccurs="0" name="FeedbackMessage"
type="tns:ReturnMessage"/>
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="SetFeedbackResponse">
    <s:complexType>
      <s:sequence>
        <s:element maxOccurs="1" minOccurs="1" name="SetFeedbackResult"
type="s:boolean"/>
      </s:sequence>
    </s:complexType>
  </s:element>
</s:schema>
</WL5G3N0:types>
<WL5G3N0:message name="SetCertificateSoapIn">
  <WL5G3N0:part element="WL5G3N1:SetCertificate" name="parameters"/>
</WL5G3N0:message>
<WL5G3N0:message name="SetCertificateSoapOut">
  <WL5G3N0:part element="WL5G3N1:SetCertificateResponse" name="parameters"/>
</WL5G3N0:message>
<WL5G3N0:message name="SetFeedbackSoapIn">
  <WL5G3N0:part element="WL5G3N1:SetFeedback" name="parameters"/>
</WL5G3N0:message>
<WL5G3N0:message name="SetFeedbackSoapOut">
  <WL5G3N0:part element="WL5G3N1:SetFeedbackResponse" name="parameters"/>
</WL5G3N0:message>
<WL5G3N0:portType name="RegistryServiceSoap">

```



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```
<WL5G3N0:operation name="SetCertificate">
  <WL5G3N0:input message="WL5G3N1:SetCertificateSoapIn"/>
  <WL5G3N0:output message="WL5G3N1:SetCertificateSoapOut"/>
</WL5G3N0:operation>
<WL5G3N0:operation name="SetFeedback">
  <WL5G3N0:input message="WL5G3N1:SetFeedbackSoapIn"/>
  <WL5G3N0:output message="WL5G3N1:SetFeedbackSoapOut"/>
</WL5G3N0:operation>
</WL5G3N0:portType>
<WL5G3N0:binding name="RegistryServiceSoap" type="WL5G3N1:RegistryServiceSoap">
  <WL5G3N2:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <WL5G3N0:operation name="SetCertificate">
    <WL5G3N2:operation soapAction="http://system.aibhub.net/SetCertificate"
style="document"/>
    <WL5G3N0:input>
      <WL5G3N2:body use="literal"/>
    </WL5G3N0:input>
    <WL5G3N0:output>
      <WL5G3N2:body use="literal"/>
    </WL5G3N0:output>
  </WL5G3N0:operation>
  <WL5G3N0:operation name="SetFeedback">
    <WL5G3N2:operation soapAction="http://system.aibhub.net/SetFeedback"
style="document"/>
    <WL5G3N0:input>
      <WL5G3N2:body use="literal"/>
    </WL5G3N0:input>
    <WL5G3N0:output>
      <WL5G3N2:body use="literal"/>
    </WL5G3N0:output>
  </WL5G3N0:operation>
</WL5G3N0:binding>
<WL5G3N0:binding name="RegistryServiceSoap12" type="WL5G3N1:RegistryServiceSoap">
  <WL5G3N3:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <WL5G3N0:operation name="SetCertificate">
    <WL5G3N3:operation soapAction="http://system.aibhub.net/SetCertificate"
style="document"/>
    <WL5G3N0:input>
      <WL5G3N3:body use="literal"/>
    </WL5G3N0:input>
    <WL5G3N0:output>
      <WL5G3N3:body use="literal"/>
    </WL5G3N0:output>
  </WL5G3N0:operation>
  <WL5G3N0:operation name="SetFeedback">
    <WL5G3N3:operation soapAction="http://system.aibhub.net/SetFeedback"
style="document"/>
    <WL5G3N0:input>
      <WL5G3N3:body use="literal"/>
    </WL5G3N0:input>
    <WL5G3N0:output>
      <WL5G3N3:body use="literal"/>
    </WL5G3N0:output>
  </WL5G3N0:operation>
</WL5G3N0:binding>
<WL5G3N0:service name="RegistryService">
  <WL5G3N0:port binding="WL5G3N1:RegistryServiceSoap" name="RegistryServiceSoap">
    <WL5G3N2:address location="https://ac-
esb02.acce.alfa.local:9043/EECS/InternationalCertificatesTrade/receiveCertificate"/>
  </WL5G3N0:port>
```

```
</WL5G3N0:service>  
</WL5G3N0:definitions>
```

C2.6 Messaging interface exposed by the AIB Hub to Registries (AMQP)

