AIM: Database Specification

# EETDB DB Specification

Programme: **UNIDO EETDB**

Author: Nikolay Komissarenko

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| 30 April 2013 | Nikolay Komissarenko | 1.0 | draft |
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| TDS.EETDB Data Service | Data access service |  |  |
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Overview

Definitions

EETDB – Energy Efficient Technologies Data Bank

UNIDO – United Nations Industrial Development Organization

Assumptions

EETDB is not a standalone web-enabled system, it’s part of the UNIDO web site <http://energy.unido.ru/>

1. If you use a user-friendly name for this customization as the replacement for <Subject>, the following paragraphs will default nicely.

Basic Needs

EETDB Database requirements

Database EETDB is part of EETDB solution. It is aimed to provide safe physical data storage with easy way to store/get data and fast search through the data.

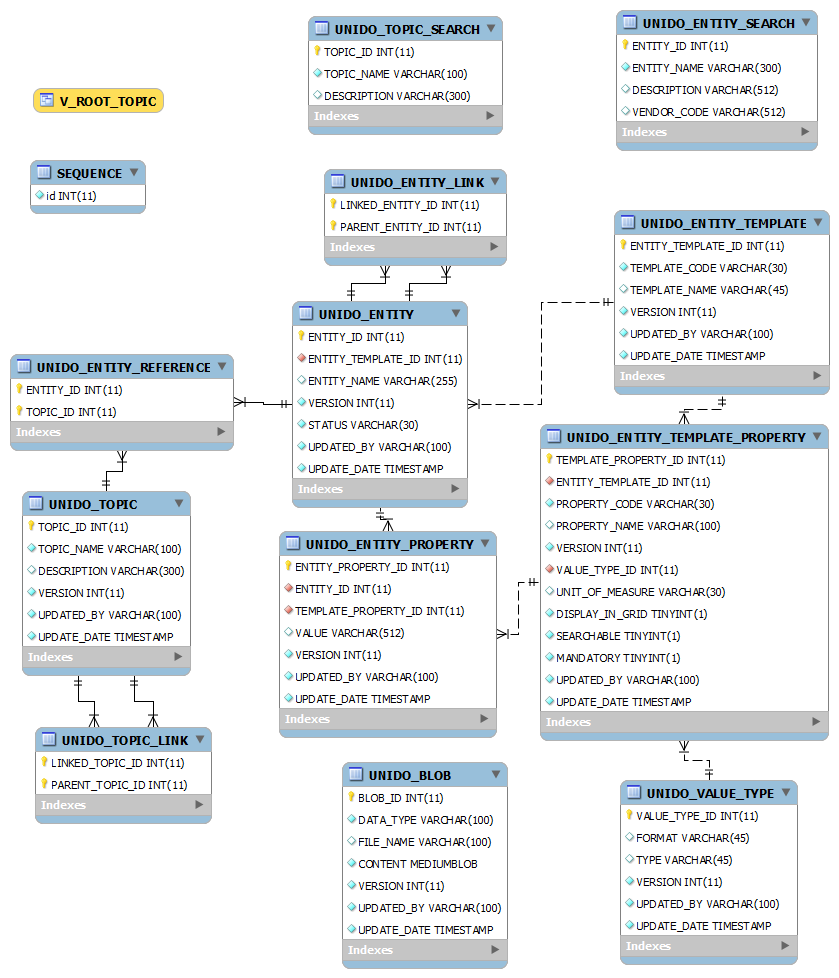
The main entities that are supposed to be stored in EETDB Database are

* lists of classification headings,
* energy saving equipments with characteristics,
* energy saving technologies descriptions.

Database is designed to be used by EETDB Data Access Services.

EETDB Database architecture

The EETDB Database has the relational structure described by the following schema:



**EETDB Database Tables**

EETDB Database has the following tables.

