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Part Model Assembly Process Classification Guidelines for Electronic-Device Packages – XML Requirements

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PART MODEL ASSEMBLY PROCESS CLASSIFICATION GUIDELINE FOR ELECTRONIC-DEVICE PACKAGES - XML REQUIREMENTS

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From JEDEC Board Ballot JCB-23-10 formulated under the cognizance of the JC-11 Committee on Mechanical Standardization.)

1 Scope

This standard establishes the requirements for exchanging part data between part manufacturers and their customers for electrical and electronic products. This standard applies to all forms of electronic parts. It forms part of the Part Model XML Schema, which covers the parental structure for the electrical, physical, thermal, assembly process classification data along with materials and substances that may be present in the supplied product or sub-products. This Guideline specifically focuses on the “Assembly Process Classification” sub-section of the Part Model.

All releases of the *AssemblyProcessClassificationSection* sub-schema must be under the umbrella of the Part Model Schema to ensure that the Part model schema is referencing the correct version of the *AssemblyProcessClassificationSection* sub-schema. In addition, this will enable the *AssemblyProcessClassificationSection* sub-schema to connect to the Manufacturer Part Number and the Manufacturer of the Part.

1.1 Purpose

This standard is intended to benefit part manufacturers and their customers by providing consistency and efficiency to the transfer of part data from part manufacturer to customers. This standard specifically covers data applicable to the assembly process classification and requirements of the part during the assembly process.

2 Applicable Documents

The following documents form a part of this standard to the extent specified herein. The revision of the document in effect at the time of solicitation shall take precedence.

2.1 JEDEC

JESD30J, *Descriptive Designation System for Electronic-device Packages*

JEP30, *Part Model Guidelines for Electronic-Device Packages – XML Requirements*

JEP30-10, *Part Model Schema*

JEP30-A101, *Part Model Assembly Process Classification Schema*

JEP30-D10, *Part Model Schema Types Dictionary* (Required to support the Part Model Schema and each of its sectional sub-schemas.)

JESD22-A111, *Evaluation Procedure for Determining Capability to Bottom Side Board Attach by Full Body Solder Immersion of Small Surface Mount Solid State Devices*

2.2 IPC

IPC-T-50, *Terms and Definitions for Interconnecting and Packaging Electronic Circuits*

IPC-CH-65, *Guidelines for Cleaning Printed Circuit Boards and Assemblies*

2.3 ECA/IPC/JEDEC

J-STD-075, *Classification of Passive and Solid State Devices for Assembly Processes*

2.4 IPC/JEDEC

J-STD-020, *Moisture/Reflow Sensitivity Classification for Nonhermetic Surface mount Devices*

2.5 ECIA

EIA 364-56, *Resistance to Soldering Heat Test Procedure for Electrical Connectors and Sockets*

EIA 364-61, *Resistance to Soldering Heat From Rework Test Procedure for Electrical Connectors and Sockets*

3 Requirements

The following terms and definitions are applicable to this XML Schema.

3.1 Terms and Definitions

All definitions and terms associated with the Process Sensitivity Levels aspect of the part or process are in accordance with J-STD-075A and / or IPC-T-50 Terms and Definitions or later versions.

All definitions and terms associated with the Moisture Sensitivity Levels aspect of the part are in accordance with J-STD-020 and / or IPC-T-50 Terms and Definitions or later versions.

The Assembly Process Classification details of the part are defined in the *AssemblyProcessClassificationSection* of the Part Model XML Schema.

All common Terms and Definitions that are used by more than one sectional sub-schema, such as any of the Electrical, Package, Environmental, Assembly Process Classification, are defined in the “Part Model Schema Types Library”

All other definitions and terms necessary to define the schema, are defined by this document.

3.1 Terms and Definitions (cont'd)

Part Model: A Part Model is a data representation described in an XML file that conforms to the rules and structure of the Part Model XML Schema.

NOTE 1 Companies who use the Part Model XML Files and claim compliance to JEDEC, must ensure that their Part Model XML file conforms to the specific released version of the Part Model XML Schema released by JEDEC.

NOTE 2 Section 4 defines the outline of the structure of the Assembly Process Classification XML Schema. Specific components of the XML Schema and their hierarchy are specifically controlled by the JC-14 Committee who retains the expertise for these structures.

NOTE 3 The *AssemblyProcessClassificationSection* of the schema forms part of the Part Model XML Schema and is not intended to act as a standalone schema. In addition, there is a "Part Model Schema Types Library" XML Schema, which is a common set of xml structures shared across the Part Model XML Schema and all its sub-section schemas.

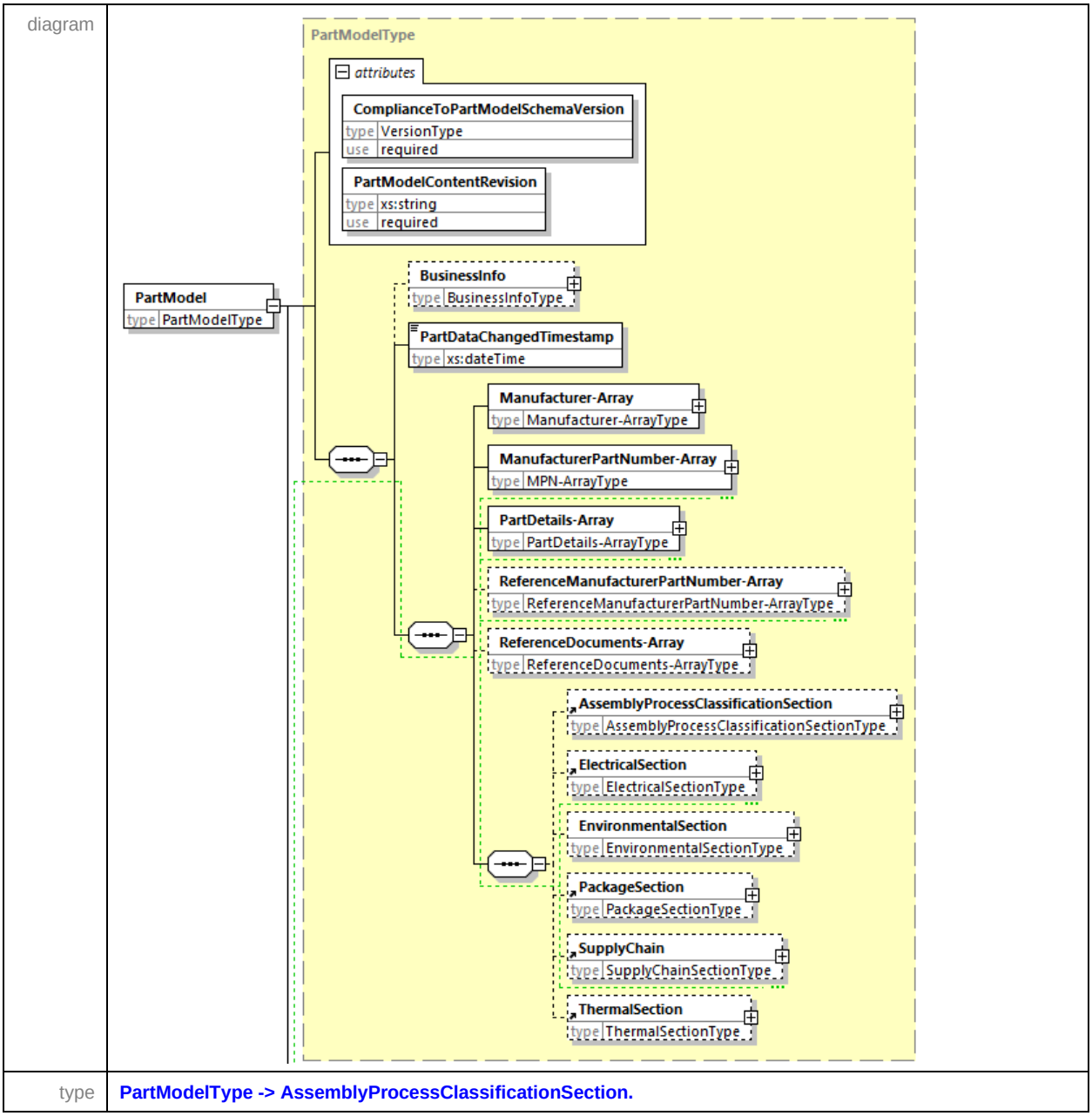
3.2 XML Schema Key Terms and Definitions

Reference the JEP30, 3.2, XML Schema Key Terms and Definitions.

4 Part Model Schema Definition

The following section describes the XML Schema structure.

4.1 Part Model Parent - Assembly Process Classification Section



The *PartModelType* belongs to the "Part Model XML Schema". The "*AssemblyProcessClassificationSection*" belongs to the "Part Model Assembly Process Classification XML Schema". The primary purpose of the Part Model Schema is to provide the structure for identifying unique parts (Manufacturer and MPN), and the structure to include the sub-schemas which define the part details, as outline in the JEP30 - Part Model Guidelines for Electronic-Device Packages – XML Requirements.

4.1 Part Model Parent - Assembly Process Classification Section (cont'd)

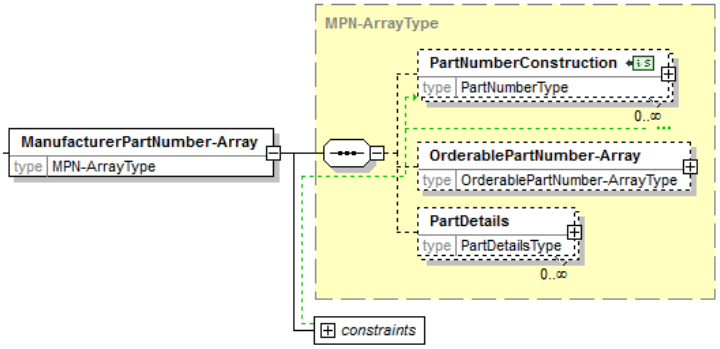
This document covers the *AssemblyProcessClassificationSection*, which is referenced from its parent's structure, the *PartModel*. The contents under the *AssemblyProcessClassificationSection* is tied to the Manufacturer's name and Manufacturer's part number

The *ComplianceToPartModelSchemaVersion* indicates the version of the Schema to which the XML file is to be validated against. All new releases to this document or XML Schema is governed by the rules outlined in JEP30, and must be released in sync with the Part Model.

> *"Each time that a Sub-schema gets updated, then the part model version also gets updated in order to release that Sub-schema under the umbrella of the Part model. This is because the Part Model must now reference the new version of Sub-schema, since all subschemas have their own version number. The parent schema includes them by referring to a precise version, so a version bump in the subschema requires a version bump in the parent only at the time of release of the Parent."*

The *PartModelContentRevision* indicates the revision of the data for the Part that is submitted in the XML file. This enables the Component Manufacturer to provide a new XML file for a Part each time they wish to upgrade a new set of data for a part, in any of the sub-sections such as this *AssemblyProcessClassificationSection*.

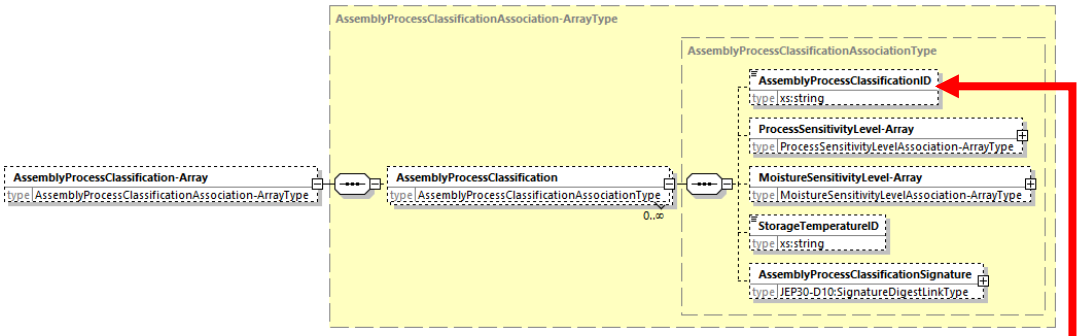
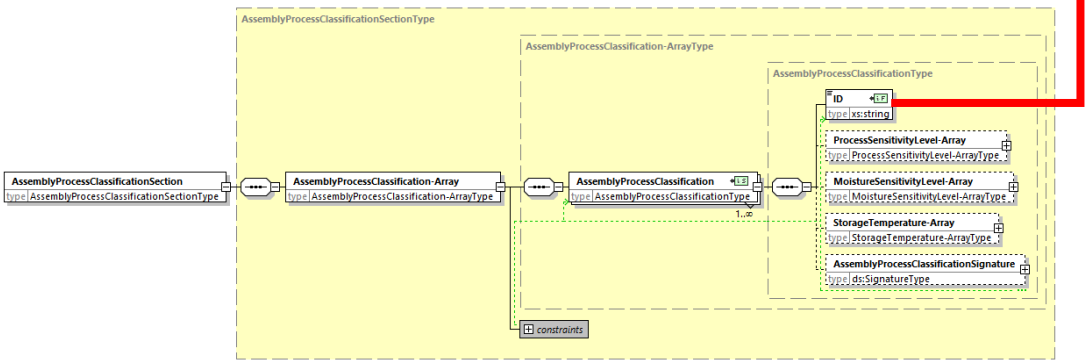
4.2 Manufacturer Part Number-Array

path	**PartModel/ManufacturerPartNumber-Array.**
diagram	
type	**MPN–ArrayType, PartNumberType, OrderablePartNumber-ArrayType, PartDetailsType.**

The *ManufacturerPartNumber-Array* consists of 3 sections that provide the definition of the part number, and how it can be connected to the technical specification. All Parts via their Orderable Part Numbers or Part Number families are connected to the details in the *AssemblyProcessClassificationSection* via the *PartDetails* section.