- C2.6.1 This interface describes the AMQP messaging input interface of the AIB Hub. Registries use this interface for communicating with the AIB Hub. The interface is responsible for receiving transfer messages and acknowledgements (AK/NAK) from Registries and forwarding them to the relevant recipient Registry.
- C2.6.2 The interface is implemented using the AMQP 1.0 protocol over a secure message broker infrastructure provided by the AIB Hub. Registries connect to the broker using mutually authenticated TLS connections and publish messages to queues assigned to their Registry identity.
- C2.6.3 The messaging interface supports the following message types:
- (a) Transfer message containing certificates from the Sending Registry (sendCertificate)
 - (b) Acknowledgement message (AK or NAK) from the Receiving Registry (sendFeedback)
- C2.6.4 sendCertificate: message for sending a transfer

When a Sending Registry submits a transfer message using the AMQP interface, the AIB Hub validates the message structure, digital signature, and content against the defined rules and master data. The AIB Hub logs the transfer details in its database and forwards the transfer message to the Receiving Registry using the corresponding messaging interface.

Example of sendCertificate AMQP message:

The sendCertificate message is transmitted as an AMQP 1.0 message with application-properties containing the digital signature and the message body containing the transfer payload.

The sendCertificate message is transmitted as an AMQP 1.0 message with application-properties containing the digital signature and the message body containing the transfer payload.

Example AMQP message structure:

```
message-id: "992017010100001"  
content-type: "application/xml"  
content-encoding: "utf-8"
```

AMQP Application-properties:

Signature:

```
"MIICljANBgkqhkiG9w0BAQEFAAOCAg8AMIICGgKCAgEExampleSignatureBase64Val  
ue..."
```

AMQP Body (XML payload example):

```
<r:Header MessageTransmissionTime="2026-02-05T11:41:02Z">  
  <r:MessageID>202602051241016</r:MessageID>  
  <r:FromRegistry>9900000000002</r:FromRegistry>  
  <r:ToRegistry>3613581</r:ToRegistry>
```