UNIDO\_TOPIC

UNIDO\_TOPIC table is used to store the lists of classification headings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| TOPIC\_ID | INT | No | Unique identifier of classification heading. *Primary key*. |
| TOPIC\_NAME | NVARCHAR(100) | No | Name of classification heading. |
| DESCRIPTION | NVARCHAR(300) | Yes | Detailed description of classification heading. |
| VERSION | INT | No | Version number of classification heading. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performed the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | Date of the operation. *Audit field.* |

UNIDO\_TOPIC\_LINK

All the classification headings of EETDB can be combined in several heading trees. UNIDO\_TOPIC\_LINK table is used to store the relationships between the headings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| PARENT\_TOPIC\_ID | INT | No | Parent heading ID from UNIDO\_TOPIC |
| LINKED\_TOPIC\_ID | INT | No | Child heading ID from UNIDO\_TOPIC |

UNIDO\_ENTITY\_TEMPLATE

UNIDO\_ENTITY\_TEMPLATE is a table used to store the templates of the EETDB Database entities. Each row in this table describes the type of equipment or technology.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ENTITY\_TEMPLATE\_ID | INT | No | Unique identifier of entity. *Primary key*. |
| TEMPLATE\_CODE | NVARCHAR(30) | No | Unique code of template. Used in the upload-file. |
| TEMPLATE\_NAME | NVARCHAR(45) | No | Name of the template. Used in UI. |
| VERSION | INT | No | Version number of template. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performed the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | Date of the operation. *Audit field.* |

UNIDO\_ENTITY\_TEMPLATE\_PROPERTY

UNIDO\_ENTITY\_TEMPLATE\_PROPERTY is a table used to store the properties of the EETDB Database template. Each row in this table describes some characteristic of equipment or technology.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| TEMPLATE\_PROPERTY\_ID | INT | No | Unique identifier of property. *Primary key*. |
| ENTITY\_TEMPLATE\_ID | INT | No | Identifier of corresponding template. *Primary key*. |
| PROPERTY\_CODE | NVARCHAR(30) | No | Code of property. Code is unique within template properties. |
| PROPERTY\_NAME | NVARCHAR(100) | No | Name of the property. |
| VALUE\_TYPE\_ID | INT | No | Type of the characteristic value. ID from the table UNIDO\_VALUE\_TYPE. |
| UNIT\_OF\_MEASURE | NVARCHAR(30) | Yes | Unit of measure of characteristic, if applicable. |
| DISPLAY\_IN\_GRID | TINYINT(1) | No | Flag showing if UI should show this characteristic in the table. |
| SEARCHABLE | TINYINT(1) | No | Flag showing if UI can provide the search functionality by this characteristic. |
| MANDATORY | TINYINT(1) | No | Flag showing if the characteristic must have the value for all entity or could be left empty. |
| VERSION | INT | No | Version number of property. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performed the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | Date of the operation. *Audit field.* |

UNIDO\_ENTITY

UNIDO\_ENTITY is a main table used to store the list of equipments and technologies. Each row in this table realizes some template described in the table UNIDO\_ENTITY\_TEMPLATE.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ENTITY\_ID | INT | No | Unique identifier of entity. *Primary key*. |
| ENTITY\_TEMPLATE\_ID | INT | No | Identifier of template that the entity realizes. ID from the table UNIDO\_ENTITY\_TEMPLATE |
| ENTITY\_NAME | NVARCHAR(255) | No | Name of the entity. |
| STATUS | NVARCHAR(30) | No | State of entity. Can take the following values: ‘PENDING’ – loaded but not processed yet so not available in the catalog, ‘CERTIFIED’ – available in catalog and certified,  ‘NOT CERTIFIED’ – available in catalog but not certified |
| VERSION | INT | No | Version number of entity. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | Date of the operation. *Audit field.* |

UNIDO\_ENTITY\_REFERENCE

All the entity of EETDB Database can be related to several classification headings from heading tree. UNIDO\_ENTITY\_REFERENCE table is used to store the relationships between the entities and headings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ENTITY\_ID | INT | No | Entity ID |
| TOPIC\_ID | INT | No | Heading ID from UNIDO\_TOPIC |

UNIDO\_ENTITY\_LINK

All the entity of EETDB Database can be related to other entities. UNIDO\_ENTITY\_LINK table is used to store the relationships between the entities.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| PARENT\_ENTITY\_ID | INT | No | Parent entity ID from UNIDO\_ENTITY |
| LINKED\_ENTITY\_ID | INT | No | Child entity ID from UNIDO\_ENTITY |