4.3 Linking the Manufacturing Part Number to a specific Assembly Process Classification Data set

The linking of the Parts to its technical data is done via the *PartDetails-Array* section as outline in the JEP30 - Part Model Guidelines for Electronic-Device Packages – XML Requirements. This consists of two sections called *PartsSelection-Array* and *Association-Array* which defines the relationship between identifying the specific set of parts and how they are associated with the assembly process classification content. Reference the JEP30 parent document for more details on this association.

path	**PartModel/PartDetails-Array/PartDetails/Association-Array/Association/AssemblyProcessClassification-Array**
diagram at the Association level	
type	**AssemblyProcessClassificationAssociation-ArrayType, AssemblyProcessClassificationAssociationType, ProcessSensitivityLevelAssociation-ArrayType, MoistureSensitivityLevelAssociation-ArrayType, JEP30-D10:SignatureDigestLinkType.**
path	**PartModel/AssemblyProcessClassificationSection**
diagram at the Assembly Process Classification Section level	
type	**AssemblyProcessClassificationSectionType, AssemblyProcessClassification-ArrayType, AssemblyProcessClassificationType, ProcessSensitivityLevel-ArrayType, MoistureSensitivityLevel-ArrayType, StorageTemperature-ArrayType, ds:SignatureType.**

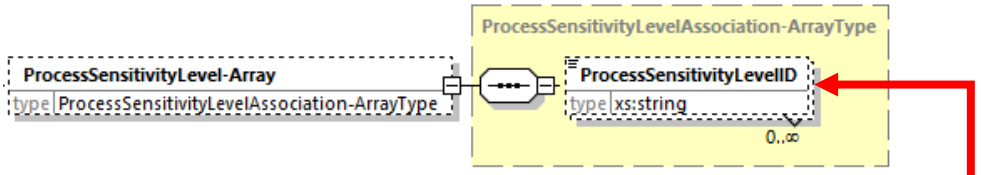
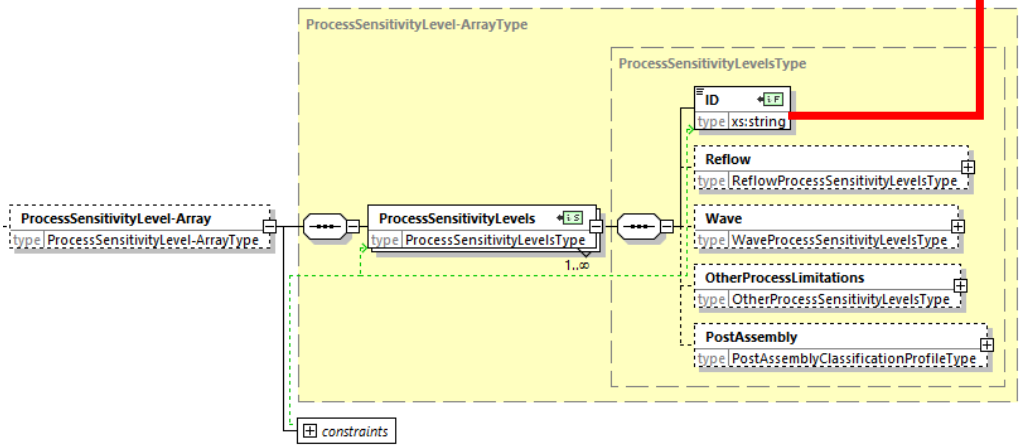
When all the parts that are identified in the parts identity section would point to a single instance of *ProcessSensitivityLevels*, *MoistureSensitivityLevelsClassification* and *StorageTemperature,* then a single mapping via the *PartsSelectionID* is used to make the association.

Typically, when providing assembly process classification data for a set of parts as defined by the *PartNumberSeriesID* or the *OrderablePartNumberID* then the entirety of the process sensitivity level profiles, moisture sensitivity levels classifications and storage temperature information is provided in one instance, then this collection can be digitally signed.

4.3 Linking the Manufacturing Part Number to a specific Assembly Process Classification Data set (cont'd)

The *AssemblyProcessClassificationID* references the *AssemblyProcessClassification/ID* under the *AssemblyProcessClassificationSection/AssemblyProcessClassification-Array/AssemblyProcessClassification*. This is enforced by the key named as *AssemblyProcessClassificationKey* that is assigned to the *AssemblyProcessClassification/ID* element, which is referenced by the *AssemblyProcessClassificationID* which has a KeyRef that refers to the *JEP30-A101: AssemblyProcessClassificationKey*.

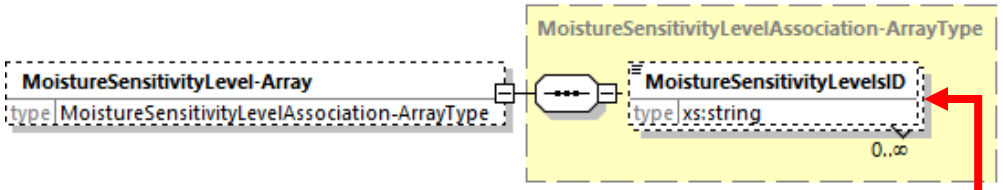
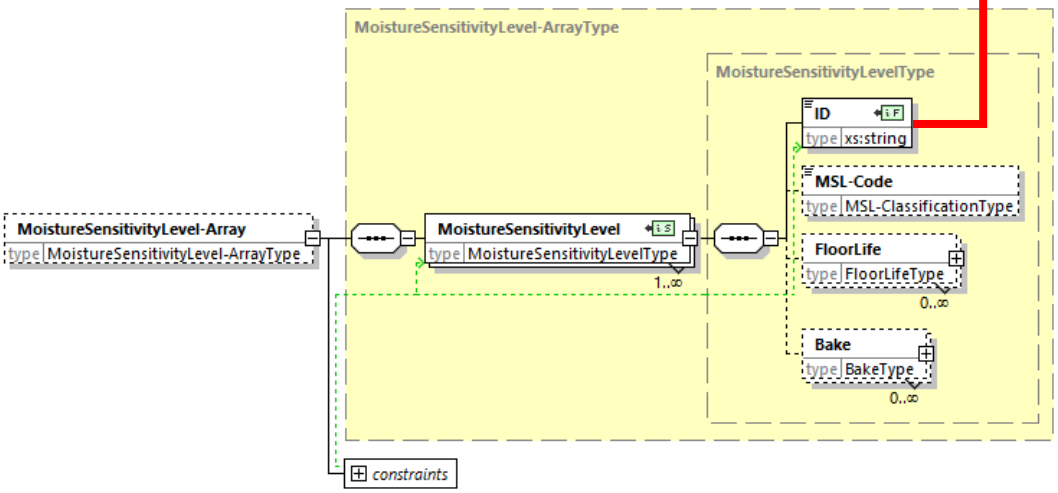
4.3.1 Linking the Manufacturing Part Number to Process Sensitivity Level

path	**PartModel/PartDetails-Array/PartDetails/Association-Array/Association/AssemblyProcessClassification-Array/AssemblyProcessClassification/ProcessSensitivityLevel-Array**
diagram at the Process Sensitivity Association level	
type	**ProcessSensitivityLevelAssociation-ArrayType**
path	**PartModel/AssemblyProcessClassificationSection/AssemblyProcessClassification-Array/AssemblyProcessClassification/ProcessSensitivityLevel-Array**
diagram at the Process Sensitivity Level-Array level	
type	**ProcessSensitivityLevel-ArrayType, ProcessSensitivityLevelsType, ….**

However, when there are multiple process sensitivity level profiles or multiple moisture sensitivity levels classifications for the same set of parts as represented by the same *PartNumberSeriesID* or by *OrderablePartNumberID*, then a subset of parts as defined by the *PartsSelectionID* is configured and mapped to its specific instance of the process sensitivity level profiles via the *ProcessSensitivityLevels/ID*. This process is repeated for each process sensitivity level profile that is mapped to its respective subset of parts as defined by each *PartsSelectionID*.

The *ProcessSensitivityLevelID* references the *ProcessSensitivityLevels/ID* under the *AssemblyProcessClassificationSectionType/AssemblyProcessClassification-Array/AssemblyProcessClassification/ProcessSensitivityLevel-Array*. This is enforced by the key named as *PSL-Key* that is assigned to the *ProcessSensitivityLevels/ID* element, which is referenced by the *ProcessSensitivityLevelID* which has a KeyRef that refers to the *JEP30-A101:PSL-Key*.

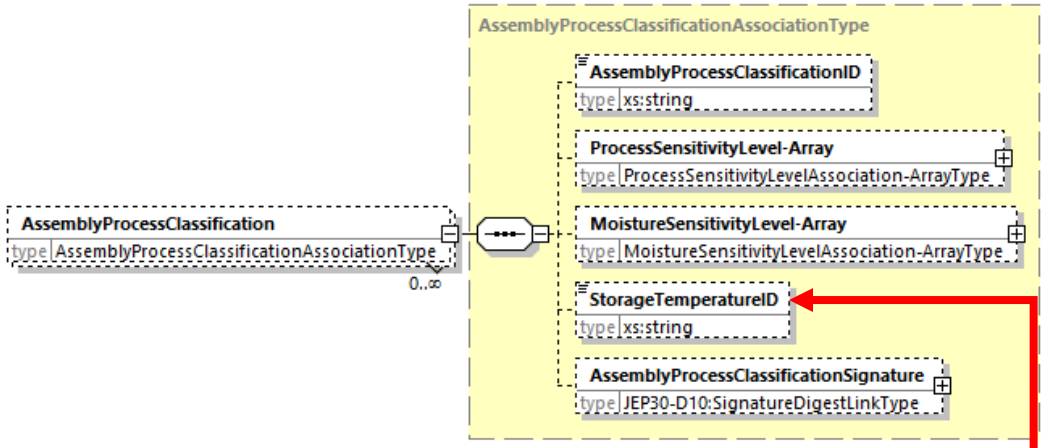
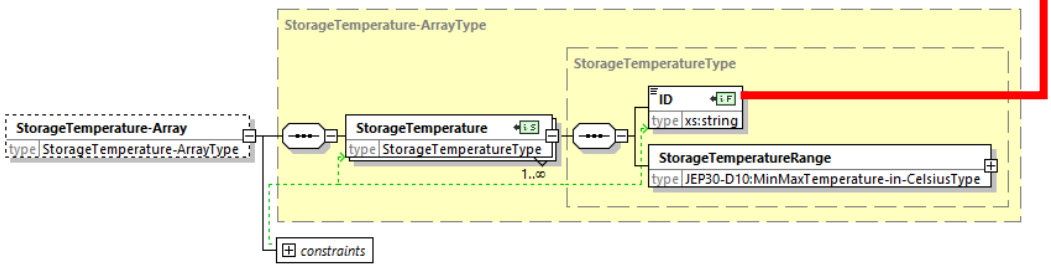
4.3.2 Linking the Manufacturing Part Number to Moisture Sensitivity Level

path	**//element(*,PartsSelection-to-DetailAssociationType)/AssemblyProcessClassification-Array/AssemblyProcessClassification/MoistureSensitivityLevel-Array**
diagram at the Moisture Sensitivity Association level	
type	**MoistureSensitivityLevelAssociation-ArrayType**
path	**PartModel/AssemblyProcessClassificationSection/AssemblyProcessClassification-Array/AssemblyProcessClassification/MoistureSensitivityLevel-Array**
diagram at the Moisture Sensitivity Level Array level	
type	**MoistureSensitivityLevel-ArrayType, MoistureSensitivityLevelType, …**

If the selection of parts as defined by any of the previous *PartsSelectionID* that was defined for mapping to the process sensitivity level profiles, has the same moisture sensitivity levels classification, then that same *PartsSelectionID* can be used to make an association to the *MoistureSensitivityLevel/ID*. If the sub-selection of parts is different, then a dedicated *PartsSelectionID* is configured to this new sub-selection of parts to the moisture sensitivity levels classifications information via the *MoistureSensitivityLevel/ID*.