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```
</r:Context>transfer</r:Context>
</r:Header>
<r:Body>
  <r:SendingAccountID cS="eecs">99X000000X</r:SendingAccountID>.....
```

Example AMQP message structure taken from AMQP queue:

- C2.6.5 If validation fails in the AIB Hub, the transfer message is rejected and is not forwarded to the Receiving Registry. The transfer is marked with an appropriate error status.
- C2.6.6 The transfer message payload must conform to the XML or JSON schema defined in Annex B and must be encoded using UTF-8.
- C2.6.7 Each transfer message must contain a unique identifier (MessageID) that allows the AIB Hub and Registries to identify and track the transfer.
- C2.6.8 All messages must be digitally signed by the Sending Registry using its signing certificate. The AIB Hub validates the digital signature upon receipt. Messages with missing or invalid signatures are rejected.
- C2.6.9 After successful validation, the AIB Hub forwards the transfer message to the Receiving Registry. The forwarded message is digitally signed by the AIB Hub.
- C2.6.10 sendFeedback: message for sending an acknowledgement

The Receiving Registry must submit an acknowledgement message using the messaging interface to indicate the processing result of the transfer.
- C2.6.11 The acknowledgement message contains a ReturnCode with one of the following values:
 - (a) "AK" ErrorCode = 0: the transfer was successfully validated and accepted by the Receiving Registry
 - (b) "NAK" ErrorCode > 0 and is one of the error codes given in the Fact Sheet 18: the transfer validation or processing failed in the Receiving Registry
- C2.6.12 The acknowledgement message must include the unique MessageID of the original transfer message and must be digitally signed by the Sending Registry.
- C2.6.13 When the AIB Hub receives a valid acknowledgement message, it validates the message and forwards it to the Sending Registry.

- C2.6.14 Message delivery is asynchronous. The Sending Registry must monitor acknowledgements and apply retry or operational procedures if acknowledgements are not received within the expected timeframe.
- C2.6.15 The messaging interface uses an at-least-once delivery model. Registries must ensure that their systems support idempotent processing and are capable of handling duplicate messages.
- C2.6.16 Secure communication between the Registry and the AIB Hub must use mutual TLS authentication. Access to messaging resources is restricted to authorised Registries.
- C2.6.17 The AIB Hub provides dedicated messaging queues for each Registry. Registries must publish outgoing messages and consume incoming messages using these queues.
- C2.6.18 The AIB Hub maintains the transfer lifecycle and status. Registries must ensure proper handling of transfer messages and acknowledgements in accordance with this specification.

C2.7 Messaging interface exposed by Registries to the AIB Hub (AMQP)

- C2.7.1 This interface describes the AMQP messaging input interface of the AIB Hub. Registries use this interface for communicating with the AIB Hub. The interface is responsible for receiving transfer messages and acknowledgements (AK/NAK) from Registries and forwarding them to the relevant recipient Registry.
- C2.7.2 The interface is implemented using the AMQP 1.0 protocol over a secure message broker infrastructure provided by the AIB Hub. Registries connect to the broker using mutually authenticated TLS connections and publish messages to queues assigned to their Registry identity.
- C2.7.3 The AIB Hub submits transfer messages and acknowledgement messages to the Registry via the AMQP external message broker infrastructure. Registries must connect to the broker using mutually authenticated TLS and consume messages from the queues assigned to their Registry identity.
- C2.7.4 The messaging interface supports the following message types:
 - (a) Transfer message containing certificates forwarded by the AIB Hub (setCertificate)
 - (b) Acknowledgement message (AK or NAK) forwarded by the AIB Hub (setFeedback)
- C2.7.5 setCertificate: message for receiving a transfer
When the AIB Hub forwards a transfer message to a Receiving Registry, the Registry must receive the message from its assigned messaging queue and validate the message structure, digital signature, and payload content.
- C2.7.6 The Registry must validate the digital signature applied by the AIB Hub. Messages with missing or invalid signatures must be rejected and handled according to Registry operational procedures.
- C2.7.7 The Registry must validate that the message conforms to the expected XML or JSON schema defined in Annex B and that the content is valid and consistent with the Registry's business rules.
- C2.7.8 After successful validation and processing of the transfer message, the Receiving Registry must submit an acknowledgement message using the sendFeedback messaging interface as described in
- C2.7.9 If the transfer message cannot be processed successfully, the Receiving Registry must submit a negative acknowledgement (NAK) message indicating the error condition.
- C2.7.10 setFeedback: message for receiving an acknowledgement
When the AIB Hub forwards an acknowledgement message to the Sending Registry, the Registry must receive the acknowledgement message from its assigned messaging queue and validate the digital signature and message content.



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- C2.7.11 The acknowledgement message contains the MessageID and ReturnCode, allowing the Sending Registry to correlate the acknowledgement with the original transfer.
 - C2.7.12 The Sending Registry must update the transfer status in its system based on the received acknowledgement message.
 - C2.7.13 The Registry messaging client must support asynchronous message reception and must be capable of receiving multiple messages concurrently, however until the double counting validation can be processed in parallel, we recommend to process messages sequentially.
 - C2.7.14 The Registry must acknowledge receipt of AMQP messages at the messaging protocol level (Technical ACK) only after successful validation and processing to ensure reliable delivery.
 - C2.7.15 The messaging interface uses an at-least-once delivery model. Registries must ensure idempotent processing and must be capable of handling duplicate message delivery without adverse effects.
 - C2.7.16 The Registry must ensure secure operation of its messaging client, including protection of private keys, certificate lifecycle management, and secure storage of credentials.
