L3HARRIS

Internal Specification Level I

Title: Substitution of Alternate Size and Shape Materials **Number: IS-013**
Revision: 02 **Revision Date: 08/11/2021** **Requirements: N/A**
Contact Name: Manager, Component Engineering

CONTENT

INTRODUCTION:

This Internal Specification (IS) describes how metallic raw material is applied and is broken into two parts:

Part I defines how to handle legacy application of materials where the material is listed on the Bill of Material (BOM).

Part II defines how to handle parts where the material specification is on the face of the drawing.

1. PART I

1.1. PURPOSE & SCOPE

Part I defines the permissible use of alternate size and shape raw stock metallic material as a substitute for metallic material item(s) listed on L3Harris Technologies, Communication Systems – West (CSW) BOM. It is permissible to use an alternate raw material size or shape to resolve the inability to procure the specified raw stock material size or shape per a CSW material number. Substitution of size and shape for the CSW material numbers listed in this specification do not require an Engineering Change (EC) to the drawing or BOM to incorporate the raw stock substitution. In other cases, substitution of alternate sizes and shapes is to allow a supplier or vendor with more advanced capabilities to use automated processes to replace manual processes as pertinent to raw material processing.

The use of alternate size raw stock metallic material specified herein shall not affect the design requirements of the material as specified on the engineering drawing and shall not affect the intended design functionality, reliability, environmental response or maintainability of the product. Substitution of raw stock material based upon size and shape dimensions as specified on the design drawing or BOM are only made with the intent to match or improve delivered product while optimizing the end product schedule and budget. When substitution of an alternate raw stock material size or shape is unacceptable to the Design, Manufacturing, Component, or Quality engineer, then a note on the drawing will specify that IS-013 substitutions shall not be permitted. These practices shall be used, unless specified otherwise by the contract.

1.2. SPECIFICATION

In all cases, the following requirements (1.2.A through 1.2.H) shall apply to permit the use of an alternate size or shape raw stock material as a substitute for the raw stock material specified by the CSW material number:

A. The alternate raw stock material shall meet the applicable industry standard requirements and applicable material specifications as determined by alloy and processing method per those listed on the drawing of the specified CSW material number (e.g. QQ-A-200, ASTM-A36, etc.). Note: requirement 1.2.H allows for substitution of material specification.

B. The alternate raw stock material composition, grade, temper, hardness, mean yield tensile strength, mean yield compressive strength and mean shear strength shall match that of the raw stock material per the drawing of the specified CSW material number (e.g., Aluminum 6061 T6, Stainless Steel Type 316L, etc.).

C. The physical material properties shall match including: density, crystal structure, melting point, boiling point, mean specific heat, thermal conductivity, co-efficient of thermal expansion, electrical resistivity, modulus of elasticity, and Poisson's Ratio.

D. The key size dimensions of the alternate raw stock material shall match or shall be greater than the original raw stock size dimensions, where applicable, for length, width, height, and diameter. Note that it shall not be permissible to bond, weld, adhere, or fasten together smaller pieces or shapes of raw stock material to produce the net or gross size and shape of the original raw stock material per the drawing of the associated CSW material number.

E. Substitution of rolled shapes using plate or sheet stock as a substitute for pipe or tubing shall not be permissible, unless first obtaining written consent via Quality Assurance Program Plan (QAPP) or Material Review Board (MRB) instruction from the owning design engineering department or a specific note on the CSW part drawing allowing for the stock material substitution.

F. Substitution of alternate raw material stock for tube, pipe, and structural shapes (L-section, I-section, C-section, U-section, T-section, round hollow, square hollow, rectangular hollow, or other hollow shapes) shall not be permissible, without first obtaining written consent via QAPP or MRB instruction from the owning design engineering department or a specific note on the CSW part drawing allowing for the stock material substitution.

G. Welded and welded drawn pipe shall not be substituted as an alternate for seamless extruded pipe. Welded and welded drawn tube shall not be substituted as an alternate for seamless extruded tubing. In specific instances, it may be allowable to substitute welded seamless for extruded pipe or tube by first obtaining written consent via QAPP or MRB instruction from the owning design engineering department or a specific note on the CSW part drawing allowing for the stock material substitution.

H. Where bar form is called out, plate form may be substituted as long as yield, ultimate, and elongation values are greater than or equal to those in the plate and all other physical characteristics such as material, temper, etc. are matched. Note: this paragraph takes exception to paragraph A above.