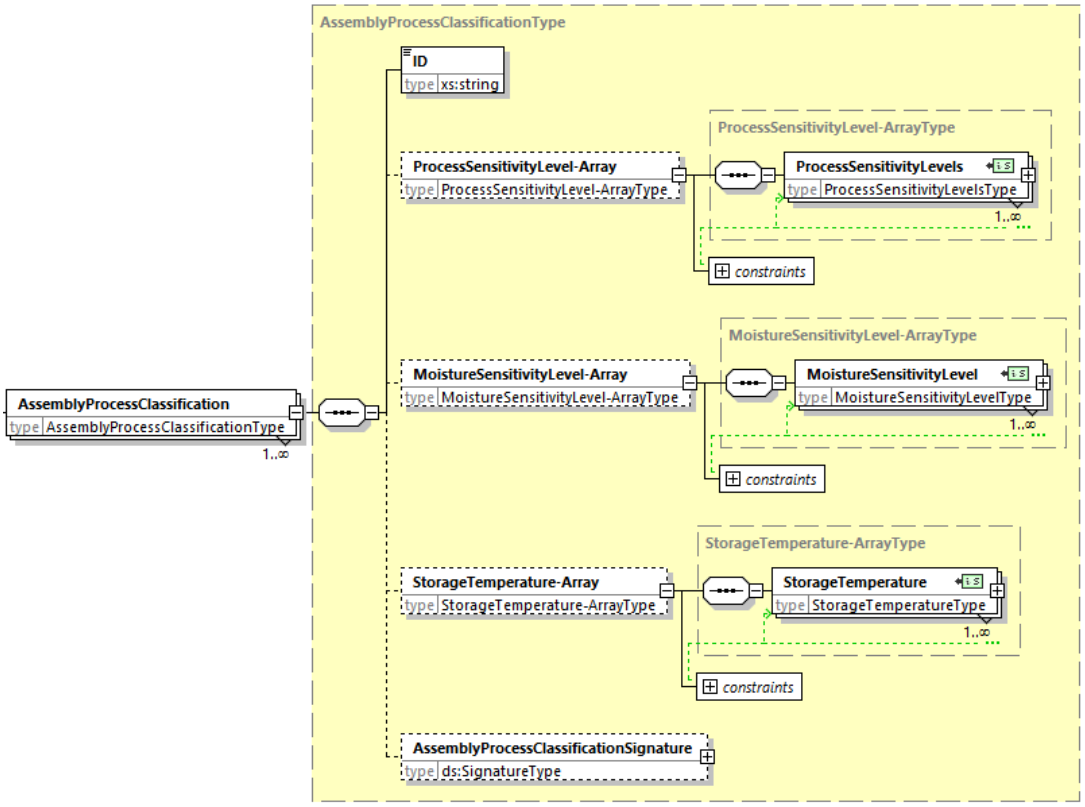
The MoistureSensitivityLevelID references the MoistureSensitivityLevels/ID under the AssemblyProcessClassificationSectionType/AssemblyProcessClassification-Array/Assembly ProcessClassification/MoistureSensitivityLevel-Array. This is enforced by the key named as MSL-Key *that is assigned to the MoistureSensitivityLevels/ID element, which is referenced by the MoistureSensitivityLevelID which has a KeyRef that refers to the* JEP30-A101:MSL-Key.

4.3.3 Linking the Manufacturing Part Number to Storage Temperature

path	**PartModel/PartDetails-Array/PartDetails/Association-Array/Association/AssemblyProcessClassification-Array/AssemblyProcessClassification**
diagram at the Assembly Process Classification Association level	
type	**AssemblyProcessClassificationAssociationType,**
path	**PartModel/AssemblyProcessClassificationSection/AssemblyProcessClassification-Array/AssemblyProcessClassification/StorageTemperature-Array**
diagram at the Storage Temperature-Array level	
type	**StorageTemperature-ArrayType, StorageTemperatureType, …**

The StorageTemperatureIID references the StorageTemperature/ID under the AssemblyProcessClassificationSectionType/AssemblyProcessClassification-Array/Assembly ProcessClassification/StorageTemperature-Array. This is enforced by the key named as StorageTemperatureKey that is assigned to the StorageTemperature/ID element, which is referenced by the StorageTemperatureIID which has a KeyRef that refers to the JEP30-A101:StorageTemperatureKey.

4.4 Assembly Process Classification

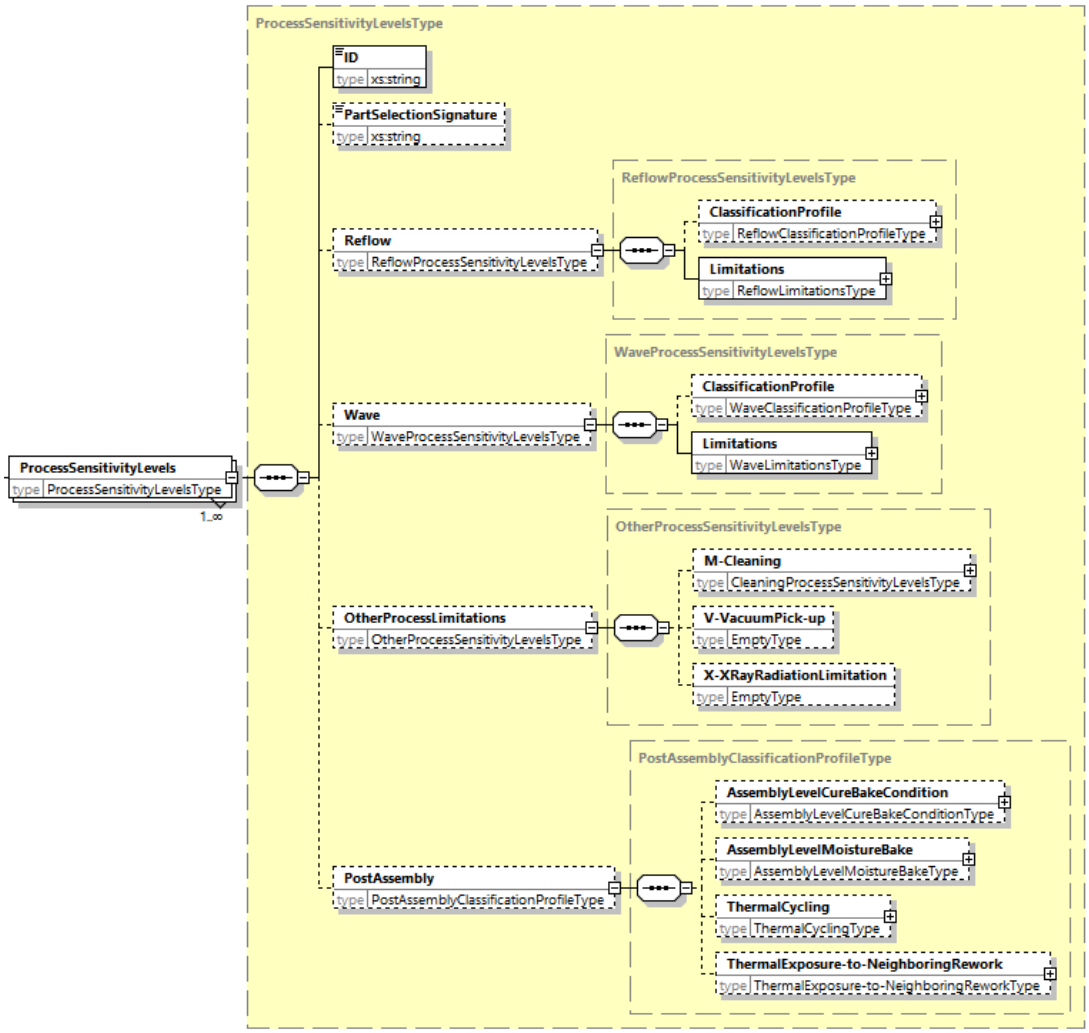
path	**PartModel/AssemblyProcessClassificationSection**
diagram	
type	**AssemblyProcessClassificationType, ProcessSensitivityLevel-ArrayType, ProcessSensitivityLevelsType, MoistureSensitivityLevel–ArrayType, MoistureSensitivityLevelType, Storage Temperature–ArrayType, StorageTemperatureType.**

The *AssemblyProcessClassificationSection* is broken into 3 sub-sections that are relevant to the Manufacturing Process for assembling the Part to the Printed Board, namely:

1. *ProcessSensitivityLevel-Array*, (see 4.4.1)
2. *MoistureSensitivityLevel-Array*,
3. *StorageTemperature-Array*.

These sections are described in detail in the following sections.

4.4.1 Process Sensitivity Levels Family

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels**
diagram	
type	**ProcessSensitivityLevelsType, ReflowProcessSensitivityLevelsType, WaveProcessSensitivityLevelsType, OtherProcessSensitivityLevelsType, PostAssemblyClassificationProfileType.**

ProcessSensitivityLevels has 4 sections, two sections for the soldering process - one for *Reflow* and one for *Wave*, a third section for *OtherProcessLimitations*, and the last section is for *PostAssembly* classification profile. Some parts are only suitable for reflow soldering process in which case the *Reflow* branch is captured (the *Wave* branch is not captured) in the XML file. Other parts are only suitable for the wave process and unsuitable for the reflow process, in which case the part model data is captured for the *Wave* branch (and not the *Reflow* branch) in the XML file. However there are also parts that are compatible for both the *Reflow* and the *Wave* process, such as

1. Coarse pitch Flatpacks/Small Outline Package Bodies with Gull-wing terminals,
2. Ceramic Discrete parts that are within a certain Package Body size,
3. Through Hole Parts that are also suitable for Paste-in-Hole technology, Etc., etc.

4.4.1 Process Sensitivity Levels Family (cont'd)

SMD Parts which are assembled to their Products and soldered via a wave soldering process will have their package body immersed in the liquidus solder, whereas in the reflow process, the package body does not receive the same thermal shock. While many of the terminologies under the *ClassificationProfile* and *Limitations* sections are similar, their values for each respective process may not be the same. These parts must have both the *Reflow* and the *Wave* sections captured in the XML file.

The 3rd section *OtherProcessLimitations* addresses device limitations to other process steps in the card assembly process other than the reflow and wave soldering processes. If none of these limitations apply then no information needs to be reported for this section.

The *PostAssembly* classification section covers four post assembly process steps to which the device specified in this xml file, could be exposed after it has been attached to a printed board assembly. If the device cannot withstand the stated conditions below, then details of what conditions the device can withstand must be captured under that respective branch. If the device can withstand the stated conditions then no information needs to be reported for this section.

1. *AssemblyLevelCureBakeCondition*,

    a. This section applies to the heating up of whole printed board assembly to cure the adhesive used to attach a heatsink onto one or more other devices on the printed board. A common cure condition is 125 °C for 90 minutes.

2. *AssemblyLevelMoistureBake*,

    a. Baking the whole printed board assembly so that nearest neighbors devices that are moisture sensitive are not damaged when a failing device is removed and replaced using hot air tools. Printed board assembly bake conditions could be 125°C for 48 hours.

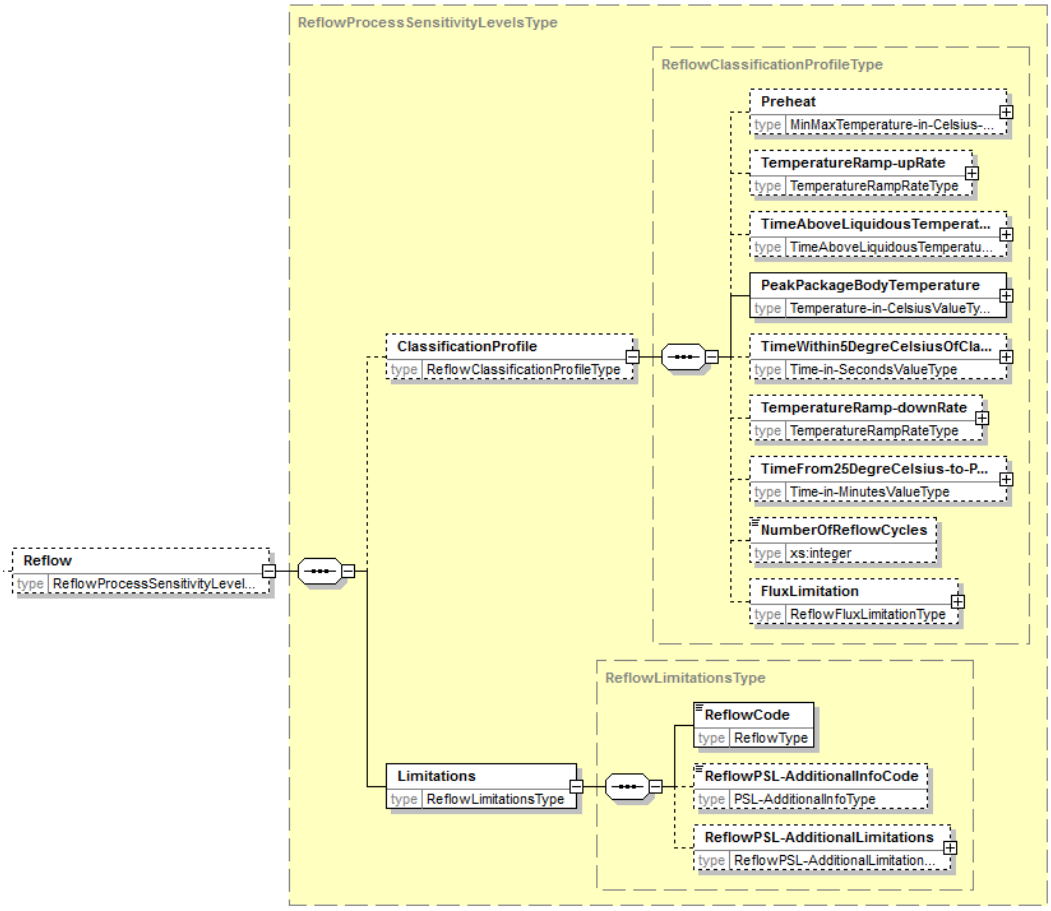
3. *ThermalCycling*, and

    a. On rare occasions to remove marginal devices or assemblies, a printed board assembly level thermal cycle screen may be performed. The target "capability" conditions are 100 cycles of 0 °C to 100 °C, at one cycle per hour.

