Data Dictionary
Certification Testing Rules
1.6.0

June 29, 2017

Version 1.6.0

Data Dictionary Certification Testing Rules v1.6.0

Date of Last Update: June 29, 2017

1.0 Introduction

This document contains the RETS Data Dictionary Compliance requirements an applicant's Data Dictionary implementation would need to satisfy before receiving RESO Certification.

This document should be read by any organization who want:

- To create Data Dictionary compliant implementation.
- To have a detailed understanding of the certification process.

Processing a Data Dictionary Certification request is a four step internal process that begins with an application submitted through http://reso.org/certification. The steps and compliance tests are described throughout this document.

The Data Dictionary certification is a server certification. We are certifying that the server can deliver Data Dictionary structured information.

> **NOTE:** We are NOT certifying that Update functionality works without data loss due to mismatched data transfer types. See the DataType and Interpretation section for more information.

1.2 RESO Certification Flow (Summary)

1.3 Supplemental Application Information

1.4 Impact of Future Data Dictionary Changes to these Testing Rules

1.2 RESO Certification Flow (Summary)
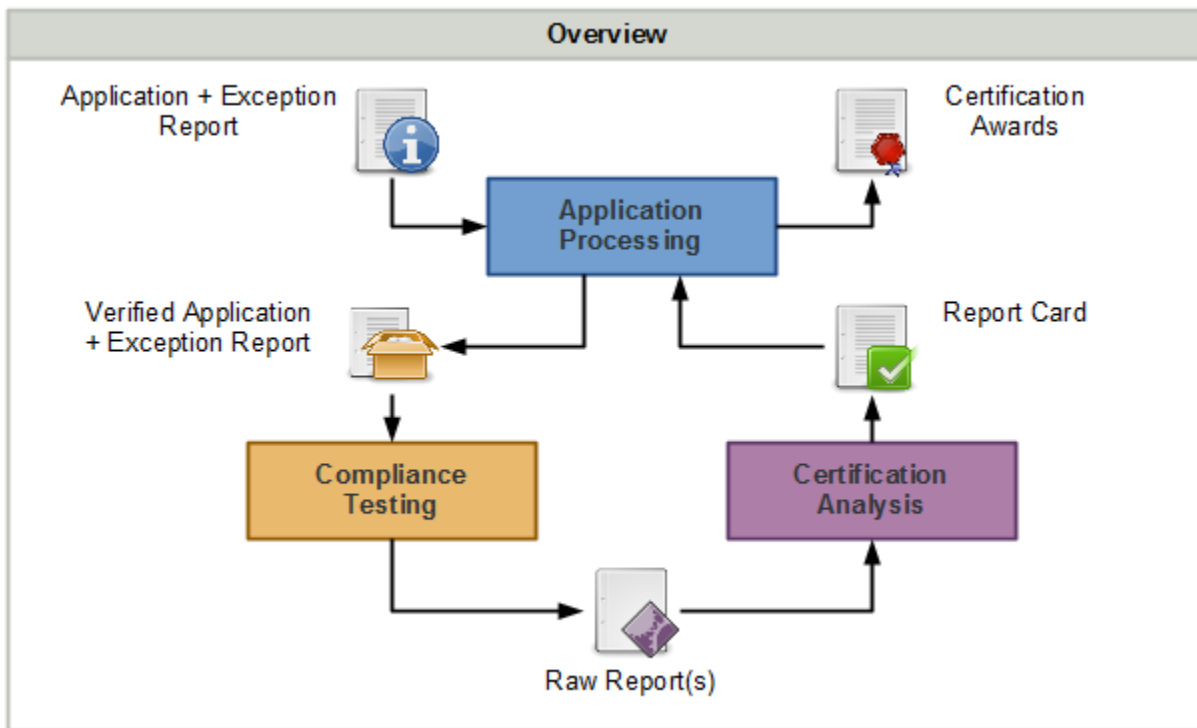
RESO Group	Action	Output
Application Processing (Pre-Certification)	Accept and Verify Applicant's **'Certification Application'** and **'Supplemental Application Information'** via reso.org/certification	Prepare for Compliance Testing. Pass application and **'Supplemental Application Information'** to Compliance Department.
Compliance Testing	Test applicant's metadata against well-defined Compliance Rules as set forth by the DD Compliance Workgroup.	Testing results formatted in **'Raw Report'** package. Pass **'Raw Report'** to Certification Department.

Certification Analysis	Analyze *'Raw Report'* to determine if applicant qualifies for a certificate. Create a *'Report Card'* with findings.	Pass analysis results and *'Report Card'* back to Application Processing.
Application Processing (Post-Certification)	Act on Certification Department recommendation	Notify applicant of Certificate Pass/Fail. Send notification and *'Report Card'* back to Applicant.

Application Processing (Pre-Certification)

1.3 Supplemental Application Information

The Supplemental Application Information (SAI) will assist RESO with the Data Dictionary evaluations. It will contain information that may not be easily transmitted through the on-line application form.

Supplemental application information MUST be delivered by the MLS (or source provider) with its application. This supplemental information may provide information required by the RESO Compliance department to perform the evaluation tests.

> **NOTE:** The exact format will be determined by the RESO Compliance Staff. Links to the SAI will be added when available.

It is recommended that the SAI is information be made available to the MLS data consumers (public) to help in data mapping efforts.

1.4 Impact of Future Data Dictionary Changes to these Testing Rules

Changes in future versions of the RESO Data Dictionary may impact the certification testing results of the rules in this document. The results of the impacted rules will be modified:

- To help ease the transition to a newer Data Dictionary version; and
- To allow decisions of the Data Dictionary workgroup to be impact certification more quickly.

Generally, the updated test result will go up or down in severity toward the newer standard. No changes to future versions of the Data Dictionary will invalidate current certifications.

If the documented test result is a(n)...	And a new rule or definition makes the same test a(n)...	Then the new result would be a(n)...
ERROR	WARNING	WARNING
ERROR	NOTICE or COMPLIANT	NOTICE
WARNING	ERROR	No Change[1]
WARNING	NOTICE or COMPLIANT	NOTICE
NOTICE	ERROR or WARNING	WARNING
NOTICE	COMPLIANT	No Change[2]
COMPLIANT	ERROR or WARNING	WARNING
COMPLIANT	NOTICE	No Change[2]

> **NOTE 1:** Changing a WARNING into an ERROR could retroactively disqualify those who have already been certified.

> **NOTE 2:** Since a NOTICE does not have to be fixed within a time-frame, this change has no practical impact on current certification. No change is made to simplify the potential list of changes.

2.0 Data Dictionary Compliance Rules

This section contains the rules that RESO will use in the Compliance testing. The specific set of rules that need must be passed for a "Certification" are discussed in .

2.1 Certified Transport Requirement

2.2 RETS 1.x Field-Level Compliance

2.3 RETS 1.x Field Compliance Notices and Compliance Warnings

2.4 RESO Web API 1.0.x Field-Level Compliance

2.5 RESO Web API 1.0.x Field Compliance Notices and Compliance Warnings

2.1 Certified Transport Requirement

REQ-DD160-TRANS-1: The Data Dictionary is independent of transport methods (i.e. RETS 1x, RETS Web API, etc.).

> **NOTE 1-1:** Each of the following sections contains transport specific rules when a Data Dictionary is implemented. While the Data Dictionary may be implemented within any transport, the compliance rules MAY vary based on transport.

2.2 RETS 1.x Field-Level Compliance

Data Dictionary compliance will be determined by comparing host's RETS 1.x Metadata fields with those defined by the Data Dictionary. Each of the host's mapped fields **MUST** follow all applicable rules in this and following sub-sections to be considered compliant.

REQ-DD160R1X-FLC-1: Tested field attributes **MUST** be found COMPLIANT for the entire field to be COMPLIANT.[1]

A field's compliance is determined by comparing multiple field attributes with the corresponding Data Dictionary attributes. Each tested attribute will receive one of the following results: ERROR, WARNING, NOTICE, or COMPLIANT (listed in descending order of severity). The field status will be the most severe label found within the attribute test results.[2]

> **NOTE 1-1:** Only the attribute tests required for the field type will be performed as not all attribute tests apply to every field.
>
> **NOTE 1-2:** A field may have 1 ERROR, 2 WARNING, and 2 COMPLIANT attributes.This field would be an ERROR. A different field may have 1 NOTICE and 4 COMPLIANT attributes. This field would be a NOTICE.

REQ-DD160R1X-FLC-2: All fields that could be mapped to the Data Dictionary **SHOULD** be mapped.[3]

> **NOTE 2-1:** All fields without a mapping will be reviewed. Any field discovered that has a match with the Data Dictionary **AND** has an **ERROR MAY** disqualify the applicant from receiving a certification.
>
> **NOTE 2-2:** All fields identified as a duplicate **MUST** have its data available in a compliant Data Dictionary field for the duplicate field to be marked **IGNORED**. Duplicate fields without an identified equivalent **MAY** be subjected to compliance testing and receive the appropriate testing result.

2.2.1 Metadata: StandardName

2.2.2 Metadata: Data Type and Interpretations

2.2.3 Metadata: Precision

2.2.4 Metadata: Suggested MaximumLength

2.2.5 Metadata: Enumerations

2.2.6 Metadata: Data Formatting

2.2.1 Metadata: StandardName

REQ-DD160R1X-SN-1: Any applicant metadata field identified as a Core Field **MUST** use a StandardName from the Data Dictionary. Any identifiable core field with an incorrect, missing, or misspelled StandardName will be an **ERROR**. Any identifiable non-core field will be a **WARNING**.

> **NOTE 1-1:** Data Dictionary StandardName values are case-sensitive. For example, "ListingID" does not match "ListingId". Difference in case will result in an **ERROR**.

> **NOTE 1-2:** Certification testers will attempt to identify fields that should be mapped. This may not be possible if the applicant's SystemName is undecipherable. A good-faith effort to provide complete and correct mappings is expected from all applicants.

> **NOTE 1-3:** All fields identified as a duplicate **MUST** have its data available in a compliant Data Dictionary field for the duplicate field to be marked **IGNORED**. Duplicate fields without an identified equivalent **MAY** be subjected to compliance testing and receive the appropriate testing result.

REQ-DD160R1X-SN-2: Applicant metadata fields without a Data Dictionary match **SHOULD** have an empty StandardName. Non-Data Dictionary applicant fields with a StandardName will be given a **NOTICE**.

> **NOTE 2-1:** While using these "extra" non-Data Dictionary StandardNames does not negatively affect certification, the practice is discouraged. These are given a **NOTICE** so that those using the metadata will be forewarned that these are not accepted Data Dictionary StandardNames.

REQ-DD160R1X-SN-3: Any applicant metadata field using StandardName that matches the Data Dictionary Repeating Field name pattern **MAY** have the definition field in the same resource class. The repeating portion of the StandardName **MAY** be found as an enumeration. Though recommended, It is **NOT REQUIRED** to have the have the field that defines the repeating field content in the system's metadata. These StandardNames will still be **COMPLIANT** even with the missing definitions.

> **Example 3-1:** "RoomLibraryArea" and "RoomBedroom1Area" both match the Room[type]Area pattern. The "RoomType" enumerated field **MAY** be present to define "Library" and "Bedroom 1" as enumerations for the repeating StandardName.

Special considerations will be made when comparing the applicant's field names and definitions with those found in the Data Dictionary.

- Fields with SIMILAR definitions and MATCHING StandardNames are **COMPLIANT**.
- Fields with SIMILAR definitions and DIFFERENT StandardNames are **NOT** compliant. In this situation, the StandardName MUST be changed to match the Data Dictionary to be compliant. Only the StandardName needs to be changed for compliance.
- Fields with DIFFERENT definitions and MATCHING StandardNames are allowed but **MUST** be listed in the Supplemental Application Information.

> **Example 3-2:** An applicant's "Subdivision" field has a different definition than the Data Dictionary.

- Fields with DIFFERENT definitions and DIFFERENT StandardNames are ignored.

REQ-DD160R1X-SN-4: A Data Dictionary Field **MUST** only be referenced (mapped) by one SystemName per Resource Class. Having multiple SystemNames using the same Data Dictionary StandardName causes a Multi-to-One mapping. This would be considered an **ERROR** for every SystemName that refers to the same Data Dictionary StandardName within the same class.

2.2.2 Metadata: Data Type and Interpretations

The Data Dictionary provides a "Simple Data Type" for each field. The corresponding field within the applicant's metadata **MUST** be a **logical** match. The exact **physical** representation may vary. The following examples highlight the difference between logic and physical matches.

> **NOTE D1:** Multiple tables in the following subsections are provided to give the reader an easier to read visual interpretation.

> **EXAMPLE 1:** Data Dictionary Boolean requires a **logical** true/false indication. (A third "no answer" or empty indication is allowed, but not required.) Booleans may be represented **physically** with 1/0, Y/N, Yes/No, T/F, True/False, or similar. A specific enumeration to represent a non-response, like "None" OR "N/A," is allowed in lookups. This non-response enumeration is the same as leaving a number or character boolean field empty.

> **EXAMPLE 2:** Data Dictionary "Number (Whole)" **MAY** be any DataType that represents a whole number: Int, Long, Small, or Tiny. It **MAY NOT** be a Decimal.

> **NOTE D2:** The RETS 1.8 Specification requires each field within the metadata to have attributes describing the data stored. Two of these attributes are "**DataType**" and "**Interpretation**". These two attributes will be used to determine if the metadata field is logically consistent with the Data Dictionary.

> **DataType** uses one of the following values: Boolean, Character, Date, DateTime, Time, Tiny, Small, Int, Long, and Decimal.