 - C2.7.17 Communication between the AIB Hub and the Registry must use mutual TLS authentication. Registries must ensure that only authorised systems are permitted to connect to the messaging infrastructure.
 - C2.7.18 Registries must ensure continuous availability of their messaging client to receive incoming transfer and acknowledgement messages in a timely manner.
 - C2.7.19 The Registry is responsible for monitoring incoming messaging queues and ensuring that transfer messages and acknowledgements are processed according to the requirements defined in this specification.

ANNEX D - EECS Transfer Interface Test Specification for the Hub

D1 Introduction

D1.1 Purpose

- D1.1.1 This document details the Interface Test Specification (ITS) for the common communication interfaces operated by the registries within the context of the AIB.
- D1.1.2 The scope of this ITS document is the definition of all tests to be completed when commissioning interfaces between a Registry and the AIB Hub.

D1.2 Approach

- D1.2.1 The approach to interface testing is defined, along with requirements for test data and test environments. Individual tests are identified. Specific test scripts, detailed file specifications and registry-specific procedures are not detailed in this document. Each registry will be responsible for the production of these items and the submission of these documents to the AIB. Following completion of any tests the test results will be provided by the AIB Hub.

D1.3 Scope of testing

- D1.3.1 Communications between registries are, for the purposes of this test specification, assumed to be mediated by the AIB Hub.
- D1.3.2 The registry Operator must undertake the full set of tests described in this annex with the AIB Hub testing service and in addition the tests specified in Technical Audit document (SD07) when:
- (a) The registry is newly constituted and has never previously undertaken tests.
 - (b) The registry is replaced.
 - (c) There is made a change to the registry that may affect compliance with SD03 Hubcom.
 - (d) The registry is intended to support a new certificate type or new file format.
 - (e) The IB is audited in the context of the AIB Member Audit.
 - (f) The following are excluded from registry interface testing:
 - (i) tests of interfaces between national or participant systems unique to the registries; and
 - (ii) testing of the business functionality of the registry provided services.

D2 Test Mechanism

D2.1 Overview

- D2.1.1 The AIB Hub provides a communications testing facility (the Test Facility). During a test, messages are passed between the tested registry and the Test Facility. The Test Facility records the responses to the transfers and the results are made available as appropriate.
- D2.1.2 A number of test protocols may be defined. These will normally address different file formats required by the ANNEX B -EECS Transfer Interface File Specification, or different versions of the file formats that may from time to time be specified.
- D2.1.3 The records kept by the Test Facility allow each registry to be given a test status against each protocol, and, by extension, against a specific file format.

D2.2 Test Protocols

- D2.2.1 Testing facilities are based on the concept that a registry operator will request one of a set of possible protocols. The system will then undergo a pre-defined sequence of sending message files to the chosen registry and expecting files from that registry. The tests do not address any functionality within the tested registry other than the ability to conform to the interface protocol.
- D2.2.2 The tests themselves will address the following abilities:
- D2.2.3 The tested registry is able to operate the secure message transport protocol,
- (iii) Tests address the ability of the Registry to both create and interpret signed and encrypted messages. In practice, this test is rolled up with other tests by requiring test messages to be signed and encrypted.
- D2.2.4 The tested registry is able to send validly formatted files.
- (iv) Tests require the tested registry to send a number of messages with variations on the content of fields as well as on the numbers of repeating elements in the file structure. The tested registry is only required to send valid files. Invalid files are, for the most part detected and rejected by the Hub itself, while remaining errors would be detected by any receiving registry. The protocol therefore provides evidence that the tested registry is able to generate correctly formatted files.
- D2.2.5 The tested registry is able to detect errors in the files sent,
- (v) Tests require the Test Facility to send a number of messages, each with specific errors. The tested registry responds with an AK or NAK as appropriate.
- D2.2.6 The tested registry understands both AK and NAK responses.
- (vi) Tests require the Test Facility to send both AK and NAK responses. Since the tested registry is only required to send valid files the test requires the Test Facility to return a NAK for some randomly chosen test file. The response is validated by the registry user entering the file ID for the file that received the NAK response.
- D2.2.7 The tested registry understands PENDING response
- D2.2.8 For each flow tested, as defined within the Interface Specification and specific test scripts, the Test Facility identifies:
- D2.2.9 Pass
- (vii) For a flow output from the tested registry, the Test Facility was able to match the flow against one of the expected files for the chosen protocol and was able to respond with an AK.
 - (viii) For a flow output from the tested registry, matching an expected file chosen at random when the test was initiated, the Registry Operator reports that a NAK was received when an AK was expected.
 - (ix) For a flow output from the Test Facility, the Test Facility noted an AK or NAK response from the registry corresponding to the expected response for that file.
- D2.2.10 Fail
- (x) For a flow output from the Test Facility, no response was received or the response was not that expected.
 - (xi) For a flow output from the registry, that the data was not as expected or no response was created.
- D2.2.11 An overall test result covering all the flows within the test will be reported:

D2.2.12 Pass

(xii) Tests for all flows within the slot were successful.

D2.2.13 Fail

(xiii) Test for at least one flow was not successful.

D2.3 Witnessing and Evidence

D2.3.1 There is no requirement for on-site witnessing of registry tests by the AIB.

D2.4 Test Process

D2.4.1 The test process is managed by the registry, all activities and process on the AIB Hub testing facility being automatic.

D2.4.2 The process involves a number of explicit steps.