1.2.1. **Aluminum Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to aluminum are permissible for substitution of alternate size and shape raw stock material within the same list or material, subject to conditions 1.2.A through 1.2.H: 40009364, 40012075, 7175472, 7175524, 7175703, 7181013, 7181082, 7184517, 7190650, 7192199, 7913417, 7913418, 7913419, 7956248, 7956253, 1000094481, 1000164770, 1000165136, 1000165138, 1000166436, 1000168343, 1000175764, 1000177609, 1000181227, 1000182374, 1000193985, 1000194192, 1000208094, 1000209405, 1000209406, 1000209408, 1000359585, 1000361248, 1000361249, 1000361250, 1000361257, 1000361264, 1000361266, 1000366331, 1000366332, 1000366333, 1000367477, 1000367674, 1000367675, 1000367676, 1000374725, 1000374726, 1000401371, 1000402888, 1000411680, 1000421891, 1000422463, 1000440226, 1000440242, 1000442624, 1000442992, 1000443009, 1000443010.

1.2.2. **Stainless Steel Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to stainless steel and CRES are permissible for substitution of alternate size and shape raw stock material within the same list, subject to conditions 1.2.A through 1.2.H: 40006978, 40006957, 40011612, 40011615, 40012276, 7175288, 7175289, 7175299, 7181081, 7181352, 7181353, 7956346, 7956453, 1000219585, 1000361227.

1.2.3. **Alloy Steel and Tool Steel Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to alloy steel and tool steel are permissible for substitution of alternate size and shape raw stock material within the same list, subject to conditions 1.2.A through 1.2.H: 7175284, 1000204536, 1000204730, 1000204731, 1000204732, 1000204733, 1000204756, 1000204788, 1000215532.

1.2.4. **Carbon Steel Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to carbon steel are permissible for substitution of alternate size and shape raw stock material within the same list, subject to conditions 1.2.A through 1.2.H: 7175278, 7175296, 7175339, 7183770.

1.2.5. **Copper, Bronze, and Brass Alloy Metal Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to copper, brass, or bronze are permissible for substitution of alternate size and shape raw stock material within the same list,

subject to conditions 1.2.A through 1.2.H: 40007193, 40009500, 40013612, 7175275, 7175320, 7175532, 7182138, 7956377, 7956433, 7956436, 7956448, 7956509, 7956510, 7956515, 7956580, 1000170371, 1000170623, 1000170625.

1.2.6. **Titanium Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to titanium materials are permissible for substitution of alternate size and shape raw stock material within the same list, subject to conditions 1.2.A through 1.2.H: 40011450, 40011451, 40010100.

1.2.7. **Other Metal Size and Shape Material Substitutions**

The following list of CSW material numbers pertaining to various alloy metallic materials are permissible for substitution of alternate size and shape raw stock material within the same list, subject to conditions 1.2.A through 1.2.H: 7175835, 7181996.

Paragraphs 1.2.1 through 1.2.7 are not intended to be a comprehensive list of materials available for substitution, notwithstanding, all requirements of paragraph 1.2 must be met.

2. PART II

2.1. PURPOSE & SCOPE

Part II defines the use of placing the material specification on the drawing.

2.2. SPECIFICATION

The material specification shall be listed on the face of the drawing along with any additional details necessary to fully define the material such as temper, type, class, etc. Alternate specifications should be listed as well. The designer shall determine which substitutions are allowed, including allowing for different forms (i.e. bar or plate).

The material specification listed on the drawing shall also be listed in Teamcenter under the "Engineering Specification" folder.

For product made in-house, the Manufacturing Bill of Material (MBOM) and Bill of Process (BOP) shall select a specific material number. The "Material Type" Teamcenter object should be used to locate the appropriate material number. Specifications listed on the face of the drawing are referenced to the material type in Teamcenter.

TERMS AND DEFINTIONS

BOM	Bill of Material
EC	Engineering Change
CSW	L3Harris Technologies, Communication Systems-West
Material Type	A Teamcenter object that represents a formless type of material

END OF DOCUMENT

DOCUMENT INFORMATION

Responsible Organization:	Component Engineering
Sub-Level Function:	NA
Governing Document:	Y-001, Quality Management System
Subordinate Documents:	NA
Related Documents:	NA
Approval Requirements:	Material Library Signoff Team Manager, Mechanical Design Manager, Supply Chain Manager, Component Engineering Director, Manufacturing Operations Director, Hardware Development Director, Hardware Assurance Chairman of the PCCB
Review Requirements:	Peer Review Committee Members DCMA

Revision History Summary:

Revision #	Reason for Update/Revision	Date
NEW	Initial release	4/24/2012
NA	Updated legacy terms with new system terms. Deleted "parts" wherever reference to "material parts number" was made in various sections of the document. Made necessary changes to reflect organizational name changes. Changes made indicated in blue text. No revision upgrade necessary.	11/01/2013
01	Updated document to add INTRODUCTION and PART II. Added terms and definitions. Modified review and approval requirements. Changes are indicated with blue text.	9/25/2014
02	Updated part I to control legacy application of placing the material number in the BOM and allowing for certain substitutions. Added additional materials in sections 1.2.1 through 1.2.5. Rewrote part II to allow for new method of placing the material specification on the face of the drawing and utilizing material types to cross reference actual material used in manufacturing process	8/11/2021