4. *ThermalExposure-to-NeighbouringRework*.

    a. During Rework, the heat from hot air rework tools on sensitive devices when a device next to it needs to be removed and replaced, can cause damage to those sensitive devices. The target "capability" conditions are 180 °C for 5 minutes.

4.4.1.1 Reflow Process Sensitivity Levels Type

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow**
diagram	
type	**ReflowProcessSensitivityLevelsType, ReflowClassificationProfileType, CelsiusTemp-in-SecondsLimitType, TemperatureRampRateType, TimeAboveLiquidousTemperatureType, CelsiusTemperatureValueType, Time-in-SecondsValueType, Time-in-MinutesValueType, ReflowFluxLimitationType, ReflowLimitationsType, ReflowType, PSL-AdditionalInfoType, ReflowPSL–AdditionalLimitationsType**

This section applies to SMD parts and selective through-hole parts (where the supplier has specifically documented support for reflow soldering, via “Paste-in-Hole” technology).

If a part is reflow compatible, then the *ReflowCode* under *Limitations* is a mandatory requirement to be specified, even in the event that the part is compliant with the standard process profile as defined in the J-STD-075 standard. The supplier shall evaluate and classify their part’s PSL to the worse-case process limits as outlined in this standard. The *ReflowCode* consists of 2 characters, as defined in the table titled “Reflow Solder PSL Classification” of that standard, where the first character denotes Reflow and the 2nd character represents a temperature classification (T_C). The *ReflowPSL–AdditionalInfoCode* is an optional 3rd character that identifies other process limitations, as defined in the “PSL 3rd Character” table in the J-STD-075 standard.

4.4.1.1 Reflow Process Sensitivity Levels Type (cont'd)

If a supplier is following the J-STD-075 classification process, then it is only necessary to capture the *Limitations* section. However in the event of the following two criteria, the part manufacturer is encouraged to provide a target classification profile for their part.

1. If better yield and reliability can be achieved for the part, or
2. The Part Manufacturer does not comply with the standard classifications specified in the J-STD-075 document.

4.4.1.1.1 Reflow Classification Profile Type

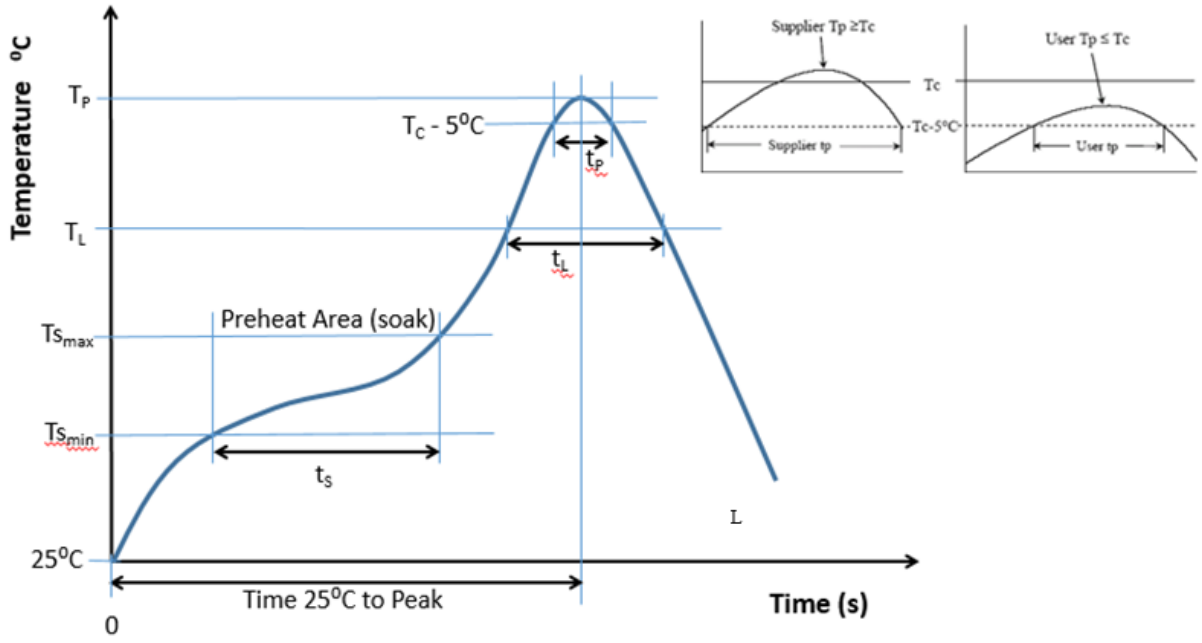


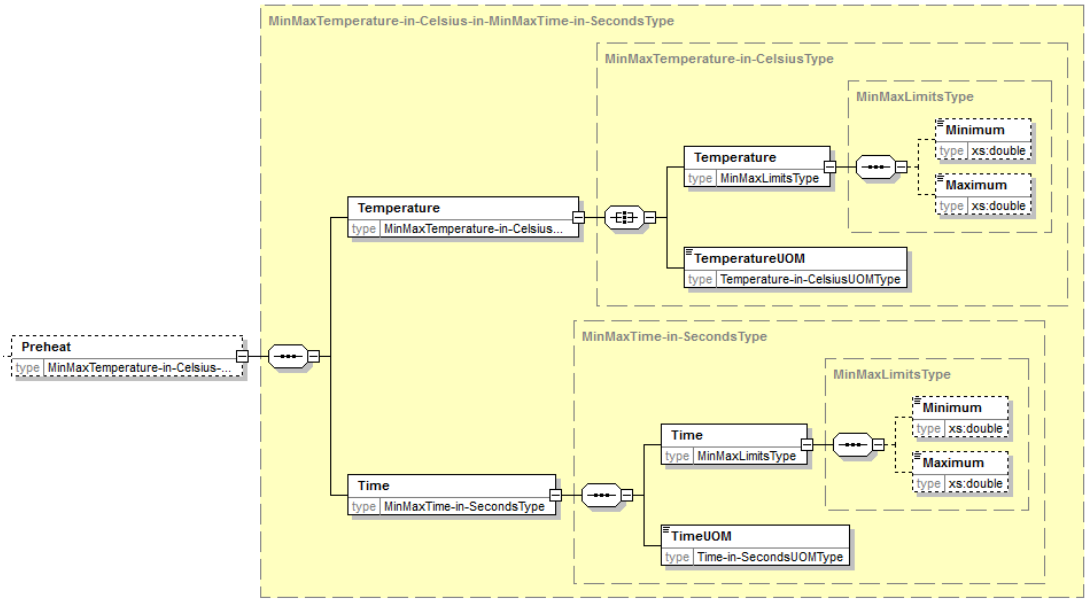
Figure 1 — Reflow Classification Profile (Not to scale)

The Base Solder Process conditions as specified under the *ClassificationProfile* and shown in Figure 1 from J-STD-075, Base Reflow Solder Process Conditions section.

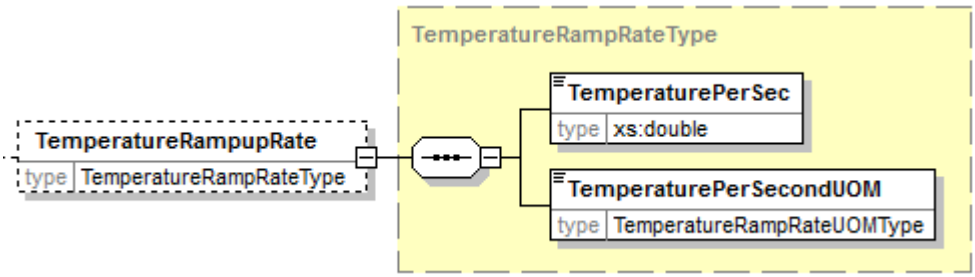
As new soldering technologies emerge, driving new requirement for new classification profiles, it is desirable for component manufacturers to provide this *ClassificationProfile* for the part, so as to enable better efficiencies in the creation of a classification profile for the board assembly, without risking damage to the part.

In addition, as new soldering alloys are introduced, which require new classification profiles to be introduced which are not yet standardized, the provision of the *ClassificationProfile* details in this section, greatly enhances the ability of a board assembler to develop a board assembly profile that will match the requirements of the part.

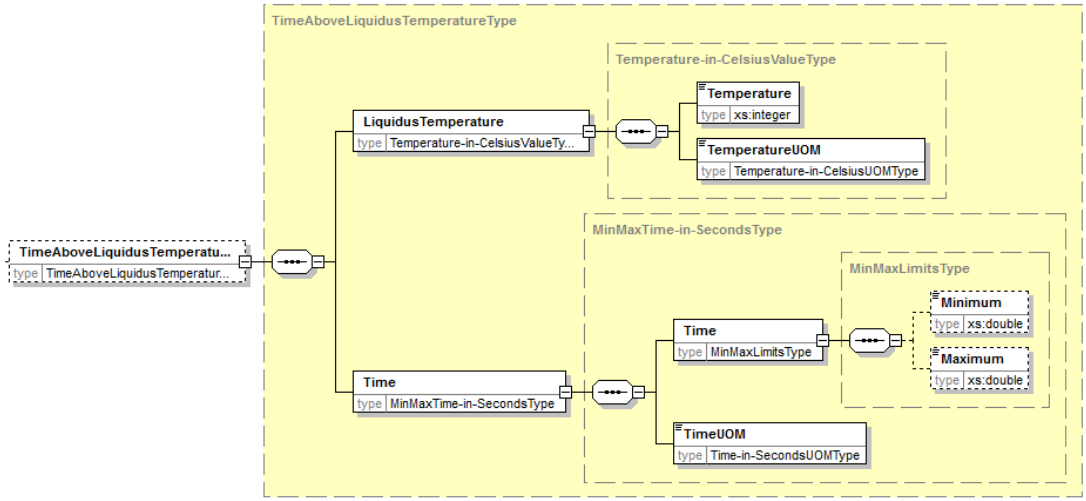
4.4.1.1.1.1 Preheat

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/Preheat**
diagram	
type	**MinMaxTemperature-in-Celsius-in-MinMaxTime-in-SecondsType, MinMaxTemperature-in-CelsiusType, MinMaxLimitsType, Temperature-in-CelsiusUOMType, MinMaxTime-in-SecondsType, Time-in-SecondsUOMType.**

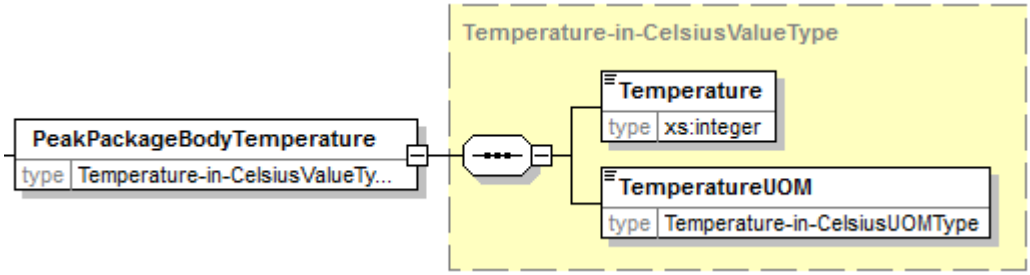
4.4.1.1.1.2 Temperature Ramp up Rate

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/TemperatureRampupRate**
diagram	
type	**TemperatureRampRateType, TemperatureRampRateUOMType.**

