SEMI E120.2-0823
SPECIFICATION FOR PROTOCOL BUFFERS FOR COMMON EQUIPMENT MODEL (CEM)

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1 Purpose

1.1 The purpose of this Specification is to provide an implementation mapping of the SEMI E120 Specification for Common Equipment Model to Protocol Buffers.

2 Scope

2.1 The scope of this Specification is the faithful representation of the messages to support SEMI E120 with Protocol Buffers. It will not add new concepts to the SEMI E120 model. The only additions made are those needed to render useful Protocol Buffers messages.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 None.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI E120 — Specification for Common Equipment Model (CEM)

SEMI E179 — Specification for Protocol Buffers Common Components

4.2 *CNCF® Documents*[1]

Wire format over HTTP2[2] — gRPC®[3] over HTTP2

4.3 *IETF® Documents*[4]

RFC 7540[5] — Hypertext Transfer Protocol Version 2 (HTTP/2)

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

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[1] Cloud Native Computing Foundation c/o The Linux Foundation®, 548 Market St, PMB 57274, San Francisco, CA 94104-5401, USA; Telephone: +1.415.723.9709, https://www.cncf.io. CNCF trademark is owned by The Linux Foundation.

[2] https://github.com/grpc/grpc/blob/master/doc/PROTOCOL-HTTP2.md.

[3] Trademark is owned by The Linux Foundation®.

[4] Internet Engineering Task Force, IETF Administration LLC, 1000 N West Street, Suite 1200, Wilmington, DE 19801, USA; Telephone: +1.510.492.4080, Fax: +1.510.492.4001, http://www.ietf.org. IETF trademark is owned by the IETF Trust.

[5] https://tools.ietf.org/html/rfc7540

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5 Terminology

5.1 *Abbreviations and Acronyms*

5.1.1 *gRPC* — gRPC Remote Procedure Call

6 Resources

6.1 Important resources and organizations used in the generation and definition of this Specification are found in:

- *Protocol Buffers* — https://developers.google.com/protocol-buffers/
- *gRPC* — https://grpc.io/docs/

6.2 For an overview of Protocol Buffers and gRPC, refer to:

- SEMI E179 — Related Information 1, Technology Overview
- SEMI E179 — Related Information 2, Protocol Buffers and gRPC Implementation Considerations

7 Conventions

7.1 *Requirements Identification*

7.1.1 The following notation specifies the structure of requirement identifiers.

7.1.1.1 The following requirements prefix format is used at the beginning of requirement text. Refer to Table 1 for the format notation of the requirements prefix: [Esss.ss-RQ-nnnnn-nn]

7.1.1.2 To mark the end of the requirement text, the following suffix format is used: [/RQ]

7.1.1.3 Requirements in the body text are highlighted with a border and light green background (may appear gray in black and white printouts) as shown below.

[Esss.ss-RQ-nnnnn-nn] Requirement text. [/RQ]

Table 1 Requirement Identifiers

Format Notation	*Purpose*
Esss.ss	SEMI Standards Specification identifier. Examples: E87.00, E87.01, E134.00.
RQ	Indicates this is a requirement identifier.
Nnnnn	Unique five-digit number within this Specification. 90000–99999 are reserved for use by SEMI.
Nn	Two-digit number that indicates version level of the requirement. A value of .00 is used for the first version of a requirement.
/RQ	Indicates the end of a requirement.

7.1.1.4 Note that the requirements in Appendix 1 use the reserved requirement numbers noted in Table 1 because they are repeated in other SEMI Standards that use this convention.

7.1.2 Requirements in tables are delimited in one of two ways.

7.1.2.1 Where the requirement occupies an entire row in the table, the requirement identifier (RequirementID) is placed in column 1. No '[/RQ]' is used to mark the end of the requirements text in this case. The table may also contain rows that are not requirements. In this case, the column 1 cell is left blank.

7.1.2.2 Non-requirements text related to a requirement row may be included in an adjacent row. The relationship between the rows is indicated by a broken line separating the two.

7.1.2.3 Where the requirement occupies only one cell, the text in the cell includes the RequirementID prefix and suffix similar to requirements in the body text.

7.1.2.4 No cell in a table will contain both requirement and non-requirement text.

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7.1.2.5 Cells that contain requirements are shaded light green.

7.1.2.6 Table 2 provides an example of requirements in a table. Note that in this example, the same requirement is presented in two alternative formats. In practice, mixing the two approaches in the same table is not typically done.

Table 2 Example Table with Requirements

RequirementID	*Statement*	*Additional Detail*
Esss.ss-RQ-nnnnn-nn	The light shall be the sole blue light.	There shall be no similar color in the light panel.
	The blue light is typically placed at the leftmost position in the light panel.	
	[Esss.ss-RQ-nnnnn-nn] The light shall be the sole blue light. There shall be no similar color in the light panel. [/RQ]	The blue light is typically placed at the leftmost position in the light panel.

7.1.3 Only text marked with the RequirementID is a requirement of this Specification.

7.1.3.1 Clarifications, examples, and related recommendations may be provided near a requirement, but are not part of the requirement.

7.1.3.2 Note that the word 'should' is used in some non-requirements text, where it denotes a recommendation or a best practice, not a requirement.

7.1.3.3 Note that the words 'must' and 'will' are used in the Implementation Overview section to illustrate the logical result of requirements specified in the prerequisites and requirements section. Such statements should not be considered requirements.

7.1.4 Parent-child relationships of requirements are noted in Appendix 1, Table A1-1. Where a parent requirement includes conditions or selection criteria, these are passed to their children. For example, if a parent requirement is stated to apply only to photolithography equipment, any child requirements also apply only to such equipment. The condition need not be restated for each child requirement.

7.1.4.1 Compliance to a parent requirement includes compliance to all of its child requirements.

7.1.4.2 Some cells or rows in a table may contain headings that are assigned a RequirementID. These are parent requirements for other requirements in the table—typically for the rows that immediately follow that heading.

8 General Requirements for Protocol Buffers

8.1 The following is the top-level parent requirement of all others in this Specification.

[E120.02-RQ-00001-00] Compliance to this Specification requires compliance to all other identified requirements in this Specification, including complementary files. [/RQ]

8.2 *Protocol Buffers File*

8.2.1 This Specification includes a .proto file, 'SEMIE120-02-0823.proto' file, that provides the normative definitions of the types and methods described here.

[E120.02-RQ-00002-00] Implementations shall use the Complementary File 'SEMIE120-02-0823.proto' file that accompanies this Specification. The Complementary File is an official part of and accompanies this Specification. The contents of the .proto file constitutes a core part of this Specification. [/RQ]

8.2.2 The .proto file can be compiled into your implementation-specific programming language, generating the appropriate classes for all specified types.

[E120.02-RQ-00003-00] Implementations shall integrate with Protocol Buffers v3.17.0 at a minimum. Implementations may use newer versions of Protocol Buffers if they are compatible with this stated version. [/RQ]

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