UNIDO\_ENTITY\_PROPERTY

UNIDO\_ENTITY\_PROPERTY table is used to store the characteristics of equipments and technologies. Each row in this table set the value of some characteristic of the entity template described in the table UNIDO\_ENTITY\_TEMPLATE\_PROPERTY.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ENTITY\_PROPERTY\_ID | INT | No | Unique identifier of property value. *Primary key*. |
| ENTITY\_ID | INT | No | Link to corresponding entity. ID from UNIDO\_ENTITY table. |
| TEMPLATE\_PROPERTY\_ID | INT | No | Link to template property that the value is set for. ID from UNIDO\_ ENTITY\_TEMPLATE\_PROPERTY table. |
| VALUE | NVARCHAR(512) | No | The value of characteristic. All the values are represented as a string. |
| VERSION | INT | No | Version number of the characteristic value. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | NT Login of user performing the operation. *Audit field.* |

UNIDO\_VALUE\_TYPE

UNIDO\_VALUE\_TYPE table is used as a dictionary of the types of the entity characteristics values. Each row in this table describes the value type, its format and determines the way to proceed with the values of the type.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| VALUE\_TYPE\_ID | INT | No | Unique identifier of value type. *Primary key*. |
| FORMAT | NVARCHAR(45) | No | Format of the value type. If applicable. |
| TYPE | NVARCHAR(45) | No | Name of the value type. |
| VERSION | INT | No | Version number of the characteristic value. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | NT Login of user performing the operation. *Audit field.* |

There are several types predefined in the system:

|  |  |  |
| --- | --- | --- |
| **Type name** | **Format** | **Description** |
| STRING |  | simple string up to 512 characters. |
| TEXT |  | long text. Value can be flat text or HTML. Value is stored in UNIDO\_BLOB. |
| NUMBER | 2 | decimal number with 2 decimal digits. |
| INTEGER |  | integer number. |
| BOOLEAN |  | Boolean value that can be true or false. |
| URL | URL | link to some web-page, image or document. |
| REFERENCE | ENTITY\_ID | the reference to the lookup value. All the lookups are stored in the EETDB Database as the entities without properties. The value of this type should be ENTITY\_ID of selected lookup’s element. |
| FILE | BINARY | The file uploaded to the system and available to be downloaded in the UI. Value should contain the valid ID from UNIDO\_BLOB table. |
| IMG | BINARY | The image uploaded to the system and available to be shown in the UI. Value should contain the valid ID from UNIDO\_BLOB table. |

UNIDO\_BLOB

UNIDO\_BLOB table is used as the data storage for the uploaded texts, files and images. Each record of this table can be referenced from UNIDO\_ENTITY\_PROPERTY table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| BLOB\_ID | INT | No | Unique identifier of value type. *Primary key*. |
| DATA\_TYPE | NVARCHAR(100) | No | Type of the data that are stored in the record. (encoding for html, format for images) |
| FILE\_NAME | NVARCHAR(100) | Yes | Name of the uploaded file or image. |
| CONTENT | MEDIUMBLOB | No | Binary data. |
| VERSION | INT | No | Version number of the file. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | NT Login of user performing the operation. *Audit field.* |

UNIDO\_TOPIC\_SEARCH

All the entities of EETDB Database have some characteristics that can be used in full text search procedure to find the required equipment, article or classification heading. UNIDO\_TOPIC\_SEARCH table is used to store the searchable field of the classification headings. The records are managed automatically by the special triggers. The table is used in the procedure SEARCH\_TOPIC.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| TOPIC\_ID | INT | No | Identifier of classification heading. ID from UNIDO\_TOPIC. |
| TOPIC\_NAME | NVARCHAR(100) | No | Name of classification heading. NAME from UNIDO\_TOPIC. |
| DESCRIPTION | NVARCHAR(300) | Yes | Description of classification heading. DESCRIPTION from UNIDO\_TOPIC |

UNIDO\_ ENTITY\_SEARCH

All the entities of EETDB Database have some characteristics that can be used in full text search procedure to find the required equipment, article or classification heading. UNIDO\_ ENTITY\_SEARCH table is used to store the searchable field of the entities. The records are managed automatically by the special triggers. The table is used in the procedure SEARCH.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ENTITY\_ID | INT | No | Identifier of the entity. ID from UNIDO\_ENTITY. |
| ENTITY\_NAME | NVARCHAR(300) | No | Name of the entity. NAME from UNIDO\_ENTITY. |
| DESCRIPTION | NVARCHAR(512) | Yes | Description of the entity. VALUE from UNIDO\_ENTITY\_PROPERTY where the property name is ‘DESCRIPTION’. |
| VENDOR\_CODE | NVARCHAR(512) | Yes | Original equipment code (SKU) of the equipment in the vendor’s catalog. VALUE from UNIDO\_ENTITY\_ PROPERTY where the property name is ‘VENDOR\_CODE’. |