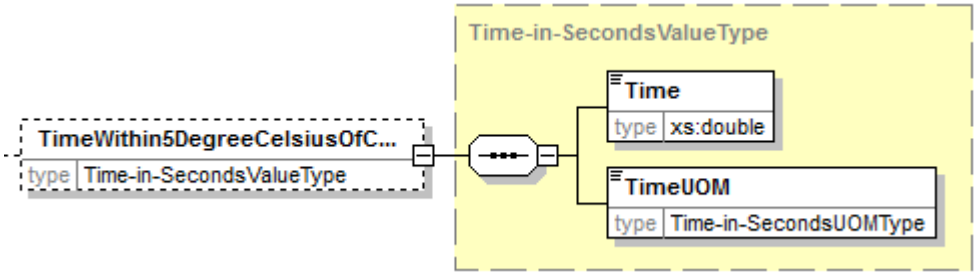
4.4.1.1.1.3 Time above Liquidus Temperature

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/TimeAboveLiquidusTemperature**
diagram	
type	**TimeAboveLiquidusTemperatureType, Temperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType, MinMaxTime-in-SecondsType, MinMaxLimitsType, Time-in-SecondsUOMType.**

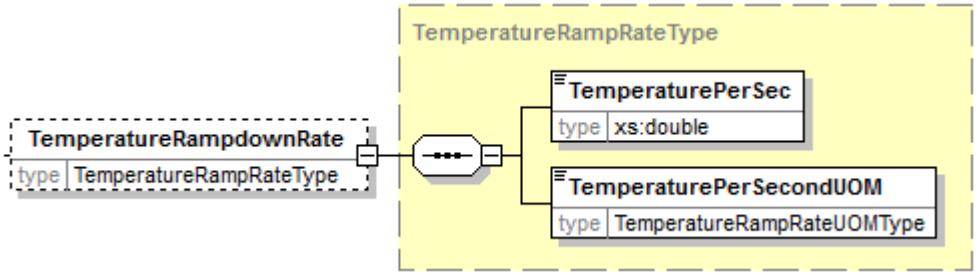
4.4.1.1.1.4 Peak Package Body Temperature

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/PeakPackageBodyTemperature**
diagram	
type	**Temperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType.**

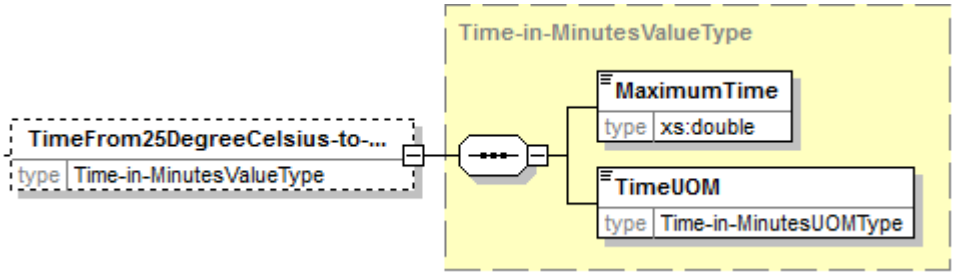
4.4.1.1.1.5 Time within 5 °C of Classification Temperature

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/TimeWithin5DegreeCelsiusOfClassificationTemperature**
diagram	
type	**Time-in-SecondsValueType, Time-in-SecondsUOMType.**

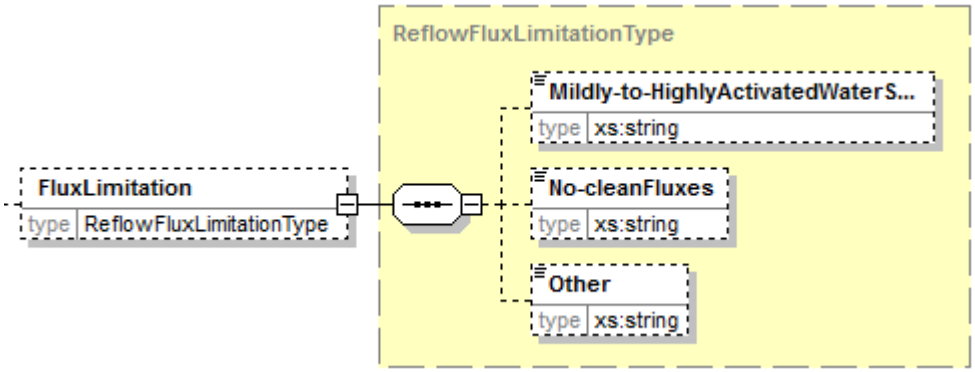
4.4.1.1.1.6 Temperature Ramp down Rate

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/TemperatureRampdownRate**
diagram	
type	**TemperatureRampRateType, TemperatureRampRateUOMType.**

4.4.1.1.1.7 Time from 25 °C -to-Peak Temperature

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/TimeFrom25DegreeCelsius-to-PeakTemperature**
diagram	
type	**Time-in-MinutesValueType, Time-in-MinutesUOMType,.**

4.4.1.1.1.8 Flux Limitation

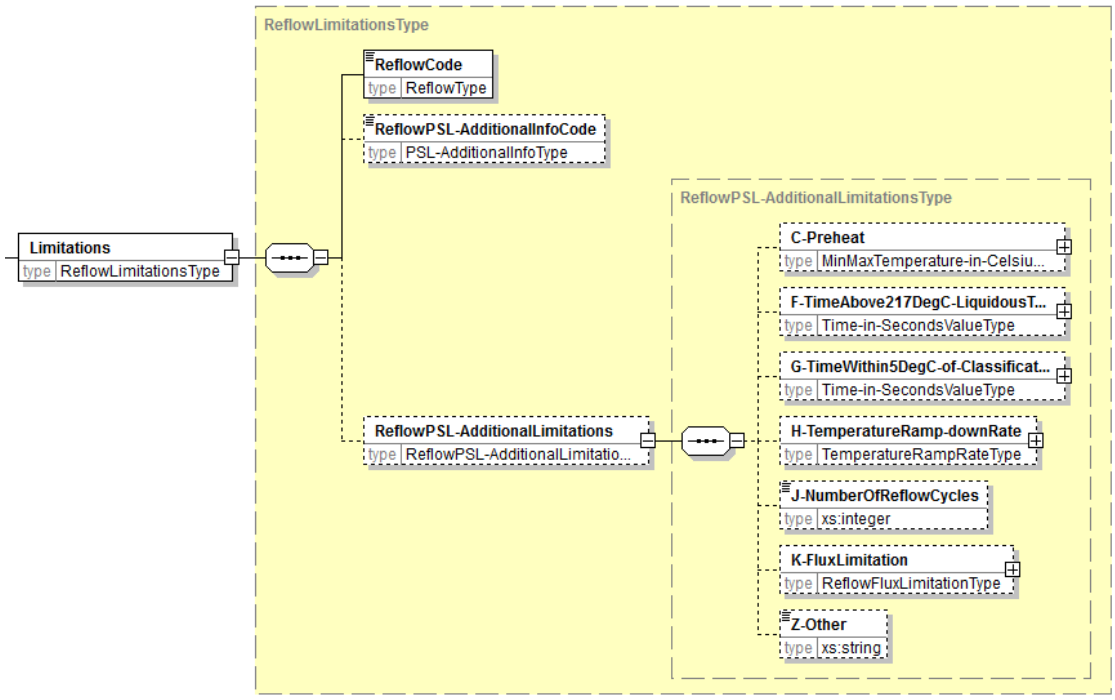
path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/ClassificationProfile/FluxLimitation**
diagram	
type	**ReflowFluxLimitationType.**

If the supplier is following the J-STD-075 classification process, then the part can be classified in the following *Reflow* Limitations Type section. However, if the supplier is either not following the J-STD-075 classification process or is unable to classify the part as per this standard, then the supplier shall provide the above *ClassificationProfiles* for the part.

The provision of this reflow classification profile for the part are for classification / preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should exceed the parameters defined for this part. For example, if T_C is 260°C and the time T_P is 30 seconds, this means the following is claimed by the supplier and becomes a restriction on the user:

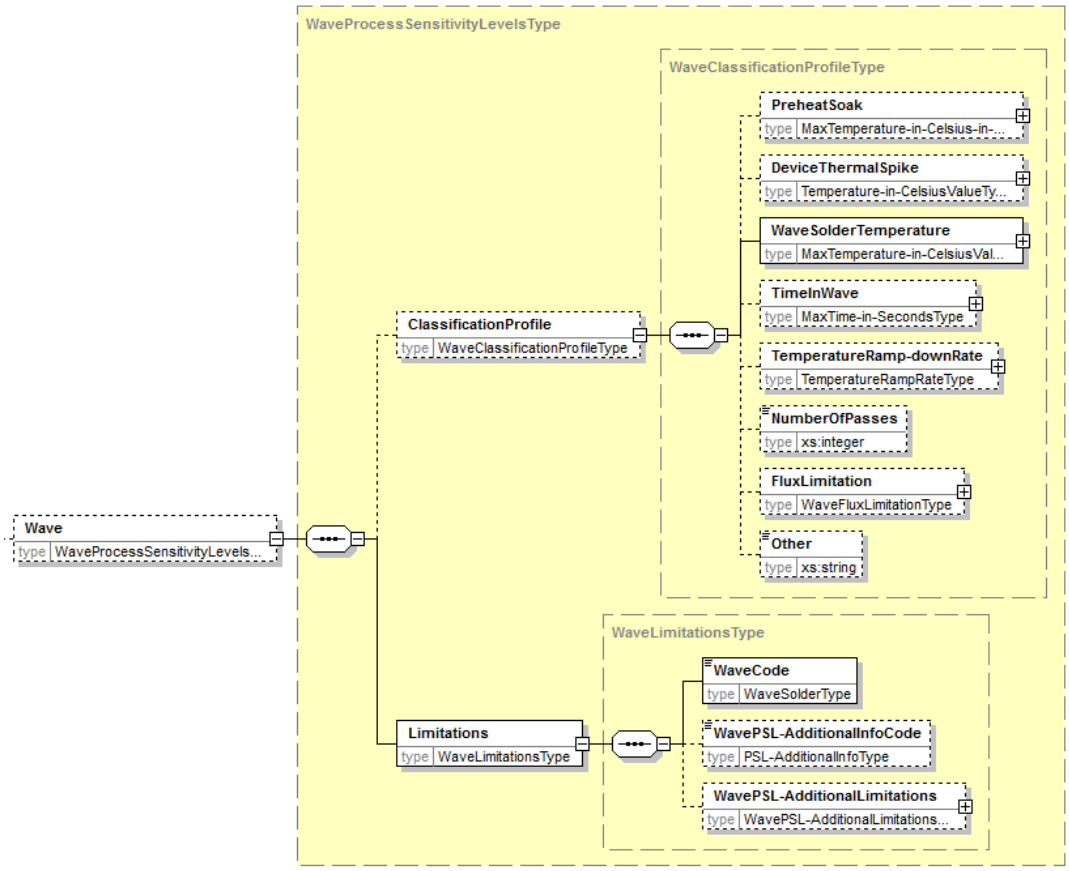
1. For a supplier, the peak temperature must be at least 260 °C, and the time above 255 °C must be at least 30 seconds.
2. For the user, the peak temperature must not exceed 260 °C, and the time above 255 °C must not exceed 30 seconds

4.4.1.1.2 Reflow Limitations Type

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Reflow/Limitations**
diagram	
type	**ReflowLimitationsType, Reflowtype, PSL–AdditionalInfoType, ReflowPSL–AdditionalLimitationsType, MinMaxTemperature-in-Celsius-in-MaxTime-in-SecondsType, Time-in-SecondsValueType, TemperatureRampRateType, ReflowFluxLimitationType.**

If a part does not comply with the industry standard J-STD-075 classification process, as denoted by the *ReflowCode* R0, then one or more limitations exists. This section enables the supplier to provide details on the limitations and to quantify the limitation that apply to the part during the reflow process.

4.4.1.2 Wave Process Sensitivity Levels Type

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave**
diagram	
type	**WaveProcessSensitivityLevelsType, WaveClassificationProfileType, MaxTemperature-in-Celsius-in-MaxTime-in-SecondsType, Temperature-in-CelsiusValueType, MaxTemperature-in-CelsiusValueType, MaxTime-in-SecondsType, TemperatureRampRateType, WaveFluxLimitationType, WaveLimitationsType, WaveSolderType, PSL–AdditionalInfoType, WavePSL–AdditionalLimitationsType.**

This section applies to through-hole parts where the package body is not immersed in the solder wave (only the terminals), and to all SMD parts where the supplier has identified full-wave submersion as an acceptable process for their part family.