D2.4.3 **Initiate test run:** The registry operator registers intent to test by starting a new test instance with the Test Facility.

D2.4.4 **AIB protocol messages:** These messages are exchanged according to the needs of the protocol. The protocol does not say anything about how the registry operator initiates the test messages, only that certain types of message are appropriate for this protocol.

D2.4.5 **Present status:** The tested registry must provide status information back to the Test Facility.

D2.5 Test Environment

D2.5.1 The test process involves sending valid data files from the Test Facility to the tested registry. The tested registry must accept these files and report an AK, and it is essential that the testing activities do not corrupt live data. Since the AIB protocols do not allow for test certificates the AIB Hub is designed to prevent messages from a test or demonstration environment being transferred to a live environment.

D2.5.2 In order to operate a successful test under these conditions the tested registry must:

D2.5.3 Set the Registry to Test mode on the AIB Hub,

D2.5.4 Either contain no live data, or be able to make a proper distinction within itself between live and test data, and

D2.5.5 Ensure that the bTest flag is set to True.

D2.5.6 The Production- and Test-mode transfers are recorded into a separate data structure in the AIB Hub for not mixing Test data to Production data. The transfers in Test-mode are validated by AIB Hub, but not forwarded to the receiving registry.

D2.5.7 The AIB authorises the use of a mirror system on a test communication system if a registry is unable to support testing on their live system. This environment must be using the same software applications as are to be used in production, and the database configured in a similar way.

D3 Test System Configuration

D3.1.1 Each registry is responsible for the preparation of test data and a test environment.

D3.2 Test Scripts and Data

D3.2.1 Test data and scripts will be required from each registry. The registry must arrange files to be sent according to the defined test protocol. The registry must also ensure that appropriate responses can be generated for received files.

D3.2.2 Registries are expected to use the same applications, procedures and local working instructions that will be used in live operation to receive and generate flows and to generate

acknowledgements or rejections. However, it is up to individual registries to decide whether they can generate the required flows without the need to run their full business processes - the data must only be syntactically correct, not necessarily representative business data.

D3.3 Systems and Procedures

- D3.3.1 Registries are expected to use the same procedures and systems as will be used in live operation to:
- D3.3.2 receive input flows and generate acknowledgements or rejections; and
- D3.3.3 generate output messages.
- D3.3.4 For these tests the AIB Hub Test Facility will transmit to the registry files containing data covering the test cases identified in the chosen protocol. This will cover both valid and invalid data. The registry will validate the data and respond with an acknowledgement as appropriate.
- D3.3.5 The AIB Hub Test Facility will then confirm that the expected responses (acknowledgement with correct rejection reason if appropriate) are received from the registry.
- D3.3.6 The registry will transmit to the AIB Hub Test Facility a set of messages required by the chosen protocol. All of these messages, except one chosen at random, are expected to result in an AK response from the AIB Hub Test Facility. The registry must identify the message which elicited a NAK response.

D4 Test Processes

D4.1 Problem Reporting and Problem Management

- D4.1.1 The registry will log all test failures observed at the tested registry. It will be the responsibility of the registry to track the problem resolution in their systems/processes and to ensure that the problem is fixed.

D4.2 Problem Escalation

- D4.2.1 Any concern arising from a registry failing a test may be escalated, in the first instance to the AIB Test Manager, and, if that does not result in successful resolution, to the full AIB.

D4.3 Test Result Reporting

- D4.3.1 The AIB Hub Test Facility records all responses and provides a test status.

D5 Test Protocol Principles

D5.1 Data agreement

- D5.1.1 In order to allow the tested registry to evaluate incoming files, some agreement is required on acceptable account holder and production device IDs.
- D5.1.2 A set of acceptable IDs is made available from time to time.
- D5.1.3 There is no guarantee that any one ID will be used in any particular data file sent by the Test Facility.

D5.2 Files sent by Test Facility

- D5.2.1 Files correspond to an identified XML interface specification version.
- D5.2.2 The valid files sent to the tested registry are designed to address some of the potential complexities of the data file. They might address, for example:
- D5.2.3 A single bundle of certificates.
- D5.2.4 Multiple bundles of certificates, each bundle with a different production device.



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- D5.2.5 Multiple bundles of certificates, each bundle with different range of certificate numbers.
 - D5.2.6 The invalid files sent to the tested registry are designed to address a single error each, so that error identification is straightforward. Examples include:
 - D5.2.7 A single bundle of certificates with an invalid checksum on either Sending Account Holder or Receiving Account Holder ID.
 - D5.2.8 A single bundle of certificates with an invalid checksum on the Production Device.
 - D5.2.9 A single bundle of certificates with an invalid Date of issue.
 - D5.2.10 A single bundle of certificates with an invalid Technology code.
 - D5.2.11 A single bundle of certificates with an invalid Earmark.
 - D5.2.12 Multiple bundles of certificates with an invalid Number of Certificates.

D5.3 Files expected from the tested registry

- D5.3.1 Files correspond to an identified XML interface specification version.
- D5.3.2 Files sent by the tested registry are matched against templates within the Test Facility. The Test Facility does not attempt to forward the transfers into a Receiving Registry.
- D5.3.3 Lists of expected patterns are made available from time to time.
- D5.3.4 Templates are designed to address some of the potential complexities of the data file. They might address, for example:
- D5.3.5 A single bundle of certificates.
- D5.3.6 Multiple bundles of certificates, each bundle with a different production device.
- D5.3.7 Multiple bundles of certificates, each bundle with a different range of certificate numbers.