> **Interpretation** uses one of the following values: Number, Currency, Lookup, LookupMulti, and URI

> More information about Metadata **DataType** and **Interpretation** may be found in Table 11-15 of Section 11.3.2 in the RETS 1.8 Specification.

REQ-DD160R1X-DTI-1: The applicant Metadata DataType field **MUST** match **logically** to the Data Dictionary DataType. It is recommended that the field **physically** match one of the DataType values as defined in the previous table. Other DataTypes and Interpretations will be evaluated on an as needed basis.

REQ-DD160R1X-DTI-2: Logical allowances of data types **MUST NOT** contradict the requirements of the utilized RETS specification where the Data Dictionary is implemented. For conflicts, the utilized RETS 1.x specification must be followed.

> **EXAMPLE 2-1:** Date and DateTime fields must be formatted are required in the utilized RETS specification. It is not sufficient for a Character field to contain date or datetime data.

REQ-DD160R1X-DTI-3: Any DataType transformation that would result in data loss when data moves from a HOST to a CLIENT is NOT compliant.

> **EXAMPLE 3-1:** A Host has a multi-select enumeration and the Client is expecting a single-select.

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

2.2.2.2 RETS 1.x Compliance Errors for Metadata (Table)

2.2.2.3 RETS 1.x Compliance Notices and Warnings for Metadata (Table)

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

The Data Dictionary provides a "Simple Data Type" for each field defined. This value dictates what is an acceptable value within the applicant's metadata DataType and Interpretation fields.

> The RETS 1.8 Specification requires each field within the metadata to have attributes describing the data stored. Two of these attributes are "**DataType**" and "**Interpretation**". These two attributes will be used to determine if the metadata field is logically consistent with the Data Dictionary.
>
> **DataType** uses one of the following values: Boolean, Character, Date, DateTime, Time, Tiny, Small, Int, Long, and Decimal.
>
> **Interpretation** uses one of the following values: Number, Currency, Lookup, LookupMulti, and URI
>
> More information about Metadata **DataType** and **Interpretation** may be found in Table 11-15 of Section 11.3.2 in the RETS 1.8 Specification.

The Data Dictionary Simple DataType is transport independent. The following chart provides acceptable translations between the single Data Dictionary value and the two RETS 1.x values: DataType and Interpretation.

Following these recommendations will allow the field to be certified without qualification. Where needed, the "Preferred" DataType and Interpretation has been identified. "Acceptable" alternative are also provided.

Requirement ID	DD Simple DataType	Acceptable Metadata DataType(s)	Acceptable Metadata Interpretation(s)
REQ-DD160R1X-DTC-1	**Boolean**[1]	**Preferred:** Boolean **Acceptable:** Int, Long, Small, Tiny, Character	**Preferred:** Empty Interpretation or Number **Acceptable:** Lookup
REQ-DD160R1X-DTC-2	**Date**	Date	Empty Interpretation Expected
REQ-DD160R1X-DTC-3	**Number (Whole)**[2]	Int, Long, Small, Tiny	**Preferred:** Number **Acceptable:** Empty Interpretation
REQ-DD160R1X-DTC-4	**Number (Decimal)**	Decimal	**Preferred:** Number, Currency **Acceptable:** Empty Interpretation
REQ-DD160R1X-DTC-5	**String**[3]	Int, Long, Small, Tiny, Character, Decimal, Boolean	**Preferred:** Empty Interpretation **Acceptable:** Number, Currency, Lookup
REQ-DD160R1X-DTC-6	**StringList, Single**[4]	Int, Long, Small, Tiny, Character, Boolean[5]	Lookup
REQ-DD160R1X-DTC-7	**StringList, Multi**[4]	Int, Long, Small, Tiny, Character	LookupMulti
REQ-DD160R1X-DTC-8	**Timestamp**	DateTime	Empty Interpretation Expected

> **NOTE T-1:** It is preferred that applicant's Boolean fields have a "Boolean" DataType and an empty or "Number" Interpretation. Since Boolean fields may be represented by many different fields or lookups, the other DataTypes and Interpretations are listed. However, an empty Interpretation is not allowed unless the DataType is Boolean. A character data type with an empty interpretation would be a "String-to-Boolean" mapping. A number data type with an empty interpretation would be a "Number-to-Boolean" mapping. These mappings are an **ERROR** (REQ-DD140R1X-DTE1).
>
> **NOTE T-2:** Any RETS 1.x DataType that represents a whole number is allowed.

NOTE T-3: Any Number-to-String mapping is allowed (Whole and Decimal Numbers). Any Single-Select Lookup-to-String mapping is allowed.

NOTE T-4: Lookup and LookupMulti fields may be represented in many different ways. These are the most common DataTypes for lookups. Other DataTypes for lookups will be evaluated on a case-by-case basis.

NOTE T-5: Boolean-to-Lookup Single is allowed ONLY when the enumeration list is "Open" or "Open (to be locked)". This mapping for Locked enumerations is NOT allowed.

2.2.2.2 RETS 1.x Compliance Errors for Metadata (Table)

Compliance Error: An "error" is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements. These error disqualify the applicant from certification.

NOTE: Only those "Errors" from DataType mappings are included here. This is NOT an extensive list of errors. Only those that apply specifically to Data Type.

Compliance Errors

Requirement ID	DD Simple Data Type	Compliance Errors DataTyps(s)	Compliance Error Interpretation(s)
REQ-DD160R1X-DTE-1	Boolean	Int, Long, Small, Tiny, Character, Date, Timestamp, Decimal	None ("String-to-Boolean", "Number-to-Boolean", or "Date/Timestamp-to-Boolean" Mapping Errors) An Interpretation is required for Non-Boolean data types.
REQ-DD160R1X-DTE-2	Date[1]	Int, Long, Small, Tiny, Character, Timestamp	*None*
REQ-DD160R1X-DTE-3	Number[2]	(Any DataType used as a Lookup)	Lookup (Any Lookup-to-Number OR LookupMulti-to-Number Mapping)
REQ-DD160R1X-DTE-4	Number (Whole)	Character, Decimal, Date, Timestamp	None ("Character-to-Whole" Mapping Error) None ("Decimal-to-Whole" Mapping Error) See **REQ-DD160R1X-P-4** None ("Date-to-Whole" or "Timestamp-to-Whole" Mapping Error)
REQ-DD160R1X-DTE-5	StringList, Multi	Int, Long, Small, Tiny, Character	*None* (This is the "String-to-LookupMulti" or "Number-to-LookupMulti" Error). The Interpretation cannot be "None" or empty for "StringList, Multi"
REQ-DD160R1X-DTE-6	StringList, Multi[3]	Boolean	*None*
REQ-DD160R1X-DTE-7	StringList, Single[3]	Boolean	*None*
REQ-DD160R1X-DTE-8	StringList, Single	Int, Long, Small, Tiny, Character	*None* (This is the "String-to-Lookup" or "Number-to-Lookup" Error) The Interpretation cannot be "None" or empty for "StringList, Single"
REQ-DD160R1X-DTE-9	StringList, Single[4]	(Any DataType used as a Lookup)	LookupMulti (This is the "Multi-to-Single Lookup" Error)
REQ-DD160R1X-DTE-10	Timestamp[1]	Int, Long, Small, Tiny, Character, Date	*None*
REQ-DD160R1X-DTE-11	(Any Non-Number/String)[5]	Decimal	Any ("Decimal-to-Non-Number/String" Mapping Error) excluding "Decimal-to-String" mappings, which are compliant.

NOTE T-1: Any transformation of a Date and Timestamp into the other is an error. Some Data Dictionary fields have a Date and Timestamp variant: OnMarketDate v. OnMarketTimestamp or OffMarketDate v. OffMarketTimestamp. Please map to the correct version to avoid receiving a compliance error.

NOTE T-2: Any lookup to be translated into a number field will be an error. The exception is when every lookup value is a pure number, without any additional symbols. If this is the case, the mapping will be given a WARNING. To receive the warning

instead of the error, this field and its lookups must be clearly stated in the Supplemental Application Information. LookupMulti-to-Number CAN NOT receive a WARNING because multiple values concatenated together cannot be a number.

For example: A lookup representing the number of bedrooms could have the values "1", "2", "3", "4", and "5+". This would be an ERROR because of the "5+" lookup value. To receive a warning, the last value would need to be changed to "5" AND documented in the Supplemental Application Information.

NOTE T-3: Due to the potential ambiguity of how a Boolean is translated, all of these mappings are considered errors. This applies to "Locked" enumerations lists. Boolean-to-Lookup, Single is allowed when the enumeration list is "Open" or "Open (to be locked)"

NOTE T-4: For Data Dictionary "StringList, Single" fields, the applicant Metadata Interpretation field **SHOULD** be "Lookup". If the applicant Metadata has a "LookupMulti" Interpretation, that creates a "Multi-to-Single" data mapping, this field will NOT be considered compliant.

NOTE T-5: Per "REQ-DD160R1X-DTC-5" the Decimal-to-String mapping is compliant.

2.2.2.3 RETS 1.x Compliance Notices and Warnings for Metadata (Table)

Compliance Notice: A "notice" is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements but does **NOT** disqualify the applicant from certification.

Compliance Warnings: A "warning" is the same as a compliance notice with the additional requirement that it is fixed within a specific time frame. Future certification MAY be denied if a "warning" is not fixed in the required time.

Compliance Notices

The direction the data "flows" is important when translating data fields between different DataTypes. The direction of all of the mappings are from the applicant's metadata (Host's implementation) into the Data Dictionary (Client's expectations). There are some DataType mappings where reversing the direction would result in a loss of data. The DataType transformations that only work going into the Data Dictionary will be marked with a "Compliance Notice."

Also, a "Compliance Notice" MAY be issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to this or other requirements, but does NOT disqualify the applicant from certification.

Any DataType transformation that could result in a loss of data from the applicant's metadata into the Data Dictionary will not be "Compliant."[N-1]

Requirement ID	DD Simple Data Type	Compliance Notice DataTyps(s)	Compliance Notice Interpretation(s)
REQ-DD160R1X-DTN-1	**String**	Int, Long, Small, Tiny, Decimal[2]	LookupMulti (LookupMulti-to-String Mapping)[3] See also **REQ-DD160R1X-DTC-5**

NOTE N-1: Only those "Notices" from DataType mappings are included here. This is NOT an extensive list of compliance notices. Only those that apply specifically to Data Type.

NOTE N-2: A string field can hold any alpha or numeric character. Placing numeric information into a string field is not going to lose data. An example is the Data Dictionary "ListingID" string field. A host's implementation **MAY** use a number field.

NOTE N-3: A multi-select lookup value MAY map into a Data Dictionary String field. An example is the Data Dictionary "OriginatingSystemName" string field. A host may store this as a lookup of predetermined system names. CAUTION: There **MAY** be too much data when the multi-select lookup values are concatenated to fit within the defined string length. **REQ-DD160R1X-DTC-5** specifies that the Single-Select Lookup-to-String mapping is "Compliant."

Compliance Warnings

A "Compliance Warning" is the same as a compliance notice with an additional deadline requirement. The source of the "warning" must be fixed within a specific timeframe. Future certification MAY be denied if a "warning" is not fixed in the required time.

Any DataType transformation that could result in a loss of data from the applicant's metadata into the Data Dictionary will not be "Compliant."[W-1]

Requirement ID	DD Simple Data Type	Compliance Warning DataTyps(s)	Compliance Warning Interpretation(s)	Comments / Rule References
REQ-DD160R1X-DTW-1	**StringList, Multi**	*None*	**Warning[2]:** Lookup (Any Single-to-Multi Mapping)	**Rule:** REQ-DD160R1X-DTI-4

NOTE W-1: Only those "Warnings" from DataType mappings are included here. This is NOT an extensive list of compliance notices. Only those that apply specifically to Data Type.

NOTE W-2: A multi-select lookup field may hold the information from a single-select lookup field without losing data.

*REQ-DD160R1X-DTI-4: For Data Dictionary "StringList, Multi" fields, the applicant Metadata Interpretation field **SHOULD** be "LookupMulti". If the applicant Metadata has a "Lookup" Interpretation and creates a "Single-to-Multi" data mapping, this field will be marked with a "Compliance Warning."*

2.2.3 Metadata: Precision

REQ-DD160R1X-P-1: The applicant Metadata Precision field **SHOULD** be equal to or less than the decimal value in the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These precision lengths will be marked with as **COMPLIANT**.

REQ-DD160R1X-P-2: The applicant Metadata Precision field **MAY** be zero or not present when the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These "Whole Number-to-Decimal" mappings will be marked with as **COMPLIANT**.

> *NOTE 2-1: Where ListPrice equals 14.2, the precision **SHOULD** be 2 or smaller (including "0" or null) to be compliant. Also, where Latitude and Longitude both equal 12.8, the precision **SHOULD** be 8 or smaller to be compliant.*

REQ-DD160R1X-P-3: The applicant Metadata Precision field **SHOULD NOT** be greater than than the decimal value in the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These field lengths will be marked with as **NOTICE**.

> *NOTE 3-1: Where ListPrice equals 14.2, the precision **MAY** be 3 or greater to receive a notice.*

REQ-DD160R1X-P-4: A "Decimal-to-Whole Number" mapping is created when the Host data provides any precision value when the Data Dictionary does not have a value. This mapping may result in data loss and the Host field will be an **ERROR**.

2.2.4 Metadata: Suggested MaximumLength

REQ-DD160R1X-ML-1: The applicant Metadata MaximumLength field **SHOULD** be equal to or less than the "Sug. Max Length" found in the Data Dictionary. These field lengths will be marked with as **COMPLIANT**.

REQ-DD160R1X-ML-2: The applicant Metadata MaximumLength field **SHOULD NOT** be greater than than the "Sug. Max Length" found in the Data Dictionary. These field lengths will be marked as a **NOTICE**.