If a part is wave solder compatible, then the *WaveCode* under *Limitations* is a mandatory requirement to be specified, even in the event that the part is compliant with the standard process profile as defined in the J-STD-075 standard. The supplier shall evaluate and classify their part's PSL to the worse-case process limits as outlined in this standard. The *WaveCode* consists of 2 characters, as defined in the table titled "Wave Solder PSL Classification" in this standard, where the first character denotes Wave and the 2nd character represents a temperature classification (T_C). The *WavePSL–AdditionalInfo* is an optional 3rd character that identifies other process limitations, as defined in the "PSL 3rd Character" table in the J-STD-075 standard.

4.4.1.2 Wave Process Sensitivity Levels Trpe (cont'd)

JESD22-A111 covers MSL testing for the backside wave attach of SMT packages (full solder immersion).

If a supplier is following the J-STD-075 classification process, then it is only necessary to capture the *Limitations* section. However in the event of the following two criteria, the part manufacturer is encouraged to provide a target classification profile for their part.

1. If better yield and reliability can be achieved for the part, or
2. The Part Manufacturer does not comply with the standard classifications specified in the J-STD-075 document.

4.4.1.2.1 Wave Classification Profile Type

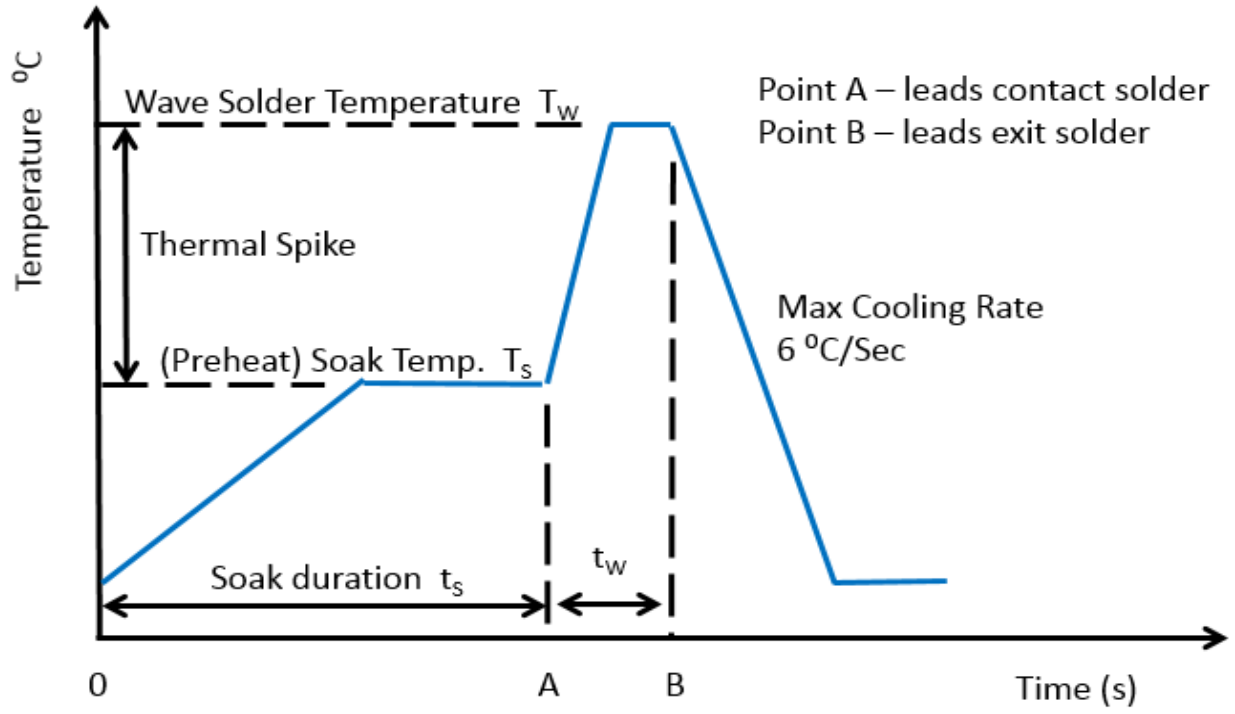


Figure 2 — Classification Profile for Wave Solder Process (Not to scale)

The Base Solder Process conditions as specified under the *ClassificationProfile* and shown above in the chart is in the "Base Wave Solder Process Conditions" section of the J-STD-075 document.

As new soldering technologies emerge, driving new requirement for new classification profiles, it is desirable for component manufacturers to provide this *ClassificationProfile* for the part, so as to enable better efficiencies in the creation of a classification profile for the board assembly, without risking damage to the part.

4.4.1.2.1 Wave Classification Profile Type (cont'd)

In addition, as new soldering alloys are introduced, which require new classification profiles to be introduced which are not yet standardized, then the provision of the classification profiles details in this section, greatly enhances the ability of a board assembler to develop a board assembly profile, that will match the requirements of the part.

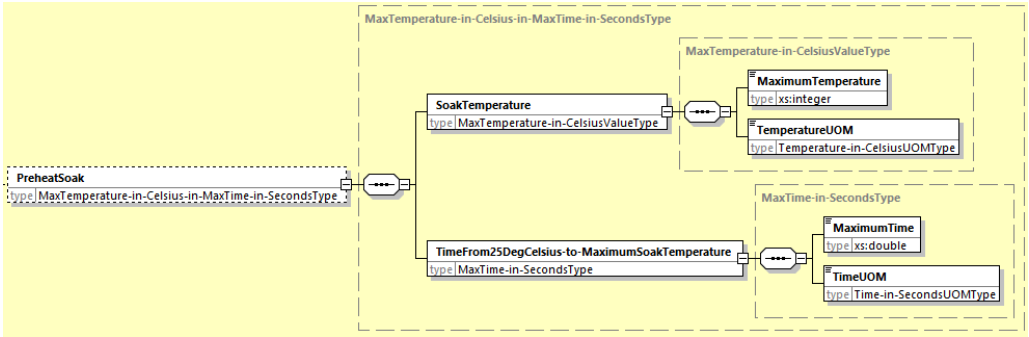
If the supplier classifies the part as being compliant with the industry standard, then the Wave Code in the following Limitation section can be specified as W0. However, for new technology components or for parts that do not conform to the normal industry standards, the supplier can provide a "Classification Profile".

The provision of this wave classification profile for the part are for classification / preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should exceed the parameters defined for this part. For example, if T_s is 160°C and the time T_s is 250 seconds, this means the following is claimed by the supplier and becomes a restriction on the user:

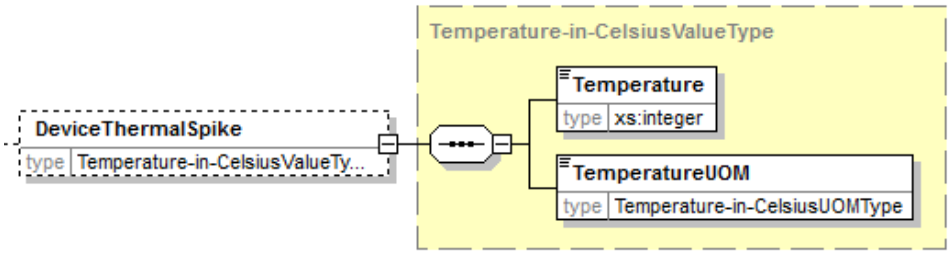
1. For a supplier, the maximum soak temperature T_s must be at least 160°C, and the time from room temperature to Max T_s must be at least 250 seconds.

2. For the user, the maximum soak temperature T_s must not exceed 160°C, and the time from room temperature to Max T_s must not exceed 250 seconds

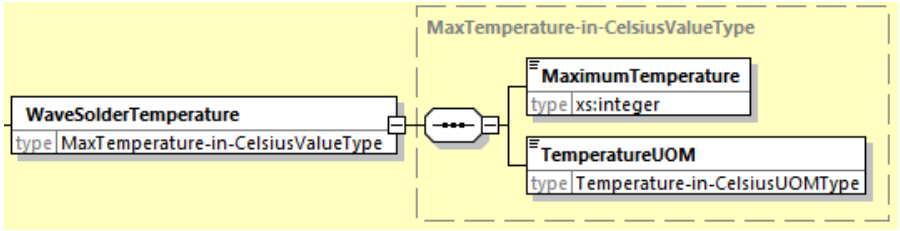
4.4.1.2.1.1 Preheat Soak

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/PreheatSoak**
diagram	
type	**MaxTemperature-in-Celsius-in-MaxTime-in-SecondsType, MaxTemperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType, MaxTime-in-SecondsType, Time-in-SecondsUOMType.**

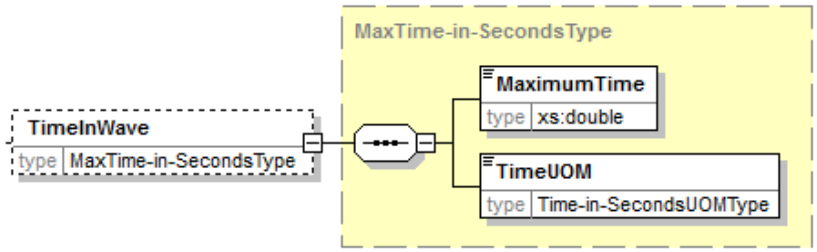
4.4.1.2.1.2 Device Thermal Spike

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/DeviceThermalSpike**
diagram	
type	**Temperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType.**

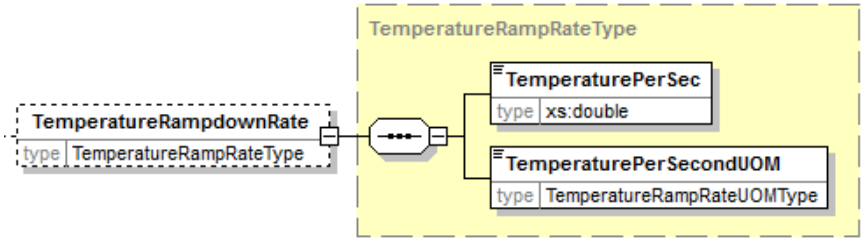
4.4.1.2.1.3 Wave Solder Temperature

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/WaveSolderTemperature**
diagram	
type	**MaxTemperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType.**

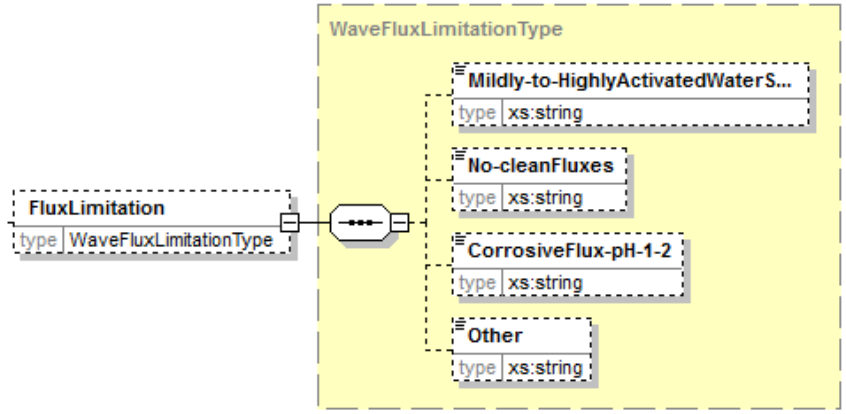
4.4.1.2.1.4 Time in Wave

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/TimeInWave**
diagram	
type	**MaxTime-in-SecondsType, Time-in-SecondsUOMType.**