UNIDO\_ LOAD\_LOG

Every time when operator uploads some files with equipment data to the system a new logging record should be created in the Log table. UNIDO\_ LOAD\_LOG table is used to store the name of uploaded file, its size and the result of uploading.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| LOAD\_LOG\_ID | INT | No | Identifier of the uploading. |
| FILE\_NAME | NVARCHAR(100) | No | Name of the uploaded file. |
| FILE\_PATH | NVARCHAR(300) | Yes | Full path to the file on the local operator’s machine. |
| FILE\_SIZE | INT | Yes | File size in bytes |
| STATUS | NVARCHAR(30) | No | Successful or failed |
| VERSION | INT | No | Version number of the file. Auto incremented with update operation. *Audit field.* |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | NT Login of user performing the operation. *Audit field.* |

UNIDO\_LOAD\_ERROR

If there are some bad data in the uploaded file the corresponding error message should be shown to the operator. UNIDO\_LOAD\_ERROR table is used to store the errors occurred during uploading.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| LOAD\_LOG\_ID | INT | No | Identifier of the error. |
| LOAD\_LOG\_ID | INT | No | Identifier of the uploading. |
| ROW\_NUMBER | INT | No | Row number within spreadsheet. |
| ERROR\_MESSAGE | NVARCHAR(300) | No | Description of the problem occurred. |
| UPDATED\_BY | NVARCHAR(100) | No | NT Login of user performing the operation. *Audit field.* |
| UPDATE\_DATE | TIMESTAMP | No | NT Login of user performing the operation. *Audit field.* |

SEQUENCE

All the entities of EETDB Database have unique identifier. To provide uniqueness of this identifier there is a special table SEQUENCE in the EETDB Database. This table store the last used ID. The special function SEQ\_NEXTVAL increments this value and returns the next identifier each time that is being called.

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Column type** | **Can be empty** | **Description** |
| ID | INT | No | Identifier. |

EETDB Views

There is only one view in EETDB Database. It contains the list of highest level classification heading.

View V\_ROOT\_TOPIC

This view contains the records from UNIDO\_TOPIC that have no parent topics. The structure of the view completely replicates the structure of UNIDO\_TOPIC table.

**EETDB Database Triggers**

The triggers are only used in EETDB Database to populate the tables with the searchable data. There are two triggers.

UNIDO\_TOPIC triggers

These triggers populate the records in the table TOPIC\_SEARCH by inserting/updating/deleting according to the operation performed on the UNIDO\_TOPIC table.

|  |  |  |
| --- | --- | --- |
| **Trigger name** | **Action** | **Description** |
| ADD\_TOPIC\_SEARCH | INSERT | Inserts the record to the table TOPIC\_ SEARCH with the same values as inserted in the original table. |
| UPDATE\_TOPIC\_SEARCH | UPDATE | Update the record with the same ID in the table TOPIC\_SEARCH with the same values (NAME, DESCRIPTION) as updated in the original table. |
| DELETE\_TOPIC\_SEARCH | DELETE | Delete the record with the same ID from the table TOPIC\_SEARCH. |

UNIDO\_ENTITY triggers

These triggers populate the records in the table ENTITY\_SEARCH by inserting/updating/deleting according to the operation performed on the UNIDO\_ENTITY table.

|  |  |  |
| --- | --- | --- |
| **Trigger name** | **Action** | **Description** |
| ADD\_ENTITY\_SEARCH | INSERT | Inserts the record to the table ENTITY\_ SEARCH with the same values as inserted in the original table. |
| UPDATE\_ENTITY\_SEARCH | UPDATE | Update the record with the same ID in the table ENTITY\_SEARCH with the same values (NAME) as updated in the original table. |
| DELETE\_ENTITY\_SEARCH | DELETE | Delete the record with the same ID from the table ENTITY\_SEARCH. |

UNIDO\_ENTITY\_PROPERTY triggers

These triggers populate the records in the table ENTITY\_SEARCH by inserting/updating/deleting according to the operation performed on the UNIDO\_ENTITY\_PROPERTY table.