REQ-DD160R1X-ML-3: When the Data Dictionary provides a Suggested Maximum Length, it is expected that the applicant Metadata MaximumLength provides any value. Failure to provide a length (a null value or empty attribute), that field length will be marked as a **WARNING**.

> *NOTE 3-1: Until further clarified in separate Non-RETS or Non-Web API Testing Rules, any transport's failure to provide any length for a field where the Data Dictionary provides a length will also be marked as a **WARNING**.*

REQ-DD160R1X-ML-4: The applicant Metadata MaximumLength field **MAY** be two more in value than the "Sug. Max Length" found in the Data Dictionary. These field lengths will be marked with as **COMPLIANT**. This is to allow for extra decimal places or sign characters required to represent positive/negative numbers.

> *NOTE 4-1: The larger value described above is allowed for numeric data types. Non-numeric data types will use the exact Data Dictionary values for the testing rules.*

2.2.5 Metadata: Enumerations

REQ-DD160R1X-ENUM-1: The applicant Metadata LongValue **MUST** match the Data Dictionary Enumeration value exactly as defined. Synonyms or spelling variations are not allowed. These synonyms will be marked as an **ERROR**.

> **Example 1-1:** PropertySubType's "Condominium" **MUST** be fully spelled out. "Condo" is not accepted.

> > **NOTE 1-1:** This spelling requirement only applies to data transport (e.g. Metadata). How the enumeration value is displayed to users is determined by the system administrators.

> > **NOTE 1-2:** Exceptions to this rule **MAY** be granted based on the allowance of "Archived Enumerations" (see rules below.) Exceptions to this rule **MAY NOT** be granted when doing so would contradict other rules, such as duplicate enumerations within the same field, misspellings, or abbreviations.

REQ-DD160R1X-ENUM-2: The applicant Metadata enumeration value **MUST** be found in the same enumeration list as defined in the Data Dictionary. Enumeration values found in the wrong field will receive a **WARNING**. Enumeration fields containing misplaced values will receive a **WARNING**.

> > **NOTE 2-1:** The applicant **MUST** make note of the incorrect location in the Supplemental Application Information provided with the application including a time frame on when this will be corrected.

> > **NOTE 2-2:** It is acceptable for an enumeration to appear in multiple places if that is desired by the applicant. However, the duplicate would receive a **WARNING** (See Example 2). Duplicate enumerations identified as "archived" will be marked as **IGNORE** and will not impact certification results.

> > **NOTE 2-3:** Some enumerations in different locations may appear to be duplicates but are actually unique based on context provided by location. These enumerations as **COMPLIANT** (See Example 3). Some RETS 1.x implementations may have enumerated lists that are unique to a resource class. Duplicates in these situations are **COMPLIANT** (See Example 4).

Example 2-1: RoomType's "Library" **MUST** be found in RoomType. Having "Library" in any other field (and using the same definitions), where it is not defined in the dictionary, will make that field non-compliant (**WARNING**).

Example 2-2: The Enumeration Value "Cabin" **SHOULD** be found in PropertySubType, as specified by the Data Dictionary. It **MAY** also appear in ArchitecturalStyle, if required by the data vendor. The duplicate **MAY** remain if it has a different definition than other enumerations found in the Data Dictionary. Other common examples of unique enumerations based on location context include: "Yes", "No", "Other", "None", and "See Remarks".

Example 2-3: Depending on the resource class chosen, the PropertySubType field **MAY** use a different enumerated list: PropertySubTypeRESI and PropertySubTypeRENT. The Enumeration Value "Single Family Residence" **MAY** appears in both enumerated lists. This is **COMPLIANT** since there is still only one selection for "Single Family Residence" within in a single class.

REQ-DD160R1X-ENUM-3: The applicant enumeration values **MAY** be defined within the metadata OR by an external validation method.

NOTE 3-1: Enumerated fields with values validated outside the metadata **MUST** be noted when applying for certification. Compliance Testers will need the enumerated values found within the field to check for compliance.

Example 3-1: A data vendor that cover a large geographical area may have too many "City" or "MLSAreaMajor" values to enumerate within their metadata. They **MAY** choose to use an external means for validation, such as a database or user interface to enforce proper selection.

REQ-DD160R1X-ENUM-4: A Data Dictionary Field with a LOCKED Enumeration **MUST NOT** have any additional enumerations. This field **MAY** have fewer as determined by the applicant.

REQ-DD160R1X-ENUM-5: A Data Dictionary Field with an OPEN or OPEN (TO BE LOCKED) Enumeration **MAY** have additional **OR** fewer enumerations as determined by the applicant.

NOTE 5-1: Previously compliant enumerated fields with "OPEN (TO BE LOCKED)" can fall out of compliance in future versions of the Data Dictionary if that field becomes LOCKED.

NOTE 5-2: Enumerations not defined in the Data Dictionary are not under the jurisdiction of compliance testing and will be ignored unless it conflicts with other compliance rules.

REQ-DD160R1X-ENUM-6: A Lookup Field **MUST NOT** have additional enumerations that are synonyms of enumerations already found within the field. This applies to Data Dictionary fields with **Locked** Enumeration Lists. These synonyms will be marked as an **ERROR**.

REQ-DD160R1X-ENUM-7: A Lookup Field **SHOULD NOT** have additional enumerations that are synonyms of enumerations already found within the field. This applies to Data Dictionary fields with **OPEN or OPEN (To Be Locked)** Enumeration Lists. These duplicates will be marked as a **WARNING**.

REQ-DD160R1X-ENUM-8: A Lookup Field **MUST NOT** have additional enumerations that are synonyms of enumerations already found within the field. These additional enumerations will be marked as an **ERROR**. Some Data Dictionary fields have **no enumeration list** defined. Synonym tests on Enumerations only apply on those fields with enumerations defined in the Data Dictionary. Additional enumerations, where there is NOT a Data Dictionary list, will be marked as an **WARNING**.

Example 8-1: The enumerations "Condominium" and "Condo" cannot appear in the same field.

REQ-DD160R1X-ENUM-9: A Lookup Field **SHOULD NOT** have additional enumerations that are duplicates of enumerations already found within the field. These duplicates, within the same field, will be marked as an **ERROR**. The "Archived Enumeration" exemption **WILL NOT** be allowed to excuse these duplicates. Some Data Dictionary fields have **no enumeration list** defined. Duplication tests on Enumerations only apply on those fields with enumerations defined in the Data Dictionary.

NOTE 9-1: RETS 1.x enumerations consists of LongValue, ShortValue, and Value portions. Testing of enumerations normally focuses on only the LongValue. Testing for duplicates will include ALL "*Value" portions of the enumeration. To be considered a "Duplicate Error," all values **MUST** be identical. (Table 1, Rows 1-3: provides samples from RETS 1.x Metadata with simplified XML for documentation length considerations.)

NOTE 9-2: The "Duplicate Error" for LOCKED Enumerations will be based on the LongValue only. It does not matter if the ShortValue or Value are different in LOCKED Enumerations, only one instance of the LongValue is allowed. Any duplicate enumeration within the LOCKED Enumerations will be marked as an **ERROR**. (Table 1, Row 4 provides sample from RETS 1.x Metadata with simplified XML for documentation length considerations.)

Table 1	Excerpt 1	Excerpt 2
Duplicate Enumerations (All Values Match) ERROR	```<LookupType> <MetadataEntryID>INDUSTR</MetadataEntryID> <LongValue>Industrial</LongValue> <ShortValue>INDUSTR</ShortValue> <Value>INDUSTR</Value></LookupType>```	```<LookupType> <MetadataEntryID>INDUSTR</MetadataEntryID <LongValue>Industrial</LongValue> <ShortValue>INDUSTR</ShortValue> <Value>INDUSTR</Value></LookupType>```

Similar Enumerations (Matching LongValue, Other Values Unique) COMPLIANT	``` <LookupType> <MetadataEntryID>446</MetadataEntryID> <LongValue>Arlington</LongValue> <ShortValue>Arlin</ShortValue> <Value>446</Value> </LookupType> ```	``` <LookupType> <MetadataEntryID>837</MetadataEntryID> <LongValue>Arlington</LongValue> <ShortValue>ArlWA</ShortValue> <Value>837</Value> </LookupType> ```
Unique Enumerations (All Values Unique) COMPLIANT	``` <LookupType> <MetadataEntryID>937</MetadataEntryID> <LongValue>Kitchen</LongValue> <ShortValue>Kitchen</ShortValue> <Value>937</Value> </LookupType> ```	``` <LookupType> <MetadataEntryID>285</MetadataEntryID> <LongValue>Master Bedroom</LongValue> <ShortValue>Master Bedroom</ShortValue> <Value>285</Value> </LookupType> ```
Duplicate Enumerations for LOCKED Enumerations (Only LongValue Match) ERROR	``` <LookupType> <MetadataEntryID>86425</MetadataEntryID> <LongValue>Active</LongValue> <ShortValue>Active Pending</ShortValue> <Value>86425</Value> </LookupType> ```	``` <LookupType> <MetadataEntryID>12496</MetadataEntryID> <LongValue>Active</LongValue> <ShortValue>Active Available</ShortValue> <Value>12496</Value> </LookupType> ```

REQ-DD160R1X-ENUM-10: A "Combined Enumeration" is a single applicant enumeration with a definition that combines more than one Data Dictionary enumerations. A "Combined Enumeration" will be marked as a **WARNING**.

> **Example 10-1:** The Data Dictionary PropertySubType has the enumerations of "Duplex", "Triplex", and "Quadruplex". An applicant's "Plex" or "Duplex/Triplex/Quadruplex" are examples of the combined enumeration.

> **Example 10-2:** Combined Enumerations that are documented as an "Archived Enumeration" would be marked **IGNORE** for certification purposes.

REQ-DD160R1X-ENUM-11: A "Specified Enumeration" is a single applicant enumeration with a definition that is more specified that any one Data Dictionary enumeration. A "Specified Enumeration" is **IGNORED** for certification purposes.

> **Example 11-1:** The Data Dictionary PropertySubType has an enumeration of "Duplex". An applicant's "Duplex Other", "Duplex Side-by-Side", and "Duplex Up-and-Down" enumerations each would be ignored.

REQ-DD160R1X-ENUM-12: An applicant **MAY** define an enumeration as an "Archived Enumeration" in the Supplemental Application Information. The "Archived Enumerations" are marked **IGNORE** in certification testing results.

> **NOTE 12-1:** An "Archived Enumeration" is any duplicate enumeration kept within the metadata to preserve information collected in old records or to provide backward or forward compatibility.

> **NOTE 12-2:** Replacement enumeration(s) **MUST** be defined in the Supplemental Application Information.

> **NOTE 12-3:** The replacement enumeration(s) created by moving, combining, or splitting **MUST** be a compliant Data Dictionary enumeration.

REQ-DD160R1X-ENUM-13: The enumeration value "Retail" will be excluded from the **REQ-DD160R1X-ENUM-1** and **REQ-DD160R1X-ENUM-2** testing rules when this value is found in the following Data Dictionary fields: PropertyType, PropertySubType, and BusinessType. Using "Retail" in any of these three fields will be **COMPLIANT**.

Best Practices:

The transitional benefits of "Archived Fields" carries with it the concern of non-standard enumeration values only appearing in an Archive field. Extensibility is the cornerstone of the Dictionary's flexibility to support any region's unique characteristics. If the extended non-standard enumerated values of an Archived Field did not also appear in the related standard field(s), this would require a client application to sift through both the standard and archived fields for a complete set of enumerated values. **It is highly recommended that all enumerations from an archived field also be included in its related standard field(s).**

2.2.6 Metadata: Data Formatting

REQ-DD160R1X-DF-1: Compliance testing will **NOT** take field formatting into account (i.e. Parcel number, Phone numbers).

> **Example 1-1:** Different Phone number formats: 555-555-1234, (555) 555-1234, 555.555.1234, etc. All of these are accepted as long as the other field attributes are compliant: DataType, MaximumLength, etc.

2.3 RETS 1.x Field Compliance Notices and Compliance Warnings

There are multiple situations where a compliance notice or warning is assigned to a RETS 1.x field. These notices or warnings may fit in one of many cases described in the tables below.

Each compliance warning is assigned a "probation time" in which it is expected that the warning is corrected. **Failure to correct a compliance warning during the probation time may result in a loss of certification.** Compliance notices are NOT assigned a "probation time."

Compliance Notices

Type	Compliance Notice Descriptions	Comments / Rule References
Data Types	Where a host provides a data type that does not exactly match what a client is expecting but there wouldn't be a loss of data in the conversion. **Example:** Host Number --> Client String;	**Section 2.2.2.2:** These may remain as long as required by the applicant. These CWs will not impact Data Dictionary certification levels.
Suggested Maximum Length	Where a host has a longer maximum length that a client is expecting. There is a potential for data truncation but not guaranteed if the data in the listing does not use the full length allowed.	**Rule:** REQ-DD160R1X-ML-1
Precision	Where a host provides a precision on a decimal number longer than the client is expecting.	**Rule:** REQ-DD160R1X-P-1

Compliance Warnings

Type	Compliance Warning Descriptions	CW Probation Time	Comments / Rule References
Lookup Multi	Where a host provides a single-select lookup but the client is expecting a multi-select.	1 Year	**Rule:** REQ-DD160R1X-DTI-4
Enumerations	A duplicate enumeration is found in a field not specified by the Data Dictionary.	1 Year	**Rule:** REQ-DD160R1X-ENUM-2

> **NOTE W-1:** As new situations arise, they will be handled on a case-by-case basis, added to this table, and subject to review.

2.4 RESO Web API 1.0.x Field-Level Compliance

Data Dictionary compliance will be determined by comparing host's RESO Web API 1.0.x data structure fields with those defined by the Data Dictionary. Each of the host's mapped fields **MUST** follow all applicable rules in this and following sub-sections to be considered compliant.

REQ-DD160WA1X-FLC-1: Tested field attributes **MUST** be found COMPLIANT for the entire field to be COMPLIANT.[1-1]

A field's compliance is determined by comparing multiple field attributes with the corresponding Data Dictionary attributes. Each tested attribute will receive one of the following results: ERROR, WARNING, NOTICE, or COMPLIANT (listed in descending order of severity). The field status will be the most severe label found within the attribute test results.[1-2]

> **NOTE 1-1:** Only the attribute tests required for the field type will be performed as not all attribute tests apply to every field.

> **NOTE 1-2:** A field may have 1 ERROR, 2 WARNING, and 2 COMPLIANT attributes.This field would be an ERROR. A different field may have 1 NOTICE and 4 COMPLIANT attributes. This field would be a NOTICE.

REQ-DD160WA1X-FLC-2: All fields that could be mapped to the Data Dictionary **SHOULD** be mapped.[2-1]

> **NOTE 2-1:** All fields without a mapping will be reviewed. Any field discovered that has a match with the Data Dictionary **AND** has an **ERROR MAY** disqualify the applicant from receiving a certification.

> **NOTE 2-2:** All fields identified as a duplicate **MUST** have its data available in a compliant Data Dictionary field for the duplicate field to be marked **IGNORED**. Duplicate fields without an identified equivalent **MAY** be subjected to compliance testing and receive the appropriate testing result.

2.4.1 EDMX: StandardName

2.4.2 EDMX: Data Type

2.4.1 EDMX: StandardName

REQ-DD160WA1X-SN-1: Any applicant metadata field identified as a Core Field **MUST** use a StandardName from the Data Dictionary. Any identifiable core field with an incorrect, missing, or misspelled StandardName will be an **ERROR**. Any identifiable non-core field will be a **WARNIN G**.

> **NOTE 1-1:** Data Dictionary StandardName values are case-sensitive. For example, "ListingID" does not match "ListingId". Difference in case will result in an ERROR.
>
> **NOTE 1-2:** Certification testers will attempt to identify fields that should be mapped. This may not be possible if the applicant's SystemName is undecipherable. A good-faith effort to provide complete and correct mappings is expected from all applicants.
>
> **NOTE 1-3:** All fields identified as a duplicate **MUST** have its data available in a compliant Data Dictionary field for the duplicate field to be marked **IGNORED**. Duplicate fields without an identified equivalent **MAY** be subjected to compliance testing and receive the appropriate testing result.

REQ-DD160WA1X-SN-2: Applicant metadata fields without a Data Dictionary match SHOULD have an empty StandardName. Non-Data Dictionary applicant fields with a StandardName will be given a **NOTICE**.

> **NOTE 2-1:** While using these "extra" non-Data Dictionary StandardNames does not negatively affect certification, the practice is discouraged. These are given a **NOTICE** so that those using the metadata will be forewarned that these are not accepted Data Dictionary StandardNames.

REQ-DD160WA1X-SN-3: Any applicant metadata field using StandardName that matches the Data Dictionary Repeating Field name pattern **MA Y** have the definition field in the same resource class. The repeating portion of the StandardName **MAY** be found as an enumeration. Though recommended, It is **NOT REQUIRED** to have the have the field that defines the repeating field content in the system's metadata. These StandardNames will still be **COMPLIANT** even with the missing definitions.

> **Example 3-1:** "RoomLibraryArea" and "RoomBedroom1Area" both match the Room[type]Area pattern. The "RoomType" enumerated field **MAY** be present to define "Library" and "Bedroom 1" as enumerations for the repeating StandardName.

Special considerations will be made when comparing the applicant's field names and definitions with those found in the Data Dictionary.

- Fields with SIMILAR definitions and MATCHING StandardNames are **COMPLIANT**.
- Fields with SIMILAR definitions and DIFFERENT StandardNames are **NOT** compliant. In this situation, the StandardName MUST be changed to match the Data Dictionary to be compliant. Only the StandardName needs to be changed for compliance.
- Fields with DIFFERENT definitions and MATCHING StandardNames are allowed but **MUST** be listed in the Supplemental Application Information.

> **Example 3-2:** An applicant's "Subdivision" field has a different definition than the Data Dictionary.

- Fields with DIFFERENT definitions and DIFFERENT StandardNames are ignored.

REQ-DD160WA1X-SN-4: A Data Dictionary Field MUST only be referenced (mapped) by one SystemName per Resource Class. Having multiple SystemNames using the same Data Dictionary StandardName causes a Multi-to-One mapping. This would be considered an ERROR for every SystemName that refers to the same Data Dictionary StandardName within the same class.

2.4.2 EDMX: Data Type

The Data Dictionary provides a "Simple Data Type" for each field. The corresponding field within the applicant's EDMX **MUST** be a **logical** match. The exact **physical** representation may vary. The following examples highlight the difference between logic and physical matches.

> **NOTE D1:** Multiple tables in the following subsections are provided to give the reader an easier to read visual interpretation.
>
> **EXAMPLE 1:** Data Dictionary Boolean requires a **logical** true/false indication. (A third "no answer" or empty indication is allowed, but not required.) Booleans may be represented **physically** with 1/0, Y/N, Yes/No, T/F, True/False, or similar. A specific enumeration to represent a non-response, like "None" OR "N/A," is allowed in lookups. This non-response enumeration is the same as leaving a number or character boolean field empty.
>
> **EXAMPLE 2:** Data Dictionary "Number (Whole)" **MAY** be any DataType that represents a whole number: Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, or Edm.Int64. It **MAY NOT** be a Edm.Decimal.
>
> **NOTE D2:** The Web API 1.0.2 Specification requires each field within the EDMX to have attributes describing the data stored.

One of these attributes is "**DataType**". This attribute will be used to determine if the EDMX field is logically consistent with the Data Dictionary.

DataType uses one of the following values: Edm.Boolean, Edm.Byte, Edm.Date, Edm.DateTimeOffset, Edm.Decimal, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.SByte, Edm.String, Edm.TimeOfDay, or Edm.EnumType. Other values may exist but do not relate with the Data Dictionary Testing Rules.

More information about **Edm DataType** may be found in the table found in Section 2.4.3 Data Type in the Web API 1.0.2 Specification.

REQ-DD160WA1X-DTI-1: The applicant EDMX DataType field **MUST** match **logically** to the Data Dictionary DataType. It is recommended that the field **physically** match one of the DataType values as defined in the previous table. Other DataTypes and Interpretations will be evaluated on an as needed basis.

REQ-DD160WA1X-DTI-2: Logical allowances of data types **MUST NOT** contradict the requirements of the utilized RESO Web API specification where the Data Dictionary is implemented. For conflicts, the utilized RESO Web API 1.x.x specification must be followed.

EXAMPLE 2-1: Edm.Date and Edm.TimeOfDay fields must be formatted are required in the utilized RESO Web API 1.x.x specification. It is not sufficient for a Character field to contain date or time data.

REQ-DD160WA1X-DTI-3: Any DataType transformation that would result in data loss when data moves from a HOST to a CLIENT is NOT compliant.

EXAMPLE 3-1: A Host has a multi-select enumeration and the Client is expecting a single-select.

2.4.2.1 RESO Web API 1.x.x EDMX DataType Values (Table)

2.4.2.2 RESO Web API 1.x.x Compliance Errors for EDMX (Table)

2.4.2.3 RESO Web API 1.x.x Compliance Notices and Warnings for Metadata (Table)

2.4.2.1 RESO Web API 1.x.x EDMX DataType Values (Table)

The Data Dictionary provides a "Simple Data Type" for each field defined. This value dictates what is an acceptable value within the applicant's EDMX field's DataType attribute.

The Web API 1.0.2 Specification requires each field within the EDMX to have attributes describing the data stored. One of these attributes is "**DataType**". This attribute will be used to determine if the EDMX field is logically consistent with the Data Dictionary.

DataType uses one of the following values: Edm.Boolean, Edm.Byte, Edm.Date, Edm.DateTimeOffset, Edm.Decimal, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.SByte, Edm.String, Edm.TimeOfDay, or Edm.EnumType. Other values may exist but do not relate with the Data Dictionary Testing Rules.

More information about **Edm DataType** may be found in the table found in Section 2.4.3 Data Type in the Web API 1.0.2 Specification.

The Data Dictionary Simple DataType is transport independent. The following chart provides acceptable translations between the single Data Dictionary value and the RESO Web API 1.x.x DataType value.

Following these recommendations will allow the field to be certified without qualification. Where needed, the "Preferred" DataType and Interpretation has been identified. "Acceptable" alternative are also provided.

Requirement ID	DD Simple DataType	Acceptable EDMX DataType(s)	Compliant UnderlyingType
REQ-DD160WA1X-DTC-1	**Boolean**	**Preferred:** Edm.Boolean	**Acceptable (Single-Valued Lookup):** Edm.EnumType and UnderlyingType="Edm.Int32"[1]
REQ-DD160WA1X-DTC-2	**Date**	Edm.Date	*None*
REQ-DD160WA1X-DTC-3	**Number (Whole)**[2]	Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64	*None*
REQ-DD160WA1X-DTC-4	**Number (Decimal)**	Edm.Decimal	*None*
REQ-DD160WA1X-DTC-5	**String**	**Preferred:** Edm.String **Acceptable:** Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.Decimal, Edm.Boolean[3]	**Acceptable (Single-Valued Lookup):** Edm.EnumType and UnderlytingType="Edm.Int32"[4]
REQ-DD160WA1X-DTC-6	**StringList, Single**	Edm.EnumType without the IsFlags attribute	"Edm.Int32" only
REQ-DD160WA1X-DTC-7	**StringList, Multi**	Edm.EnumType and IsFlags="true"	"Edm.Int32" or "Edm.Int64"

| REQ-DD160WA1X-DTC-8 | Timestamp | Edm.TimeOfDay, Edm.DateTimeOffset | *None* |

NOTE T-1: It is preferred that applicant's Boolean fields have an "Edm.Boolean" DataType. Since Boolean fields may be represented by a lookup with the Edm.EnumType, an UnderlyingType of "Edm.Int32", and only two True/False like values (a third NULL-type value is permitted). See **REQ-DD160WA1X-DTE-1** for more information.

NOTE T-2: Any RESO Web API 1.x.x DataType that represents a whole number is allowed.

NOTE T-3: Any Number-to-String mapping is allowed (Whole and Decimal Numbers).

NOTE T-4: Any Single-Valued Lookup-to-String mapping is allowed.

2.4.2.2 RESO Web API 1.x.x Compliance Errors for EDMX (Table)

Compliance Error: An "error" is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements. These error disqualify the applicant from certification.

NOTE: Only those "Errors" from DataType mappings are included here. This is NOT an extensive list of errors. Only those that apply specifically to Data Type.

Compliance Errors

Requirement ID	DD Simple Data Type	Compliance Errors DataTyps(s)	Compliance Error UnderlyingType
REQ-DD160WA1X-DTE-1	Boolean	Edm.String, Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.Decimal, Edm.Date, Edm.TimeOfDay	None ("String-to-Boolean", "Number-to-Boolean", or "Date/Edm.TimeOfDay-to-Boolean" Mapping Errors) An UnderlyingType is required for Non-Boolean data types (enumerations) that act like a Boolean value.
REQ-DD160WA1X-DTE-2	Date[1]	Edm.TimeOfDay, Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64	*None*
REQ-DD160WA1X-DTE-3	Number[2]	(Any DataType used as a Lookup)	UnderlyingType="Edm.Int32" or UnderlyingType="Edm.Int64" (Any Lookup-to-Number OR LookupMulti-to-Number Mapping)
REQ-DD160WA1X-DTE-4	Number (Whole)	Edm.String, Edm.Decimal, Edm.Date, Edm.TimeOfDay	None ("Edm.String-to-Whole" Mapping Error) None ("Edm.Decimal-to-Whole" Mapping Error) See **REQ-DD160WA1X-P-4** None ("Edm.Date-to-Whole" or "Edm.TimeOfDay-to-Whole" Mapping Error)
REQ-DD160WA1X-DTE-5	StringList, Multi	Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.String	*None* (This is the "String-to-LookupMulti" or "Number-to-LookupMulti" Error). The UnderlyingType cannot be "None" or empty for "StringList, Multi"
REQ-DD160WA1X-DTE-6	StringList, Multi[3]	Edm.Boolean	*None*
REQ-DD160WA1X-DTE-7	StringList, Single[3]	Edm.Boolean	*None*
REQ-DD160WA1X-DTE-8	StringList, Single	Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.String	*None* (This is the "String-to-Lookup" or "Number-to-Lookup" Error) The Interpretation cannot be "None" or empty for "StringList, Single"
REQ-DD160WA1X-DTE-9	StringList, Single[4]	(Any DataType used as a Lookup)	LookupMulti (This is the "Multi-to-Single Lookup" Error) <<OPEN>>

| REQ-DD160WA1X-DTE-10 | Timestamp[1] | Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.String, Edm.Date | *None* |
| REQ-DD160WA1X-DTE-11 | (Any Non-Number/String)[5] | Edm.Decimal | Any ("Edm.Decimal-to-Non-Number/Edm.String" Mapping Error) excluding "Edm.Decimal-to-Edm.String" mappings, which are compliant. |

NOTE T-1: Any transformation of a Date and Timestamp into the other is an error. Some Data Dictionary fields have a Date and Timestamp variant: OnMarketDate v. OnMarketTimestamp or OffMarketDate v. OffMarketTimestamp. Please map to the correct version to avoid receiving a compliance error.

NOTE T-2: Any lookup to be translated into a number field will be an error. The exception is when every lookup value is a pure number, without any additional symbols. If this is the case, the mapping will be given a WARNING. To receive the warning instead of the error, this field and its lookups must be clearly stated in the Supplemental Application Information. LookupMulti-to-Number CAN NOT receive a WARNING because multiple values concatenated together cannot be a number.

For example: A lookup representing the number of bedrooms could have the values "1", "2", "3", "4", and "5+". This would be an ERROR because of the "5+" lookup value. To receive a warning, the last value would need to be changed to "5" AND documented in the Supplemental Application Information.

NOTE T-3: Due to the potential ambiguity of how a Boolean is translated, all of these mappings are considered errors. This applies to "Locked" enumerations lists. Boolean-to-Lookup, Single is allowed when the enumeration list is "Open" or "Open (to be locked)"

NOTE T-4: For Data Dictionary "StringList, Single" fields, the applicant Metadata Interpretation field **SHOULD** be "Lookup". If the applicant Metadata has a "LookupMulti" Interpretation, that creates a "Multi-to-Single" data mapping, this field will NOT be considered compliant.

NOTE T-5: Per "REQ-DD160WA1X-DTC-5" the Edm.Decimal-to-String mapping is compliant.

2.4.2.3 RESO Web API 1.x.x Compliance Notices and Warnings for Metadata (Table)

Compliance Notice: A "notice" is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements but does **NOT** disqualify the applicant from certification.

Compliance Warnings: A "warning" is the same as a compliance notice with the additional requirement that it is fixed within a specific time frame. Future certification MAY be denied if a "warning" is not fixed in the required time.

Compliance Notices

The direction the data "flows" is important when translating data fields between different DataTypes. The direction of all of the mappings are from the applicant's metadata (Host's implementation) into the Data Dictionary (Client's expectations). There are some DataType mappings where reversing the direction would result in a loss of data. The DataType transformations that only work going into the Data Dictionary will be marked with a "Compliance Notice."

Also, a "Compliance Notice" MAY be issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to this or other requirements, but does NOT disqualify the applicant from certification.

Any DataType transformation that could result in a loss of data from the applicant's metadata into the Data Dictionary will not be "Compliant."[N-1]

Requirement ID	DD Simple Data Type	Compliance Notice DataTyps(s)	Compliance Notice UnderylingType
REQ-DD160WA1X-DTN-1	**String**	Edm.SByte, Edm.Byte, Edm.Double, Edm.Int16, Edm.Int32, Edm.Int64, Edm.Decimal[2]	LookupMulti (LookupMulti-to-String Mapping)[3] See also **REQ-DD160WA1X-DTC-5**

NOTE N-1: Only those "Notices" from DataType mappings are included here. This is NOT an extensive list of compliance notices. Only those that apply specifically to Data Type.

NOTE N-2: A string field can hold any alpha or numeric character. Placing numeric information into a string field is not going to lose data. An example is the Data Dictionary "ListingID" string field. A host's implementation **MAY** use a number field.

NOTE N-3: A multi-select lookup value MAY map into a Data Dictionary String field. An example is the Data Dictionary "OriginatingSystemName" string field. A host may store this as a lookup of predetermined system names. CAUTION: There **MAY** be too much data when the multi-select lookup values are concatenated to fit within the defined string length. **REQ-DD160WA1X-DTC-5** specifies that the Single-Select Lookup-to-String mapping is "Compliant."

Compliance Warnings

A "Compliance Warning" is the same as a compliance notice with an additional deadline requirement. The source of the "warning" must be fixed within a specific timeframe. Future certification MAY be denied if a "warning" is not fixed in the required time.

Any DataType transformation that could result in a loss of data from the applicant's metadata into the Data Dictionary will not be "Compliant."[W-1]

Requirement ID	DD Simple Data Type	Compliance Warning DataTyps(s)	Compliance Warning UnderlyingType	Comments / Rule References
REQ-DD160WA1X-DTW-1	StringList, Multi	*None*	**Warning**[W-2]**:** Lookup (Any Single-to-Multi Mapping)	**Rule:** REQ-DD160WA1X-DTI-4

NOTE W-1: Only those "Warnings" from DataType mappings are included here. This is NOT an extensive list of compliance notices. Only those that apply specifically to Data Type.

NOTE W-2: A multi-select lookup field may hold the information from a single-select lookup field without losing data.

REQ-DD160WA1X-DTI-4: For Data Dictionary "StringList, Multi" fields, the applicant Metadata Interpretation field **SHOULD** be "LookupMulti". If the applicant EDMX has data structure that creates a "Single-to-Multi" data mapping, this field will be marked with a "Compliance Warning."

NOTE W-3: The RESO Web API 1.0.2 describes how "Single-Valued Lookups" (2.4.9) and "Multi-Valued Lookups (2.4.10) are to be constructed within the EDMX:

- Single-Valued Lookups MUST have an UnderlyingType of either "Edm.Int32" or "Edm.Int64" without the IsFlags attribute, and
- Multi-Valued Lookups MUST have an UnderlyingType of either "Edm.Int32" or "Edm.Int64" AND the IsFlags attribute is "true".

2.4.3 EDMX: Scale

NOTE S1: *OData "Scale" is equivalent to the RETS "Precision". This is not to be confused with OData "Precision" which is equivalent with RETS "MaxLength"*

REQ-DD160WA1X-S-1: The "Scale" testing rules apply to the following EDM data types: Decimal.

NOTE 1-1: *[OData Version 4.0 Part 3 Section 6.2.4 Scale](#) states: "A decimal property **MAY** define a non-negative integer value or variable for the Scale attribute." For Data Dictionary implementation, "variable" is NOT an acceptable Scale value as is cannot be compared to subsequent testing rules.*

REQ-DD160WA1X-S-2: The applicant's data structure Scale attribute **SHOULD** be equal to or less than the decimal value in the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These precision lengths will be marked with as **COMPLIANT**.

REQ-DD160WA1X-S-3: The applicant's data structure Scale attribute **MAY** be zero or not present when the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These "Whole Number-to-Decimal" mappings will be marked with as **COMPLIANT**.

NOTE 3-1: *Where ListPrice equals 14.2, the Scale attribute **SHOULD** be 2 or smaller (including "0" or null) to be compliant. Also, where Latitude and Longitude both equal 12.8, the scale attribute **SHOULD** be 8 or smaller to be compliant.*

REQ-DD160WA1X-S-4: The applicant's data structure Scale attribute **SHOULD NOT** be greater than than the decimal value in the Data Dictionary "Sug. Max Length" column found in the Data Dictionary. These field lengths will be marked with as **NOTICE**.

NOTE 4-1: *Where ListPrice equals 14.2, the Scale attribute **MAY** be 3 or greater to receive a notice.*

REQ-DD160WA1X-S-5: A "Decimal-to-Whole Number" mapping is created when the Host data provides any precision value when the Data Dictionary does not have a value. This mapping may result in data loss and the Host field will be an **ERROR**.

2.4.4 EDMX: Precision

NOTE P1: *OData "Precision" is equivalent to the RETS "MaxLength". This is not to be confused with RETS "Precision" which is equivalent with OData "Scale."*

REQ-DD160WA1X-P-1: The "Precision" testing rules apply to the following EDM data types: Byte, DateTime, DateTimeOffset, Decimal, Double, Float, Guid, Int16. Int32, Int64, SByte, String, and Time. Any field using "MaxLength" (instead of "Precision") will be tested with all of the same rules as if it used "Precision."

NOTE 1-1: *[OData Version 4.0 Part 3 Section 6.2.3 Precision](#) states: "A datetime-with-offset, decimal, duration, or time-of-day property **MAY** define a value for the Precision attribute."*

NOTE 1-2: *As the OData specification does not forbid additional EDM data types to use "precision", RESO allows "precision" to be added to all data types listed above.*

REQ-DD160WA1X-P-2: The applicant EDMX Precision value **SHOULD** be equal to or less than the "Sug. Max Length" found in the Data

Dictionary. These field lengths will be marked with as **COMPLIANT**.

REQ-DD160WA1X-P-3: The applicant EDMX Precision value **SHOULD NOT** be greater than than the "Sug. Max Length" found in the Data Dictionary. These field lengths will be marked as a **NOTICE**.

REQ-DD160WA1X-P-4: When the Data Dictionary provides a Suggested Maximum Length, it is expected that the applicant EDMX Precision value provides any value. Failure to provide a length (a null value or empty attribute), that field length will be marked as a **WARNING**.

> *NOTE 4-1: Until further clarified in separate Non-RETS or Non-Web API Testing Rules, any transport's failure to provide any length for a field where the Data Dictionary provides a length will also be marked as a **WARNING**.*

REQ-DD160WA1X-P-5: The applicant EDMX Precision value **MAY** be two more in value than the "Sug. Max Length" found in the Data Dictionary. These field lengths will be marked with as **COMPLIANT**. This is to allow for extra decimal places or sign characters required to represent positive/negative numbers.

> *NOTE 5-1: The larger value described above is allowed for numeric data types. Non-numeric data types will use the exact Data Dictionary values for the testing rules.*

2.4.5 EDMX: Enumerations

REQ-DD160WA1X-ENUM-1: The applicant Metadata LongValue **MUST** match the Data Dictionary Enumeration value exactly as defined. Synonyms or spelling variations are not allowed.

> **Example 1-1:** PropertySubType's "Condominium" **MUST** be fully spelled out. "Condo" is not accepted.

> > **NOTE 1-1:** This spelling requirement only applies to data transport (e.g. Metadata). How the enumeration value is displayed to users is determined by the system administrators.

> > **NOTE 1-2:** Exceptions to this rule **MAY** be granted based on the allowance of "Archived Enumerations" (see rules below.) Exceptions to this rule **MAY NOT** be granted when doing so would contradict other rules, such as duplicate enumerations within the same field, misspellings, or abbreviations.

REQ-DD160WA1X-ENUM-2: The applicant Metadata enumeration value **MUST** be found in the same enumeration list as defined in the Data Dictionary. Enumeration values found in the wrong field will receive a **WARNING**. Enumeration fields containing misplaced values will receive a **WARNING**.

> > **NOTE 2-1:** The applicant **MUST** make note of the incorrect location in the Supplemental Application Information provided with the application including a time frame on when this will be corrected.

> > **NOTE 2-2:** It is acceptable for an enumeration to appear in multiple places if that is desired by the applicant. However, the duplicate would receive a **WARNING** (See Example 2). Duplicate enumerations identified as "archived" will be marked as **IGNORE** and will not impact certification results.

> > **NOTE 2-3:** Some enumerations in different locations may appear to be duplicates but are actually unique based on context provided by location. These enumerations as **COMPLIANT** (See Example 3). Some RESO Web API 1.0.x implementations may have enumerated lists that are unique to a resource class. Duplicates in these situations are **COMPLIANT** (See Example 4).

> **Example 2-1:** RoomType's "Library" **SHOULD** be found in RoomType. Having "Library" in any other field (and using the same definitions), where it is not defined in the dictionary, will make that field non-compliant (**WARNING**). If the reuse of the same enumerated value is for system compatibility, a documented "Archived" enumeration will be marked **IGNORE.**

> **Example 2-2:** The Enumeration Value "Cabin" **SHOULD** be found in PropertySubType, as specified by the Data Dictionary. It **MAY** also appear in ArchitecturalStyle, if required by the data vendor. The duplicate **MAY** remain if it has a different definition than other enumerations found in the Data Dictionary. Other common examples of unique enumerations based on location context include: "Yes", "No", "Other", "None", and "See Remarks".

> **Example 2-3:** Depending on the resource class chosen, the PropertySubType field **MAY** use a different enumerated list: PropertySubTypeRESI and PropertySubTypeRENT. The Enumeration Value "Single Family Residence" **MAY** appears in both enumerated lists. This is **COMPLIANT** since there is still only one selection for "Single Family Residence" within in a single class.

REQ-DD160WA1X-ENUM-3: The applicant enumeration values **MAY** be defined within the metadata OR by an external validation method.

> > **NOTE 3-1:** Enumerated fields with values validated outside the metadata **MUST** be noted when applying for certification. Compliance Testers will need the enumerated values found within the field to check for compliance.

> **Example 3-1:** A data vendor that cover a large geographical area may have too many "City" or "MLSAreaMajor" values to enumerate within their metadata. They **MAY** choose to use an external means for validation, such as a database or user interface to enforce proper selection.

REQ-DD160WA1X-ENUM-4: A Data Dictionary Field with a LOCKED Enumeration **MUST NOT** have any additional enumerations. This field **MAY** have fewer as determined by the applicant.

REQ-DD160WA1X-ENUM-5: A Data Dictionary Field with an OPEN or OPEN (TO BE LOCKED) Enumeration **MAY** have additional **OR** fewer enumerations as determined by the applicant.

> > **NOTE 4-1:** Previously compliant enumerated fields with "OPEN (TO BE LOCKED)" can fall out of compliance in future versions

of the Data Dictionary if that field becomes LOCKED.

> **NOTE 4-2:** Enumerations not defined in the Data Dictionary are not under the jurisdiction of compliance testing and will be ignored unless it conflicts with other compliance rules.

REQ-DD160WA1X-ENUM-6: A Lookup Field **MUST NOT** have additional enumerations that are synonyms of enumerations already found within the field. This applies to Data Dictionary fields with **Locked** Enumeration Lists. These synonyms will be marked as an **ERROR**.

REQ-DD160WA1X-ENUM-7: A Lookup Field **SHOULD NOT** have additional enumerations that are synonyms of enumerations already found within the field. This applies to Data Dictionary fields with **OPEN or OPEN (To Be Locked)** Enumeration Lists. These duplicates will be marked as a **WARNING**.

REQ-DD160WA1X-ENUM-8: A Lookup Field **MUST NOT** have additional enumerations that are synonyms of enumerations already found within the field. These additional enumerations will be marked as an **ERROR**. Some Data Dictionary fields have **no enumeration list** defined. Synonym tests on Enumerations only apply on those fields with enumerations defined in the Data Dictionary. Additional enumerations, where there is NOT a Data Dictionary list, will be marked as an **WARNING**.

> **Example 8-1:** The enumerations "Condominium" and "Condo" cannot appear in the same field.

REQ-DD160WA1X-ENUM-9: A Lookup Field **SHOULD NOT** have additional enumerations that are duplicates of enumerations already found within the field. These duplicates, within the same field, will be marked as an **ERROR**. The "Archived Enumeration" exemption **WILL NOT** be allowed to excuse these duplicates. Some Data Dictionary fields have **no enumeration list** defined. Duplication tests on Enumerations only apply on those fields with enumerations defined in the Data Dictionary.

> **NOTE 10-1:** RESO Web API 1.0.x enumerations consists of a "Name" attribute in the enumeration definition. Testing for duplicates will include ALL "*Value" portions of the enumeration. To be considered a "Duplicate Error," all values **MUST** be identical.

REQ-DD160WA1X-ENUM-10: A "Combined Enumeration" is a single applicant enumeration with a definition that combines more than one Data Dictionary enumerations. A "Combined Enumeration" will be marked as a **WARNING**.

> **Example 10-1:** The Data Dictionary PropertySubType has the enumerations of "Duplex", "Triplex", and "Quadruplex". An applicant's "Plex" or "Duplex/Triplex/Quadruplex" are examples of the combined enumeration.

> **Example 10-2:** Combined Enumerations that are documented as an "Archived Enumeration" would be marked **IGNORE** for certification purposes

REQ-DD160WA1X-ENUM-11: A "Specified Enumeration" is a single applicant enumeration with a definition that is more specified that any one Data Dictionary enumeration. A "Specified Enumeration" is **IGNORED** for certification purposes.

> **Example 11-1:** The Data Dictionary PropertySubType has an enumeration of "Duplex". An applicant's "Duplex Other", "Duplex Side-by-Side", and "Duplex Up-and-Down" enumerations each would be ignored.

REQ-DD160R1X-ENUM-12: An applicant **MAY** define an enumeration as an "Archived Enumeration" in the Supplemental Application Information. The "Archived Enumerations" are marked **IGNORE** in certification testing results.

> **NOTE 12-1:** An "Archived Enumeration" is any duplicate enumeration kept within the metadata to preserve information collected in old records or to provide backward or forward compatibility.

> **NOTE 12-2:** Replacement enumeration(s) MUST be defined in the Supplemental Application Information.

> **NOTE 12-3:** The replacement enumeration(s) created by moving, combining, or splitting **MUST** be a compliant Data Dictionary enumeration.

REQ-DD160WA1X-ENUM-13: The enumeration value "Retail" will be excluded from the **REQ-DD160WA1X-ENUM-1** and **REQ-DD160WA1X-ENUM-2** testing rules when this value is found in the following Data Dictionary fields: PropertyType, PropertySubType, and BusinessType. Using "Retail" in any of these three fields will be **COMPLIANT**.

REFERENCE: RESO Web API 1.0.2 Implementation Details

The RESO Web API 1.0.2 describes how "Single-Valued Lookups" (2.4.9) and "Multi-Valued Lookups (2.4.10) are to be constructed within the EDMX:

- Single-Valued Lookups **MUST** have an UnderlyingType of either "Edm.Int32" or "Edm.Int64" without the IsFlags attribute, and
- Multi-Valued Lookups **MUST** have an UnderlyingType of either "Edm.Int32" or "Edm.Int64" **AND** the IsFlags attribute is "true".

Best Practices:

The transitional benefits of "Archived Fields" carries with it the concern of non-standard enumeration values only appearing in an Archive field. Extensibility is the cornerstone of the Dictionary's flexibility to support any region's unique characteristics. If the extended non-standard enumerated values of an Archived Field did not also appear in the related standard field(s), this would require a client application to sift through both the standard and archived fields for a complete set of enumerated values. **It is highly recommended that all enumerations from an archived field also be included in its related standard field(s).**

2.4.6 EDMX: Data Formatting

REQ-DD160WA1X-DF-1: Compliance testing will **NOT** take field formatting into account (i.e. Parcel number, Phone numbers).

> **Example 1-1:** Different Phone number formats: 555-555-1234, (555) 555-1234, 555.555.1234, etc. All of these are accepted as long as the other field attributes are compliant: DataType, MaximumLength, etc.

2.5 RESO Web API 1.0.x Field Compliance Notices and Compliance Warnings

There are multiple situations where a compliance notice or warning is assigned to a RETS 1.x field. These notices or warnings may fit in one of many cases described in the tables below.

Each compliance warning is assigned a "probation time" in which it is expected that the warning is corrected. **Failure to correct a compliance warning during the probation time may result in a loss of certification.** Compliance notices are NOT assigned a "probation time."

Compliance Notices

Type	Compliance Notice Descriptions	Comments / Rule References
Data Types	Where a host provides a data type that does not exactly match what a client is expecting but there wouldn't be a loss of data in the conversion. **Example:** Host Number --> Client String;	**Section 2.2.2.2:** These may remain as long as required by the applicant. These CWs will not impact Data Dictionary certification levels.
Suggested Maximum Length	Where a host has a longer maximum length that a client is expecting. There is a potential for data truncation but not guaranteed if the data in the listing does not use the full length allowed.	**Rule:** REQ-DD160WA1X-ML-1
Precision	Where a host provides a precision on a decimal number longer than the client is expecting.	**Rule:** REQ-DD160WA1X-P-1

Compliance Warnings

Type	Compliance Warning Descriptions	CW Probation Time	Comments / Rule References
Lookup Multi	Where a host provides a single-select lookup but the client is expecting a multi-select.	1 Year	**Rule:** REQ-DD160WA1X-DTI-4
Enumerations	A duplicate enumeration is found in a field not specified by the Data Dictionary.	1 Year	**Rule:** REQ-DD160WA1X-ENUM-2

> **NOTE W-1:** As new situations arise, they will be handled on a case-by-case basis, added to this table, and subject to review.

3.0 Data Dictionary Certification Rules

This section contains all of the rules that RESO will use in awarding Data Dictionary Certificates. The specific set of rules that must be passed for "Compliance" are discussed in Section 2.

Certification is awarded when all Data Dictionary fields used within an applicant's Data Dictionary Implementation are mapped and found compliant.

> **NOTE 1:** *A guiding principle behind Data Dictionary Certification is: "If you do it and the dictionary does it, then you must do it the dictionary way." The Data Dictionary is filled with many "entries" expressed as fields or enumerations. If the data host has a "data container" (field or enumeration) that is similar to the Data Dictionary entry, that container MUST be made compliant with the corresponding Data Dictionary entry.*

> **NOTE 2:** *No Data Dictionary fields are "required." An implementation of the Data Dictionary may use as many or as few fields the data host wishes to satisfy their business needs.*

> **NOTE 3:** *A data host may use any additional data fields not found within the Data Dictionary. Any field not defined within the Data DIctionary SHOULD be implemented according to the requirements of the transport protocol: RESO RETS 1.x, RESO Web API, etc. These fields may be specific to a host's region or required for operations.*

3.1 Certification Levels Definition Summary

3.2 Certification Level Testing Rules

3.1 Certification Levels Definition Summary

Different Data Dictionary Certification levels have been defined to recognize those who implement more than the minimum requirements. These higher levels are named after different precious metals: Bronze, Silver, Gold, and Platinum. The minimum certification is named "Core."

> **NOTE 1-1:** Each certification level builds upon the previous level. Being "Core" is a requirement for "Bronze"; being "Bronze" for "Silver", "Silver" for "Gold", and "Gold" for "Platinum." Generally speaking, failing at a specific level will result in receiving certification at the next level below.

Every field within the Data Dictionary has been assigned to one of these different levels. To be certified at any of these level, all fields used by an applicant at that level MUST be compliant.

> **EXAMPLE 1-1:** To be "Core" certified, all Core fields found in the applicant's implementation must be compliant. To be "Bronze" certified, all Bronze fields must be compliant. This pattern continues for each certification level.

3.2 Certification Level Testing Rules

Data Dictionary Certification is awarded at different levels. These level provide additional recognition to those who implement more than the minimum requirement.

Core Compliance is the first level of Data Dictionary certification. Higher levels are named after different precious metals: Bronze, Silver, Gold, Platinum.

> **NOTE 0-1:** Compliance and Certification have specific meanings in the testing rules. "Certification" is the single over-all level that is provided at the end of the testing process. "Compliance" refers to how well individual resources or fields comply with the testing rules.

Data Dictionary Resource Certification Testing

Each Data Dictionary Resource is evaluated separately and given a compliance level: Core, Bronze, Silver, Gold, or Platinum.

The fields in Data Dictionary Resources are categorized into one of five compliance levels: Core, Bronze, Silver, Gold, or Platinum.

More information on the rules for determining each resources' compliance level are described in later subsections.

Combining Resource and Field Compliance Levels

REQ-DD160-CR-1: Data structures with multiple resources **MAY** have different compliance levels for each resource. The lowest resource compliance level of any of the resources will be the combined certification level.

> **EXAMPLE 1:** An ERROR, WARNING, or NOTICE on any of these fields will prevent compliance at the level of the field.
>
> - If one of the PLATINUM rules are broken (for any resource), GOLD is the highest certification level that can be awarded.

- If one of the SILVER rules are broken (for any resource), BRONZE is the highest certification level that can be awarded even if there are resources with higher compliance levels (i.e. GOLD or PLATINUM).

> **NOTE 1-1:** While larger resources use all five compliance levels, smaller resources may use only a few of them. A resource without fields from a compliance level **MAY** not be able to achieve that level.

> **NOTE 1-2:** Data Dictionary certification does not require fields to be implemented. Exceptions to the previous examples are made for resources without some compliance levels.

REQ-DD160-CR-2: When resources are assigned a lower compliance level because (1) a higher level is not available or (2) higher-level fields were not implemented in the data structure, these lower compliance levels will **NOT** lower the over-all certification level.

> **EXAMPLE 2:** A hypothetical data structure has only one CORE-compliant resource. Meaning, no BRONZE, SILVER, GOLD or PLATINUM fields or other resources have been implemented.

- PLATINUM certification level is awarded if no NOTICES or WARNINGS are found for any field.
- GOLD certification is awarded if one CORE field has a NOTICE (the PLATINUM rule **REQ-DD160-DDP-2** is broken).
- SILVER certification is awarded if one CORE field has a WARNING (the GOLD rule **REQ-DD160-DDG-2** is broken).
- BRONZE certification is awarded if one CORE field has a WARNING for a Field DataType conversion (the SILVER rule **REQ-DD 160-DDS-2** is broken).
- No certification is awarded if one CORE field has an ERROR of any type (the CORE rule **REQ-DD160-DDC-1** is broken).

> **EXAMPLE 3:** A hypothetical data structure has a SILVER-compliant HistoryTransactional and GOLD-compliant Property, Member, Office, Contacts, and Media. (HistoryTransactional only has PLATINUM and SILVER-level fields.)

- If the data structure has a HistoryTransactional PLATINUM field with an ERROR, WARNING, or NOTICE, the combined certification level is SILVER regardless of the other resource levels.
- If the HistoryTransactional only uses compliant SILVER fields, the combined certification level will be GOLD. (**REQ-DD160-CR-3** provides additional logic for this statement.)

> **EXAMPLE 4:** A hypothetical data structure has PLATINUM-compliant Property, Member, Office, and Contacts resources and a Media resource using only CORE fields. The combined certification level will be PLATINUM provided there are no NOTICES or WARNINGS in any resource.

REQ-DD160-CR-3: Some Data Dictionary resources do not use all five of the certification levels. If a resource is NOT able to satisfy the Certification Rules for the lowest field level used in the resource, the next level down **SHOULD** be used for determining the overall certification level.

> **NOTE 3-1:** Applicants **MAY** request a review of testing results if the examples are not sufficiently broad to cover a specific result set.

> **EXAMPLE 5**: A hypothetical data structure has a HistoryTransactional Resource consisting of fields assigned to the SILVER-compliance level. One SILVER field has a Data Type Conversion WARNING. This WARNING breaks rule **REQ-DD160-DDS-2**. This WARNING prevents this HistoryTransactional Resource from being SILVER compliant. This resource will be considered a BRONZE resource for determining overall certification.

> **EXAMPLE 6:** A hypothetical data structure has a HistoryTransactional Resource consisting of fields assigned to both SILVER and PLATINUM compliance levels. One PLATINUM field has a WARNING or NOTICE of any kind. This NOTICE breaks rule **REQ-DD160-DDP-2**. This NOTICE prevents this HistoryTransactional Resource from being PLATINUM compliant. This resource will be considered a GOLD resource for determining overall certification.

> **EXAMPLE 7:** A hypothetical data structure has a HistoryTransactional Resource consisting of fields assigned to both SILVER and PLATINUM compliance levels. One SILVER field has a NOTICE that's NOT on a DataType Conversion. This NOTICE breaks rule **REQ-DD 160-DDP-2** but does NOT break rule **REQ-DD160-DDG-3**. This NOTICE prevents this HistoryTransactional Resource from being PLATINUM compliant. This resource will be considered a GOLD resource for determining overall certification as all SILVER rules are satisfied.

Minimum Certification Requirements Timeline

The minimum compliance levels required to receive a Data Dictionary Certificate will change based on the year the application is tested:

- Starting January 1st, 2015, a Data Dictionary Certificate can be awarded for achieving the CORE compliance level or higher.
- Starting January 1st, 2017, a Data Dictionary Certificate can be awarded for achieving the BRONZE compliance level or higher.
- Starting January 1st, 2018, a Data Dictionary Certificate can be awarded for achieving the SILVER compliance level or higher.
- Starting January 1st, 2019, a Data Dictionary Certificate can be awarded for achieving the GOLD compliance level or higher.
- Starting January 1st, 2020, a Data Dictionary Certificate can be awarded for achieving the PLATINUM compliance level.

Year	2015-2016	2017	2018	2019	2020+
Effective	1/1/2015	1/1/2017	1/1/2018	1/1/2019	1/1/2020
Level	Core	Bronze	Silver	Gold	Platinum

NOTE 1-3: For the Data Dictionary 1.6.0, BRONZE is the minimum certification level. CORE Certificates will not be awarded for the Data Dictionary 1.6.0.

3.2.1 Data Dictionary Core Certification (Minimum)

These are the minimum requirements that MUST be satisfied to receive certification. Any description of Data Dictionary Certification without a precious metal distinction will refer to this minimum level.

REQ-DD160-DDC-1: All Data Dictionary Core Fields found AND mapped within the applicant's system MUST be found compliant. Core Fields found within the applicant's Data Dictionary implementation that is NOT mapped or found to be compliant will prevent certification.

REQ-DD160-DDC-2: Only those resources that have Core fields defined are evaluated to determine "Core" certification: Media, Member, Office, OpenHouse, and Property.

> **NOTE 1-1:** It is NOT required to implement all five resources. Core certification may be awarded for any number of implemented resources. However, if a resource in this list is implemented, it MUST meet Core standards for the whole implementation to be considered compliant.

> **NOTE 1-2:** The "Core Certification" requirements will roll up into the Bronze requirements at the end of 2016. The Bronze Certification will become the "minimum" for Data Dictionary certification in 2017.

3.2.2 Data Dictionary Bronze Certification

Bronze is the first of the certification levels beyond the minimum. All Data Dictionary fields will be evaluated, regardless of what resource they are found in. Any non-compliant Bronze field will prevent Bronze certification.

REQ-DD160-DDB-1: All Data Dictionary Bronze Fields found AND mapped within the applicant's system MUST be found compliant. Bronze Fields found within the applicant's Data Dictionary implementation that is NOT mapped or found to be compliant will not be awarded Bronze certification but may be eligible for lower levels.

REQ-DD160-DDB-2: Satisfies all requirements for "Core" certification.

> **NOTE 2-1:** The "Bronze Certification" requirements will roll up into the Silver requirements at the end of 2017. The Silver Certification will become the "minimum" for Data Dictionary certification in 2018.

3.2.3 Data Dictionary Silver Certification

Silver certification is the first level where the presence of cautionary warnings impacts certification results.

REQ-DD160-DDS-1: All Data Dictionary Silver Fields found AND mapped within the applicant's system MUST be found compliant. Silver Fields found within the applicant's Data Dictionary implementation that are NOT mapped or found to be compliant will not be awarded Silver certification but may be eligible for lower levels.

REQ-DD160-DDS-2: No Cautionary Warnings for Field DataType Conversions are allowed for fields in this Silver level or below.

REQ-DD160-DDS-3: Satisfied all requirements for "Bronze" certification.

> **NOTE 3-1:** The "Silver Certification" requirements will roll up into the Gold requirements at the end of 2018. The Gold Certification will become the "minimum" for Data Dictionary certification in 2019.

3.2.4 Data Dictionary Gold Certification

Additional resources have been defined at the Silver certification level. Some of the smaller resources do not have Silver level fields. This is the first level where the presence of cautionary notices impacts certification results.

REQ-DD160-DDG-1: All Data Dictionary Gold Fields found AND mapped within the applicant's system MUST be found compliant. Gold Fields found within the applicant's Data Dictionary implementation that is NOT mapped or found to be compliant will will not be awarded Gold certification but may be eligible for lower levels.

REQ-DD160-DDG-2: No Cautionary Warnings of any type are allowed.

REQ-DD160-DDG-3: No Cautionary Notices for Field DataType Conversions are allowed.

REQ-DD160-DDG-4: Satisfied all requirements for "Silver" certification.

> **NOTE 4-1:** The "Gold Certification" requirements will roll up into the Platinum requirements at the end of 2019. The Platinum Certification will become the only level for Data Dictionary certification in 2020.

3.2.5 Data Dictionary Platinum Cerification (Maximum)

Platinum is the highest level of certification. This is the 100% compliance level.

REQ-DD160-DDP-1: All Data Dictionary Platinum Fields found AND mapped within the applicant's system MUST be found compliant. Platinum Fields found within the applicant's Data Dictionary implementation that is NOT mapped or found to be compliant will will not be awarded Platinum certification but may be eligible for lower levels.

REQ-DD160-DDP-2: No Cautionary Warnings or Notices of any type are allowed.

REQ-DD160-DDP-3: Satisfies all requirements for "Gold" certification.

> **NOTE 3-1:** The Platinum Certification will become the only level for Data Dictionary certification in 2020.

4.0 Data Dictionary Report Card and Specifications

The Data Dictionary Report Card is used to report to the applicant the certification findings.

This will include a list of the "Compliance Warnings" and "Compliance Notices" that were found during testing.

The structure of the Report Card is based on the current RESO Data Dictionary spreadsheet. The exact format will be determined by the RESO Compliance Staff.

Glossary

What is the Data Dictionary?

The Data Dictionary is a set of rules that instructs host providers how to construct (i.e. name, data type, length) a specific set of an agreed upon fields.

General Data Dictionary Terminology:

DD: A common abbreviation for "Data Dictionary."

DD Compliance Rules: A set of rules applied to an applicant's metadata to determine if it adheres to the Data Dictionary.

DD Certification: A DD certificate is awarded if that applicant's metadata adheres to the set of DD Compliance Rules as dictated by this workgroup.

DD Entry: Any object, value, time, person or idea that has been defined in the dictionary and given a standard name. It is often represented as a row within the Data Dictionary spreadsheet.

DD Implementation: The data set constructed by the Host provider.

DD Starter Kit: This Starter Kit is geared towards a source provider (like an MLS). This kit will guide them through the steps to become Data Dictionary compliant.

Data Dictionary Core Fields:

DD Core fields are those fields that MUST be compliant to receive certification. If a Core field is not present in the host providers data set, it does not need to be added. Missing Core fields will not be considered in the certification process.

A host provider is strongly encourage to have all of its fields (Core and Non Core) compliant to the Data Dictionary.

All DD Entries tagged as Core fields AND that exist within an applicant's DD data set, MUST be compliant to receive certification.

Compliance Terminology:

Compliance Notice: A **NOTICE** is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements but does NOT disqualify the applicant from certification.

Compliance Warnings: A **WARNING** is the same as a compliance notice with the additional requirement that it is fixed within a specific timeframe. Future certification MAY be denied if a "warning" is not fixed in the required time.

Host/Client: The host is the party in a transaction that delivers data to a client. The client is the party in the transaction that receives data via client get or host put. The direction of data flow is important in determining compliance for DataType conversions and other mappings.

Requirement IDs: Each compliance rule in this document is identified by a unique ID. They take the format similar to "**REQ-DD###$$$-XXX-%**" and are found immediately before the rule. This ID is provided to help those discussing these rules to identify rules in this document.

> *NOTE: REQ-DD is an abbreviation for "Requirement-Data Dictionary".*

> **###** is the Data Dictionary version number -- 160 is Data Dictionary 1.5.

> **$$$** is the Transport -- R1X is RETS 1.x, WA1X is Web API 1.x.x.

> **XXX** is the compliance rule group -- SN = StandardName, ENUM = Enumerations, etc.

> **%** is a unique number when one or more rule(s) are in a section.

Synonym: Another name for any definition within the dictionary other than the stated standard name. Synonyms are provided in the dictionary as a reference to aid in understanding the field or enumeration's meaning. Use of synonyms in place of the standard name, whether listed in the dictionary or not, is not allowed.

Certification & Procedures Terminology:

Application Processes, Compliance Testing, and Certification Analysis: RESO staff process all certification applications through three phases. Application processing ensures that all information required to process the application is gathered. Compliance testing compares the applicant's Data Dictionary implementation with the compliance rules. Certification Analysis determines if a certificate is to be awarded.. More details are in "1.2 RESO Certification Flow (Summary)" of the Data Dictionary Testing Rules.

Supplemental Application Information: A report of additional details that an MLS MUST provide along with the application. The information in this report supplements that found when retrieving the applicant's Data Dictionary implementation.

NOTE: *The Supplemental Application Information was previously called 'Exception Report'.*

RESO Data Dictionary Certification Glossary

What is the Data Dictionary?

The Data Dictionary is a set of rules that instructs host providers how to construct (*i.e. name, data type, length*) a specific set of an agreed upon fields.

General Data Dictionary Terminology:

DD: A common abbreviation for "**D**ata **D**ictionary."

DD Compliance Rules: A set of rules applied to an applicant's metadata to determine if it adheres to the Data Dictionary.

DD Certification: A DD certificate is awarded if that applicant's metadata adheres to the set of DD Compliance Rules as dictated by this workgroup.

DD Entry: Any object, value, time, person or idea that has been defined in the dictionary and given a standard name. It is often represented as a row within the Data Dictionary spreadsheet.

DD Implementation: The data set constructed by the Host provider.

DD Starter Kit: This Starter Kit is geared towards a source provider (like an MLS). This kit will guide them through the steps to become Data Dictionary compliant.

Data Dictionary Core Fields:

DD Core fields are those fields that MUST be compliant to receive certification. If a Core field is not present in the host providers data set, it does not need to be added. Missing Core fields will not be considered in the certification process.

A host provider is strongly encourage to have all of its fields (Core and Non Core) compliant to the Data Dictionary.

All DD Entries tagged as Core fields AND that exist within an applicant's DD data set, **MUST** be compliant to receive certification.

Compliance Terminology:

Compliance Notice: A "notice" is issued for any portion of the Data Dictionary's implementation (field, enumerations, etc.) that does not conform to the requirements but does NOT disqualify the applicant from certification.

Compliance Warnings: A "warning" is the same as a compliance notice with the additional requirement that it is fixed within a specific timeframe. Future certification MAY be denied if a "warning" is not fixed in the required time.

Host/Client: The host is the party in a transaction that delivers data to a client. The client is the party in the transaction that receives data via client get or host put. The direction of data flow is important in determining compliance for DataType conversions and other mappings.

Requirement IDs: Each compliance rule in this document is identified by a unique ID. They take the format similar to "**REQ-DD###$$$-XXX-%**" and are found immediately before the rule.
This ID is provided to help those discussing these rules to identify rules in this document.

> *Note: **REQ-DD** is an abbreviation for "Requirement-Data Dictionary".*
> *### is the Data Dictionary version number -- 130 is Data Dictionary 1.3.*
> *$$$ is the Transport -- R1X is RETS 1.x.*
> ***XXX** is the compliance rule group -- SN = StandardName, ENUM = Enumerations, etc.*
> *% is a unique number when one or more rule(s) are in a section.*

Synonym: Another name for any definition within the dictionary other than the stated standard name. Synonyms are provided in the dictionary as a reference to aid in understanding the field or enumeration's meaning. Use of synonyms in place of the standard name, whether listed in the dictionary or not, is not allowed.

Certification & Procedures Terminology:

Application Processes, Compliance Testing, and Certification Analysis: RESO staff process all certification applications through three phases. **Application processing** ensures that all information required to process the application is gathered. **Compliance testing** compares the applicant's Data Dictionary

implementation with the compliance rules. **Certification Analysis** determines if a certificate is to be awarded.. More details are in "1.2 RESO Certification Flow (Summary)" of the Data Dictionary Testing Rules.

Supplemental Application Information: A report of additional details that an MLS MUST provide along with the application. The information in this report supplements that found when retrieving the applicant's Data Dictionary implementation.

> ***Note****: The Supplemental Application Information was previously called 'Exception Report'.*

Change Log

Data Dictionary Testing Rules Change Log

Version 1.6.0

Version Numbering Updates

- Change the version number to 1.6.0
- Changing Testing Rule IDs from DD150 to DD160 (throughout document).

2.2.4 Metadata: Suggested MaximumLength

- **NOTE 4-1**: The larger value described in **REQ-DD160R1X-ML-4** is allowed for numeric data types. Non-numeric data types will use the exact Data Dictionary values for the testing rules. (The same clarification has been made for Web API Testing Rules.)

2.4.2.1 RESO Web API 1.x.x EDMX DataType Values (Table)

- **REQ-DD150WA1X-DTC-6**: Adding "Edm.Int64" as a COMPLIANT UnderlyingType to match RESO Web API definition for Single-Select Enumerations
- **REQ-DD160WA1X-DTC-8**: Adding "Edm.DateTimeOffset" as a COMPLIANT DataType for Timestamp Data Dictionary fields.

2.4.2.3 RESO Web API 1.x.x Compliance Notices and Warnings for Metadata (Table)

- Corrected page numbering typo: "2.2.2.3" changed to "2.4.2.3"
- **REQ-DD160WA1X-DTI-4**: This rule still uses RETS 1.x terminology. Rule re-worded to use RESO Web API 1.x.x terminology. The new NOTE W-3 is copied from the 2.4.5 EDMX: Enumerations page. (The same clarification has been made for RETS Testing Rules.)

2.4.3 EDMX: Scale

- **NOTE 1-1:** For Data Dictionary implementation, "variable" is NOT an acceptable Scale value as is cannot be compared to subsequent testing rules.

2.4.4 EDMX: Precision

- **REQ-DD160WA1X-P-1**: Adding clarification that the Precision rules apply to the MaxLength attribute when Precision is not provided.
- **NOTE 5-1**: The larger value described in **REQ-DD160WA1X-P-5** is allowed for numeric data types. Non-numeric data types will use the exact Data Dictionary values for the testing rules.

3.2 Certification Level Testing Rules

- Added new sections to the page with accompanying text (not separate numbered sub-sections):
  "Data Dictionary Resource Compliance Testing"
  "Combining Resource and Field Compliance Levels"
  "Minimum Certification Requirements Timeline"

3.2 Certification Level Testing Rules

- Adding multiple "**REQ-DD160**" identifications (**CR-1** & **CR-2**) to the paragraphs to better track the requirements. Notes renumbered to match new IDs.
- Added **REQ-DD160-CR-3** to address resources without Core or other lower-level compliance levels. (For example, HistoryTransactional and SavedSearch Resources do not have CORE or BRONZE level-fields.)

3.3 Certification Levels Field Count Summary (No Link)

- Page Deleted: Visit http://ddwiki.reso.org/ for detailed information on all Data Dictionary versions

Version 1.5.0

Version Numbering Updates

- Change the version number to 1.5.0
- Changing Testing Rule IDs from DD141 to DD150 (throughout document).
- New template for requirement id for RESO Web API 1.0.X (**REQ-DD150WA1X**)
- Changed Note and Example numbering to make it easier to insert new notes and examples without requiring all following to be updated.

2.2 RETS 1.x Field-Level Compliance

- Added: **Note 2-2**: Duplicate fields, used for transitioning data locations, **MAY** be used if documented.

2.2.1 Metadata: StandardName

- Updated: **REQ-DD150R1X-SN-1:** This rule also applies to "missing" StandardNames
- Added: **REQ-DD150R1X-SN-4:** A Data Dictionary field may only be used once per Resource per class.
- Added: **Note 1-3**: Duplicate fields, used for transitioning data locations, **MAY** be used if documented.

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

- Updated: **REQ-DD141R1X-DTC-5**: Adding "Boolean-to-String" mappings as compliant mappings.

2.2.5 Metadata: Enumerations

- Edited: **REQ-DD150R1X-ENUM-1:** Added "These synonyms will be marked as an **ERROR**." for clarity.
- Added: **Note 1-2:** Exceptions to this rule may be allowed for "Archived Enumerations" when value is used for transitioning data locations, if documented.
- Edited: **REQ-DD150R1X-ENUM-2:** Changed "Compliance warning" to "WARNING.
- Edited: **NOTE 2-1:** Changed "Exception Report" to "Supplemental Application Information"
- Edited: **NOTE 2-2:** Added "Archived Enumeration" exception clarification. Split into two notes (2-2 and 2-3).
- Edited: **Example 2-1:** Changed "**MUST**" to "**SHOULD**" and provided "Archived Enumeration" exception clarification.
- Edited: **REQ-DD150R1X-ENUM-8**: Added **ERROR** and **WARNING** for specifications for clarity in the different situation where Data Dictionary provides an enumerated list, or does not.
- Deleted: **REQ-DD150R1X-ENUM-9:** Duplicate of rule "10" Following Numbers renumbered
- Added note and table row for **REQ-DD150R1X-ENUM-9** (Previously "ENUM-10") to clarify Duplicate Enumeration **ERROR** conditions for **LOCKED** Enumerations.
- Added: **REQ-DD150R1X-ENUM10** and **REQ-DD150R1X-ENUM11** to provide rules to cover "Combined" and "Specified" enumerations, respectively.
- Corrected formatting of some instances of **MUST**, **MAY**, **SHOULD**, etc to follow RFC 2119 Standards.
- Added: **REQ-DD150R1X-ENUM-12:** New rule regarding "Archived Enumerations.
- Added: **REQ-DD150R1X-ENUM-12:** New rule regarding "Retail" enumeration's use in various fields

2.4 RESO Web API 1.0.X Field-Level Compliance

- Created as a copy of the section "2.2 RETS 1.x Field-Level Compliance". Edited to use RESO Web API 1.0.x specific terminology.
- Various "Duplicate Field" and "Archived Enumeration" edits made to bring Web API testing rules similar to RETS testing rules

2.4.5 EDMX: Enumerations

- Added: **REQ-DD150WA1X-ENUM11** and **REQ-DD150WA1X-ENUM12** to provide rules to cover "Combined" and "Specified" enumerations, respectively.
- Various "Duplicate Field" and "Archived Enumeration" edits made to bring Web API testing rules similar to RETS testing rules

2.5 RESO Web API 1.0.X Field Compliance Notices and Compliance Warnings

- Created as a copy of the section "2.3 RETS 1.x Field Compliance Notices and Compliance Warnings". Edited to use RESO Web API 1.0.x terminology.

3.3 Certification Levels Field Count Summary

- Updated Counts in Summary Table

Glossary

- Previous versions of the Glossary were kept in a separate document. That information has been added to this page and moved to the end of the document.

Version 1.4.1

Version Numbering Updates
- Change the version number to 1.4.1.
- Changing Testing Rule IDs from DD140 to DD141 (throughout document).

2.2.1 Metadata: StandardName

- Added: **REQ-DD141R1X-SN-3:** Added clarification on expectations regarding how Repeating StandardNames are certified.

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

- Modified: **REQ-DD141R1X-DTC-1:** "Empty Interpretation" is an allowable Interpretation ONLY when DataType is "Boolean." Expanding Note 1 to explain changes.

2.2.2.2 RETS 1.x Compliance Errors for Metadata (Table)

- Modified: **REQ-DD141R1X-DTE-1:** An Interpretation is required for Non-Boolean data types: "Number-to-Boolean" and "Date/Timestamp-to-Boolean" mappings (without an Interpretation) is an ERROR.
- Modified: **REQ-DD141R1X-DTE-2:** "Character-to-Date" or "Any Whole Number-to-Date" is an ERROR
- Modified: **REQ-DD141R1X-DTE-4:** "Decimal-to-Whole Number" , "Date-to-Whole Number" or "Timestamp-to-Whole Number" is an ERROR.

- Modified: **REQ-DD141R1X-DTE-5:** Added "Number" Data Types to make this rule consistent with **REQ-DD141R1X-DTE-8**
- Modified: **REQ-DD141R1X-DTE-10:** "Character-to-Timestamp" or "Any Whole Number-to-Timestamp" is an ERROR
- Clarified: **REQ-DD141R1X-DTE-11** does not apply to "Decimal-to-String" mappings, which are compliant.

2.2.2.3 RETS 1.x Compliance Notices and Warnings for Metadata (Table)

- Removed: **REQ-DD141R1X-DTN-2:** "Whole-to-Decimal" Mappings are now **COMPLIANT**.

2.2.3 Metadata: Precision

- Expanded and Changed **REQ-DD141R1X-P-1** to be consistent with Suggested MaximumLength rules.
- New Rule: **REQ-DD141R1X-P-2:** "Whole Number-to-Decimal" mappings will be marked with as **COMPLIANT**.
- Removed: **REQ-DD140R1X-P-2:** A "Whole Number-to-Decimal" mapping [...] will be marked with a "**Compliance Notice**."
- Renumbered existing rules.

2.2.4 Metadata: Suggested MaximumLength

- Expanded **REQ-DD141R1X-ML-1** into ML-1 and ML-2 to provide clarity between COMPLIANT and NOTICE conditions
- Added **REQ-DD141R1X-ML-3** and Note 1: Failure to provide a length when expected is a WARNING.
- Added **REQ-DD141R1X-ML-4** to allow two extra spaces for decimal, positive, negative characters.

2.2.5 Metadata: Enumerations

- Expanded and clarified Note 2 and 3 regarding misplaced and common enumerations. Also added Note 4 and renumbered all other notes for this insertion.
- Expanded **REQ-140R1X-ENUM-6** into ENUM-6, ENUM-7, ENUM-8, ENUM-9, and ENUM-10. Synonym and duplicate tests on Enumerations only apply on those fields with enumerations defined in the Data Dictionary.
- Changed Note 4: Changed example field(s) from "SubdivisionName" to "City" or "MLSAreaMajor".
- Added Note 7 and Table 1: Clarified that Duplicate Enumerations are only when ALL values of the enumerations (LongValue, ShortValue, Value, etc.) are identical.

2.3: RETS 1.x Field Compliance Notices and Compliance Warnings

- Removed "Precision" Notice from the table. Changed other rules to match changes described above.

Version 1.4.0

Version Numbering Updates
- Change the version number to 1.4.0.
- Going forward, the first two digits of the Testing Rules document will match the version number of the Data Dictionary. Any changes to the rules that applies to the same Data Dictionary version will increment the third digit. (1.4.1, 1.4.2, etc.)
- Changing Testing Rule IDs from DD130 to DD140 (throughout document).

2.2.2.1: RETS 1.x Metadata DataType and Interpretation Values

- REQ-DD140R1X-DTC-5: Adding "Lookup" as an acceptable Interpretation. Allowing for Single-Select Lookup-to-String mappings to be "Compliant." (See Note 3)

2.2.2.3 RETS 1.x Compliance Notices and Warnings for Metadata

- REQ-DD140R1X-DTN-1: Removed "Lookup" as an Interpretation that would cause a "Notice". Allowing for Single-Select Lookup-to-String mappings to be "Compliant" (See Note 3). Multi-Select Lookup-to-String mappings will still receive a "Notice" due to concerns about truncation when adding multiple enumerated values into one string field.

2.2.4 Metadata: Suggested Maximum Length - Renamed Section Header, added "Suggested"

- Reclassified the "Warning" given when Host data is longer than the Data Dictionary's length to a "Notice" based on recommendation by Data Dictionary Work Group.
- Also impacts "2.3: RETS 1.x Field Compliance Notices and Compliance Warnings" tables

3.0 Data Dictionary Certification Rules

- All pages within this section have been updated to include detailed descriptions of the Core, Bronze, Silver, Gold, and Platinum Certification requirements. Please refer to all pages within this section for the updated rules.

Version 1.0.3

1.4 Impact of Future Data Dictionary Changes to these Testing Rules

- A new page.

2.2 RETS 1.x Field-Level Compliance

- REQ-DD130R1X-FLC-2: Added description about the importance of adding Data Dictionary mappings, regardless if fields are fully compliant.

2.2.1 Metadata: StandardName

- Replaced current rule with two new rules to address the use of Non-Data Dictionary fields as RETS 1.x StandardName: REQ-DD130R1X-SN-1 and REQ-DD130R1X-SN-2.
- Added Note clarifying that StandardNames are case sensitive.

2.2.2 Metadata: Data Type and Interpretations

- Moved "REQ-DD130R1X-DTI-3" to 2.2.2.2 (Errors)
- Moved "REQ-DD130R1X-DTI-4" to 2.2.2.3 (Warnings)
- Renumberd "REQ-DD130R1X-DTI-5" to "3" to take the place of rules moved.

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

- Added Requirement Numbering to table for easier reference.
- New COMPLIANT Mapping: "Number-to-String" (Added Note 3, renumbered following notes)
- Removed "Time" as an acceptable DataType for Timestamp - Moved to ERROR page (2.2.2.2)
- Added "Boolean-to-Lookup" as a compliant mapping ONLY for open enumerations. Locked enumerations are errors.

2.2.2.2 RETS 1.x Compliance Errors for Metadata (Table)

- Added Requirement Numbering to table for easier reference.
- A new page to contain all of the known mappings that will result is errors
- New ERROR Mapping: "String-to-LookupMulti" (To match "String-to-Lookup" ERROR)
- New ERROR Mapping: "Boolean-to-Lookup" (Added Note 1)
- New ERROR Mapping: "Timestamp-to-Date" (Added Note 2)
- New ERROR Mapping: "Date-to-Timestamp" (Added Note 2)
- New ERROR Mapping: "Lookup-to-Number" (Added Note 3 with examples)
- New ERROR Mapping: "Character-to-Number"
- New ERROR Mapping: "Decimal-to-Whole" Numbers to match similar logic for Precision REQ-DD130R1X-P-3
- Removed ERROR Mapping: "Whole-to-Decimal" Numbers now classified as a NOTICE
- Sorted table based on "DD Simple Data Type" and renumbered the notes for the new notes added.

2.2.2.3 RETS 1.x Compliance Notices and Warnings for Metadata (Table)

- Added Requirement Numbering to tables for easier reference.
- Renumbered "2.2.2.2" to "2.2.2.3" to make room for new page.
- New NOTICE Mapping: "LookupMulti-to-String" (Expanded "Note 2")
- New NOTICE Mapping: "Whole-to-Decimal" Numbers to match similar logic for Precision REQ-DD130R1X-P-2.
- Removed NOTICE Mapping: "Date-to-Timestamp" (Deleted "Note 3") - Moved to ERROR page (2.2.2.2)

Version 1.0.2

1.2 RESO Certification Flow (Summary)

- Simplified Certification Flow descriptions.

1.3 Supplemental Application Information

- Simplified page contents by removing specific application content information. Instructions will be in an external document so testing rules will not need changes when the application changes.

2.2.2 Metadata: Data Type and Interpretations

- Expanded and clarified examples and notes.

2.2.2.1 RETS 1.x Metadata DataType and Interpretation Values (Table)

- Added explanatory note describing RETS 1.x DataType and Interpretation.
- Added footnotes to table.

2.2.2.2 RETS 1.x Compliance Notices and Warnings for Metadata (Table)

- Recategorized "Cautionary Warnings" into "Compliance Warnings" and "Compliance Notices" based on severity. Separated example tables into different sections on the same page.