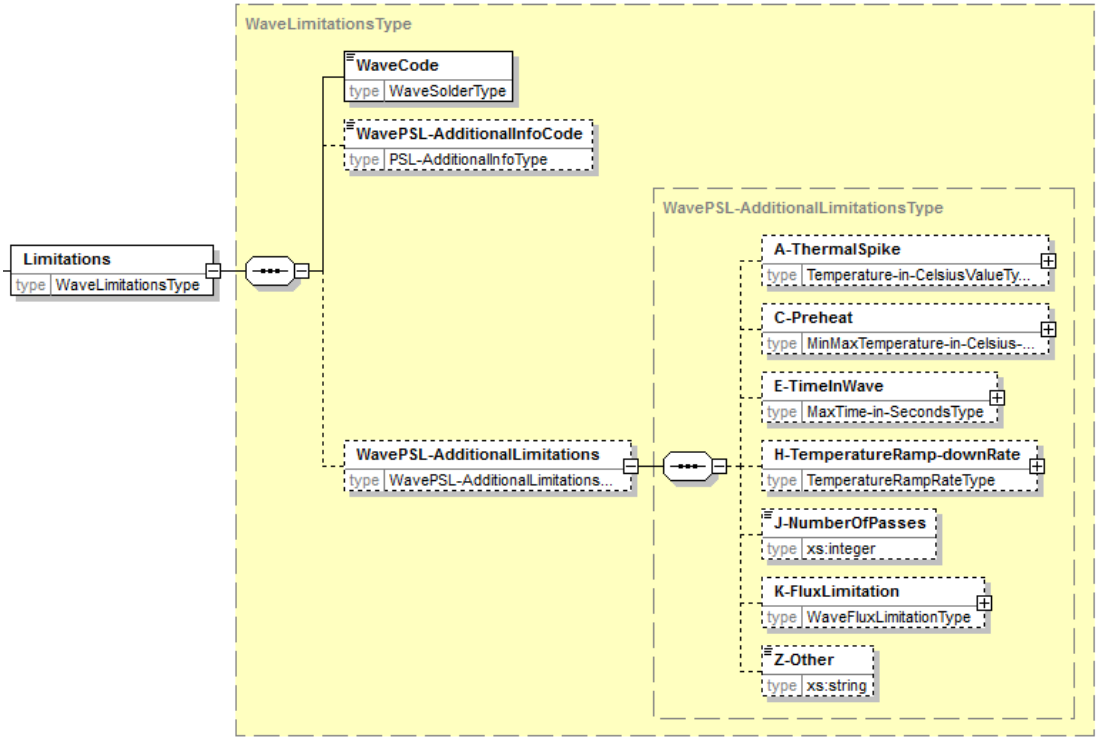
4.4.1.2.1.5 Temperature Ramp down Rate

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/TemperatureRampdownRate**
diagram	
type	**TemperatureRampRateType, TemperatureRampRateUOMType.**

4.4.1.2.1.6 Flux Limitation

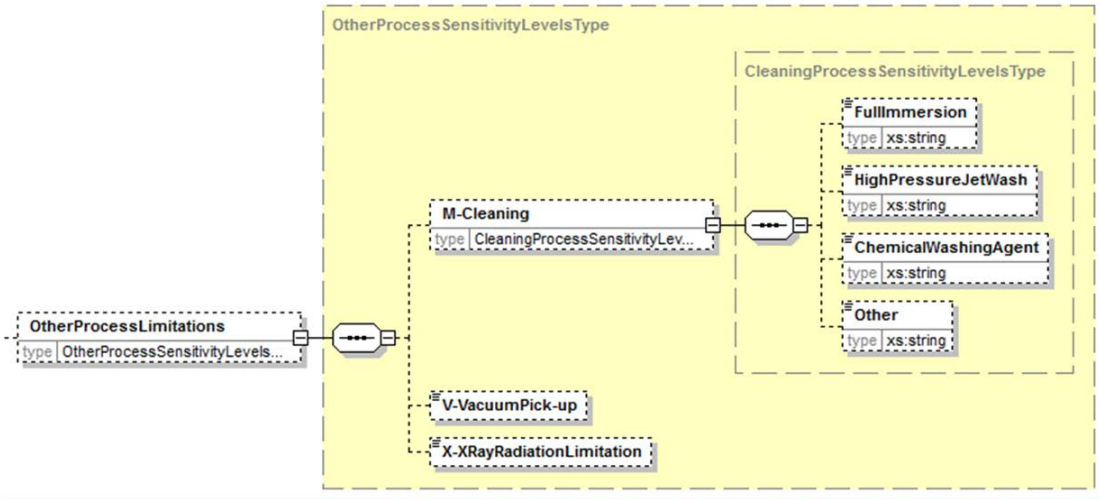
path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/ClassificationProfile/FluxLimitation**
diagram	
type	**WaveFluxLimitationType.**

4.4.1.2.2 Wave Limitations Type

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/Wave/Limitations**
diagram	
type	**WaveLimitationsType, WaveSolderType, PSL–AdditionalInfoType, WavePSL–AdditionalLimitationsType, Temperature-in-CelsiusValueType, MinMaxTemperature-in-Celsius-in-MaxTime-in-SecondsType, MaxTime-in-SecondsType, TemperatureRampRateType, WaveFluxLimitationType.**

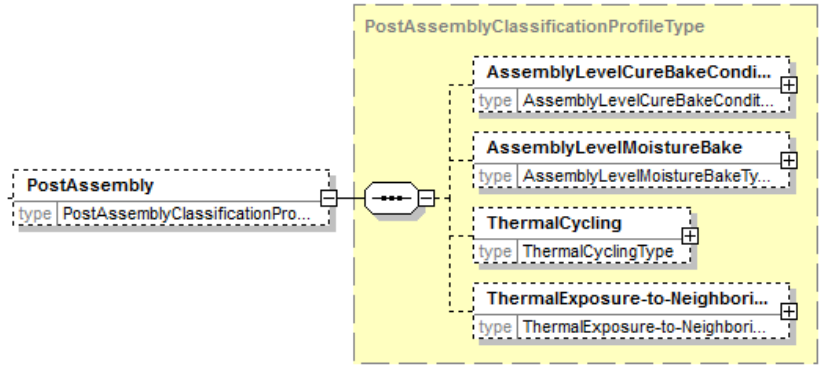
If a part does not comply with the industry standard J-STD-075 classification process, as denoted by the *WaveCode* W0, then one or more limitations exists. This section enables the supplier to provide details on the limitations and to quantify the limitation that apply to the part during the wave process.

4.4.1.3 Other Process Limitations

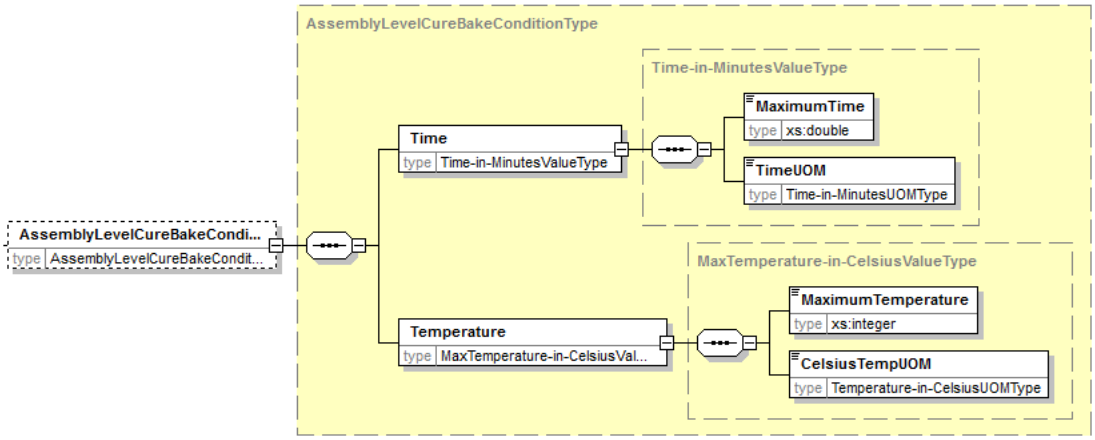
path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/OtherProcessLimitations**
diagram	
type	**OtherProcessSensitivityLevelsType, CleaningProcessSensitivityLevelsType.**

This section *OtherProcessLimitations* indicates a component's susceptibility to the non-soldering stages in the assembly process of mounting the part to the printed board and in subsequent product validation.

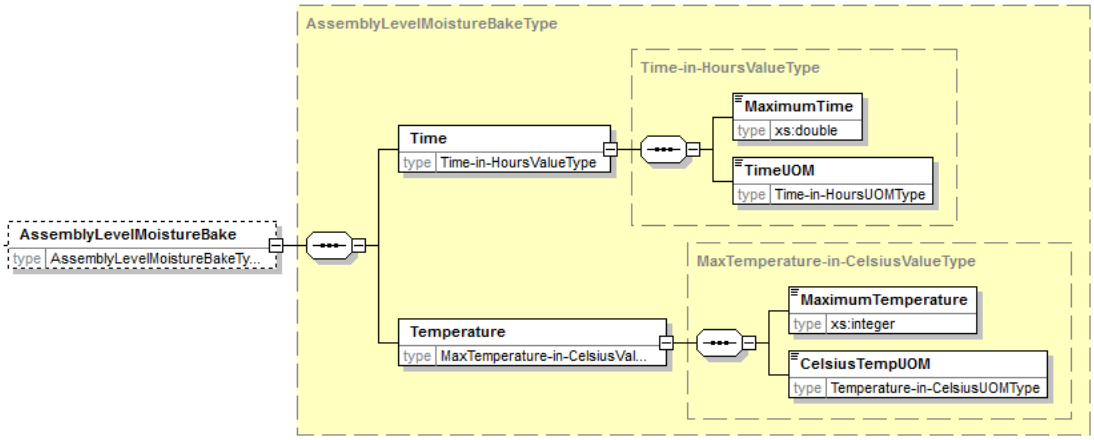
4.4.1.4 Post Assembly

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/PostAssembly**
diagram	
type	**PostAssemblyClassificationProfileType, AssemblyLevelCureBakeConditionType, AssemblyLevelMoistureBakeType, ThermalCyclingType, ThermalExposure-to-NeighboringReworkType.**

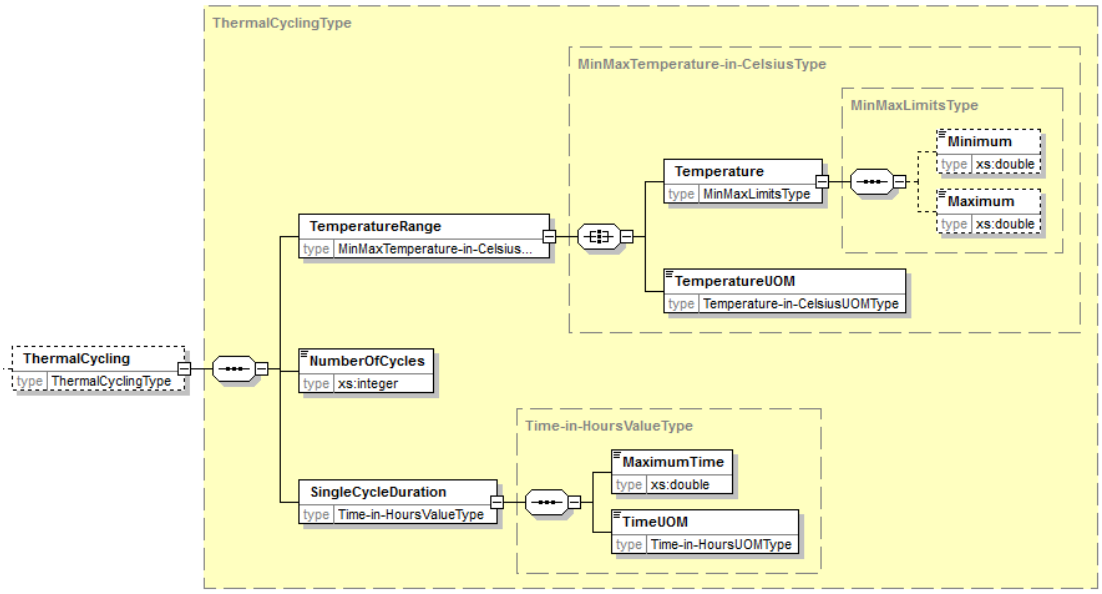
4.4.1.5 Assembly Level Cure Bake Condition

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/PostAssembly/AssemblyLevelCureBakeCondition**
diagram	
type	**AssemblyLevelCureBakeConditionType, Time-in-MinutesValueType, MaxTemperature-in-CelsiusValueType, Time-in-MinutesUOMType, Temperature-in-CelsiusUOMType**

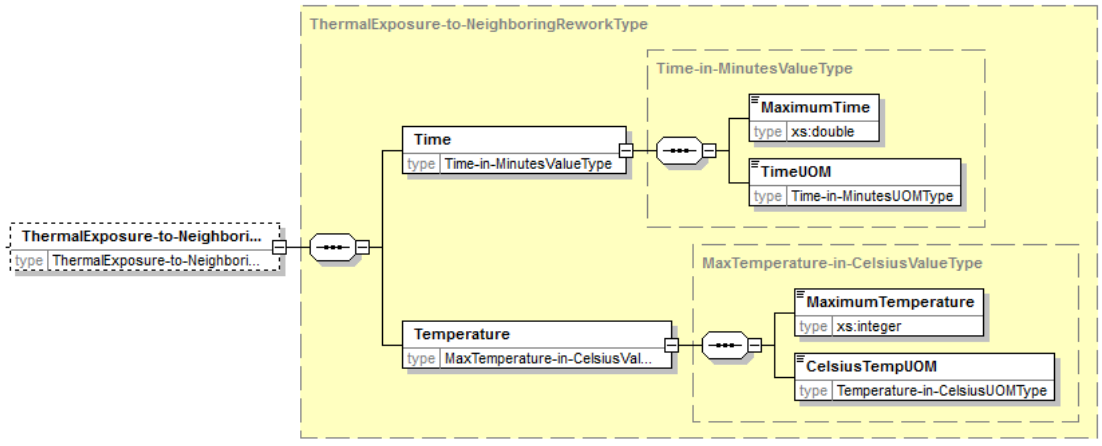
4.4.1.6 Assembly Level Moisture Bake

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/PostAssembly/AssemblyLevelMoistureBake**
diagram	
type	**AssemblyLevelMoistureBakeType, Time-in-HoursValueType, MaxTemperature-in-CelsiusValueType, Time-in-HoursUOMType, Temperature-in-CelsiusUOMType.**

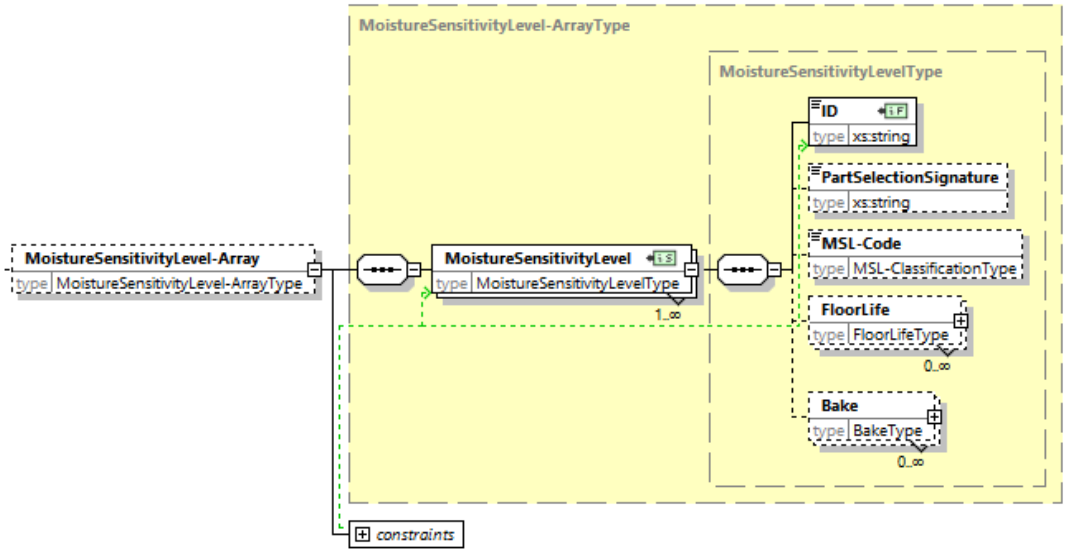
4.4.1.7 Thermal Cycling

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/PostAssembly/ThermalCycling**
diagram	
type	**ThermalCyclingType, MinMaxTemperature-in-CelsiusType, MinMaxLimitsType, Temperature-in-CelsiusUOMType, Time-in-HoursValueType, Time-in-HoursUOMType.**

4.4.1.8 Thermal Exposure-to-Neighboring Rework

path	**PartModel/AssemblyProcessClassificationSection/ProcessSensitivityLevel-Array/ProcessSensitivityLevels/PostAssembly/ThermalExposure-to-NeighbouringRework**
diagram	
type	**ThermalExposure-to-NeighboringReworkType, Time-in-MinutesValueType, Time-in-MinutesUOMType, MaxTemperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType.**

4.4.2 Moisture Reflow Sensitivity

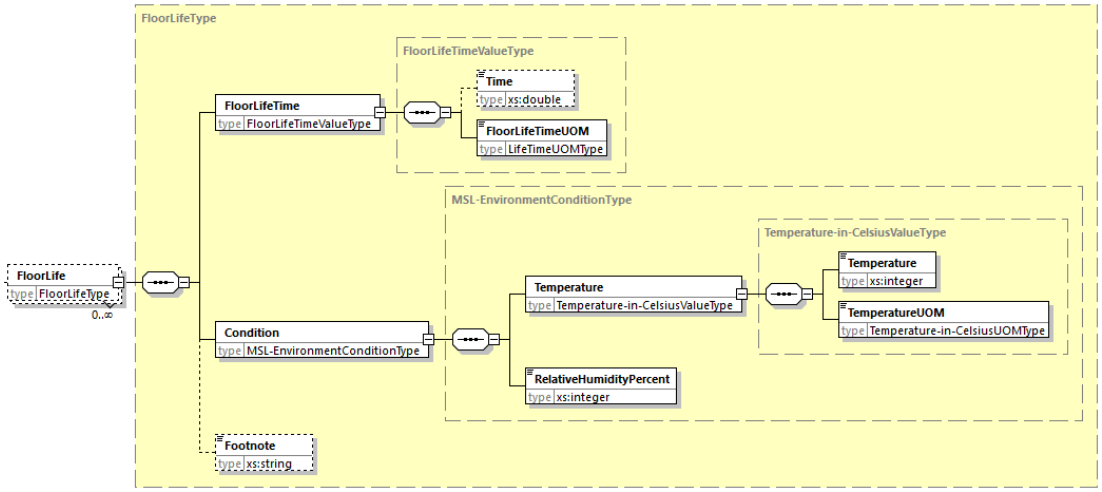
path	**PartModel/AssemblyProcessClassificationSection/MoistureSensitivityLevelClassification-Array/MoistureSensitivityLevelClassification**
diagram	
type	**MoistureSensitivityLevel-ArrayType, MoistureSensitivityLevelType, MSL-ClassificationType, FloorLifeType, BakeType.**

This section *MoistureSensitivityLevel* indicates a component's susceptibility to damage due to absorbed moisture when subjected to reflow soldering, as defined by the J-STD-020 standard "Moisture/Reflow Sensitivity Classification for Nonhermetic Surface Mount Devices". It is intended to be used by component manufacturers to inform users (board assembly operations) of the level of moisture sensitivity of their product devices, and by board assembly operations to ensure that proper handling precautions are applied to moisture/reflow sensitive devices.

The vapor pressure of moisture inside a nonhermetic package increases greatly when the package is exposed to the high temperature of solder reflow. Under certain conditions, this pressure can cause internal delamination of the packaging materials from the die and/or terminal-frame/substrate, internal cracks that do not extend to the outside of the package, bond damage, wire necking, bond lifting, die lifting, thin film cracking, or cratering beneath the bonds. In the most severe case, the stress can result in external package cracks. This is commonly referred to as the ''popcorn'' phenomenon because the internal stress causes the package to bulge and then crack with an audible ''pop.''

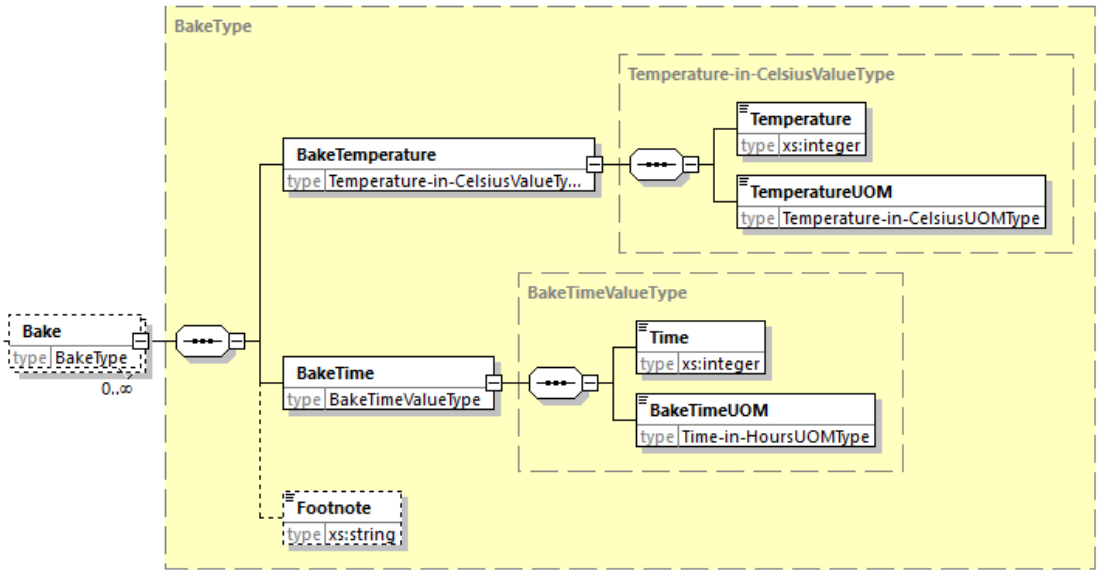
The *MSLCode* are defined in the "Moisture Sensitivity Levels" table in the J-STD-020 standard.

4.4.2.1 Floor Life type

path	**PartModel/AssemblyProcessClassificationSection/MoistureSensitivityLevelClassification-Array/MoistureSensitivityLevelClassification/MoistureSensitivityLevel/FloorLife**
diagram	
type	**FloorLifeType, FloorLifeTimeValueType, LifeTimeUOMType, MSL–EnvironmentConditionType, Temperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType.**

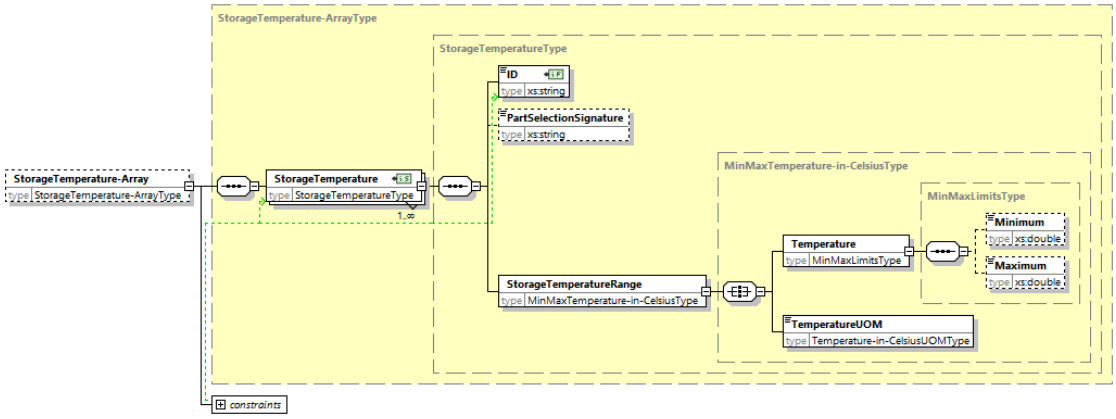
This section *FloorLife* enables the supplier to provide details on the allowable *FloorLifeTime* period after removal from a moisture barrier bag, dry storage, or dry bake and before the soldering process, under a set of temperature and humidity conditions.

4.4.2.2 Bake Type

path	**PartModel/AssemblyProcessClassificationSection/MoistureSensitivityLevelClassification-Array/MoistureSensitivityLevelClassification/MoistureSensitivityLevel/Bake**
diagram	
type	**BakeType, Temperature-in-CelsiusValueType, Temperature-in-CelsiusUOMType, BakeTimeValueType, Time-in-HoursUOMType.**

This section *Bake* enables the supplier to provide details on the *BakeTemperature* in degree Celsius and the *BakeTime* duration in hours, in order to remove the moisture from the part prior to the soldering process.

4.4.3 Storage Temperature - Array Type

path	**PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/SurfaceTerminal**
diagram	
type	**StorageTemperature–ArrayType, StorageTemperatureType, MinMaxTemperature-in-CelsiusType, MinMaxLimitType, Temperature-in-CelsiusUOMType**

This section *StorageTemperature* enables the supplier to provide details on the storage temperature for the part.

Annex A (informative) Differences between JEP30-A100 and its predecessors

This table briefly describes most of the changes made to entries that appear in this standard, JEP30-A100, compared to its predecessor; Punctuation changes may or may not be included.

Change Record History

Initial Issue: 1	Date: February 2018	Item Number: 11.2-938

Issue: A	Date: March 2023	Item Number:
Section 4.4.1.2.1.1 Preheat Soak: Renamed element name from “CelcuisTempUOM” to “TemperatureUOM”.		
Section 4.4.1.2.1.3 Wave Solder Temperature: Renamed element name from “CelcuisTempUOM” to “TemperatureUOM”.		
Sections 4.4.2, 4.4.2.1 and 4.4.2.2: Changed “FloorLife” and “Bake” from bounded to unbounded elements.		

Issue:	Date:	Item Number:
Description of Change		

Standard Improvement Form JEDEC JEP30-A100A

The purpose of this form is to provide the Technical Committees of JEDEC with input from the industry regarding usage of the subject standard. Individuals or companies are invited to submit comments to JEDEC. All comments will be collected and dispersed to the appropriate committee(s).

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1. I recommend changes to the following:

☐ Requirement, clause number _____

☐ Test method number _____ Clause number _____

The referenced clause number has proven to be:

☐ Unclear ☐ Too Rigid ☐ In Error

☐ Other _____

2. Recommendations for correction:

_____

_____

_____

_____

3. Other suggestions for document improvement:

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