|  |  |  |
| --- | --- | --- |
| **Trigger name** | **Action** | **Description** |
| ADD\_ENTITY\_PROPERTY\_SEARCH | INSERT | Updates the record with the same ENTITY\_ID in the table ENTITY\_ SEARCH with the same value as inserted to the original table for properties ‘DESCRIPTION’ and ‘VENDOR\_CODE’. |
| UPDATE\_ENTITY\_PROPERTY\_SEARCH | UPDATE | Updates the record with the same ENTITY\_ID in the table ENTITY\_ SEARCH with the same value as inserted to the original table for properties ‘DESCRIPTION’ and ‘VENDOR\_CODE’. |
| DELETE\_ENTITY\_PROPERTY\_SEARCH | DELETE | Set the corresponding values to NULL for the record with the same ENTITY\_ID in the table ENTITY\_SEARCH for properties ‘DESCRIPTION’ and ‘VENDOR\_CODE’. |

Data Access API

EETDB Data Service provides CRUD methods by using direct access to the tables and data search methods based on the stored procedures SERACH and SEARCH\_TOPIC. The procedures use the standard MySql full text search engine.

Procedure SEARCH\_TOPIC

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Direction** | **Type** | **Description** |
| p\_text | IN | varchar(200) | The text entered by user that should be found in the text fields of the TOPIC\_SEARCH. |
|  | RETURN | recordset | The list of the records from UNIDO\_TOPIC + REL (factor of conformity to search criteria) |

Procedure SEARCH

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Direction** | **Type** | **Description** |
| p\_text | IN | varchar(200) | The text entered by user that should be found in the text fields of the TOPIC\_SEARCH. |
|  | RETURN | recordset | The list of the records from UNIDO\_ENTITY + REL (factor of conformity to search criteria) |

Function SEQ\_NEXTVAL

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Direction** | **Type** | **Description** |
|  | RETURN | INT | The next available identifier in the SEQUENSE. |

Configuration

Character set

EETDB Database uses UTF-8 character set.

Tablespaces

EETDB Database uses two standard tablespaces of MySql server: InnoDB and MYISAM. The main structure is realized in InnoDB with foreign keys relationships between tables. The tables used for full text search are placed in MYISAM tablespace.

Audit

EETDB Database have the common audit strategy realized by VERSION, UPDATED\_BY, UPDATE\_DATE columns added in the main tables. These fields provide the clear view on the changes performed on the records.

Deployment

EETDB Database should be created with UTF-8 character set.

The following SQL-scripts should be run on EENDB database for installation and initial setup.

|  |  |
| --- | --- |
| **SQL-script name** | **Description** |
| eetdb\_db\_create.sql | Creates the tables |
| eetdb\_triggers.sql | Creates the triggers |
| eetdb\_views.sql | Creates the view |
| eetdb\_seq\_nextval.sql | Creates the function SEQ\_NEXTVAL |
| format\_search\_string.sql | Create the internal string formatting function used in search procedures |
| eetdb\_search.sql | Creates the search procedures |
| internal\_functions.sql | Creates the internal functions and procedures used for initial setup |
| initial\_setup.sql | Creates the list of value types and classification headings tree |
| setup\_lookups.sql | Creates the list of lookups used for equipment characteristics |
| setup\_templates.sql | Creates the list of entity templates with properties |
| setup\_vendors.sql | Creates the list of equipment manufacturers |
|  |  |
|  |  |
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Open and Closed Issues for this Deliverable

1. **Define Auto Cash Rules:** Dell Prepaid Rule, Dell Standard RuleAdd open issues that you identify while writing or reviewing this document to the open issues section. As you resolve issues, move them to the closed issues section and keep the issue ID the same. Include an explanation of the resolution.  
     
   When this deliverable is complete, any open issues should be transferred to the project- or process-level Risk and Issue Log (PJM.CR.040) and managed using a project level Risk and Issue Form (PJM.CR.040). In addition, the open items should remain in the open issues section of this deliverable, but flagged in the resolution column as being transferred.

Open Issues

|  |  |  |  |  |  |  |
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Closed Issues

| ID | Raised by | Issue | Resolution | Owner | Target Date | Impact Date |
| --- | --- | --- | --- | --- | --- | --- |
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Appendix A

Format of the file to upload with the list of equipment details:

