Use of Non-Specified Hardware/Material and Drawings Notes

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PURPOSE & SCOPE

This internal specification (IS) document is applicable to L3Harris Technologies, Communication Systems-West (CSW) Salt Lake City products. It defines acceptable substitutions to items on CSW drawings and bill of materials and defines components that can be added to an assembly that aid manufacturing and do not affect design intent. This specification also provides interpretation or updates to some drawing notes when a standard note or design best practice has been altered. These items are detailed in the sections below. In some cases, the permissions herein resolve uncontrollable tolerance buildup on deliverable product. In other instances an allowance is given to vendors with better capabilities to use automated processes to replace manual processes. In still other cases, this IS document allows for the use of common manufacturing aids as leave-behinds in the assembly. The use of alternate parts, additional parts, note updates, or leave-behind manufacturing aids specified herein shall not affect the ability of the part or assembly to meet program requirements and shall not affect the intended design functionality, reliability, or maintainability of the part or assembly. The application of this document shall not preclude the requirement to meet workmanship standards called out on the drawing. Changes to items called out on the drawing are only made with the intent to improve delivered product while providing flexibility to manufacturing consistent with workmanship standards. Changes should not be made to "use up" existing hardware. Concerns with IS-001 substitutions should be brought to the attention of the Design Engineer. If any of the permissions or substitutions contained herein are not acceptable to the Design Engineer, a note on the drawing will specify that IS-001 changes are not acceptable. Notes that disallow an IS-001 permission shall take precedence. Substitutions made should be documented in manufacturing documentation. The latest released IS revision should be the governing document for a current build. Alternatively, the IS released version at the time of product baseline (P-750) may be used. If these practices are not acceptable to the customer, the Quality Assurance Program Plan (QAPP) will detail acceptable practices.

1. SPECIFICATION

1.1. HARDWARE

All standard screws, bolts, or rivets can be changed in length by one consecutive size up or down within the same base material number (MN) to achieve fastening intent if no interference is created. Standard screw, bolt, or rivet base material numbers are defined by military or NAS specifications which define requirements and size increments. Specifications used at CSW normally start with an M, MS or NAS (example MS16995 or NAS1352). Thread diameter, thread type, material, finish, and head style cannot be changed without an approved ECR.

1.2. THREAD LOCKING COMPOUND

Unless otherwise specified on the engineering drawing, or in the exceptions listed below, an approved thread locking compound may be added to threaded devices within assemblies when a locking feature is required and none is provided, as defined in specification 60083155 Torque and Retention Requirements for Threaded Hardware. A list of approved thread locking compounds is provided in the Table 1 below. The selected compound shall comply with the application/thread material/thread size requirements of the last column and shall be applied to the threaded joint per the manufacturer's recommendations. An inert metal activator (primer) may be required per manufacturing recommendation before applying.

Table 1 – Approved Thread Locking Compounds

CSW Material Number	Vendor Part Number	Strength	Color	Form	Primerless	Wicking	Application / Thread Material and Size
7914043-003	Loctite® 222 or equivalent	Low	Purple	Liquid	-	-	Metal threads SAE #10 (Ø.190") and smaller Metric M5 (Ø.197") and smaller
7914043-004	Loctite® 242 or equivalent	Medium	Blue	Liquid	-	-	Metal threads SAE 1/4 (Ø.250") to 3/4 (Ø.750") Metric M5.5 (Ø.217") to M18 (Ø.709")
40014024-000	Loctite® 243	Medium	Blue	Liquid	X	-	
40007404-001	Loctite® 248	Medium	Blue	Semisolid	-	-	
7914043-005	Loctite® 262 or equivalent	High	Red	Liquid	-	-	Metal threads SAE 7/8 (Ø.875") and larger Metric M20 (Ø.787") and larger
40014024-001	Loctite® 263	High	Red	Liquid	X	-	
40007404-002	Loctite® 268	High	Red	Semisolid	-	-	
7914043-007	Loctite® 220 or equivalent	Medium	Blue	Liquid	-	X	Apply to metal threads after assembly SAE 1/4 (Ø.250") and smaller Metric M6 (Ø.236") and smaller
7914043-008	Loctite® 290 or equivalent	Medium to High	Green	Liquid	-	X	Apply to metal threads after assembly SAE 5/16 (Ø.313") and larger Metric M7 (Ø.276") and larger
7918401-000	Pacer® ISL-22 or equivalent	Low	Purple	Liquid	X	-	Plastic threads (one or both mating parts) SAE 1/4 (Ø.250") and smaller Metric M6 (Ø.236") and smaller
7918401-001	Pacer® ISL-42 or equivalent	Medium	Blue	Liquid	X	-	Plastic threads (one or both mating parts) SAE 5/16 (Ø.313") and larger Metric M7 (Ø.276") and larger

Thread locking compound shall not be applied to the following types of threaded devices unless otherwise specified on the engineering drawing:

- Segmented card retainers ("wedgelok"; this exception only applies to the screw used to expand/contract the segments)
- Captive screws for mating connectors
- Captive screws for panel to rack mounted equipment
- Threaded or bayonet type mating connectors
- Self-tapping screws
- Threaded hose clamps
- Tapered pipe threads
- Threaded pipe/hose fittings and adapters
- Threaded fasteners between components designed for disassembly as part of normal operation

Liquid thread locking compound shall not be applied to fasteners that are used to mount Circuit Card Assemblies (CCAs). Semisolid thread locking compound from Table 1 above or 40014169-000 Vibra-TITE® VC-3 Threadmate should be used in these situations. This is done to reduce the likelihood that the thread locker will wick underneath the screw head and affect the CCA ground path.

Thread locking compound CSW MN 7914043-008 (wicking type) may be used as secondary retention for round connector threaded back shells after the backshell is properly torqued to the connector.

If CSW MN 7914043-008 cannot be applied after torqueing due to limited access to threads, non-wicking thread-lock CSW MN 7914043-004 applied prior to torque may be applied to the threads only in the following instances:

A. Connectors that use grounding teeth such as MIL-DTL-38999, MIL-C-5015, Mighty Mouse, LEMO, MIL-DTL-26482 Series 2, or any other connector series with grounding accessory teeth.

B. On backshells that do not have a metal braid terminated to them or threads of multi-piece backshells that are not part of an electrical grounding path.

C. On multi-piece shield-terminating backshells that clamp a metal braid between two portions of the backshell that do not rely on the threads for grounding, such as M85049/17, M85049/18 and M85049/19 backshells.

Normally vendor-supplied equipment that is received pre-assembled is not disassembled in order to add a locking feature. If disassembly is performed, an approved thread locking compound from above may be added upon reassembly.

1.3. CABLE AND HARNESS SLEEVING

Protective cable and harness sleeving diameter size can be changed one size up or down within the same base material number to allow for cable bundle diameter variability provided the material type and material intrinsic sleeving shrink ratio does not change. Protective sleeving may be spliced together provided the conditions in Workmanship Standards are met.

1.4. PROTECTIVE SLEEVING ON WIRE SPLICES

Protective sleeving on wire splices (butt, solder, wrap, and crimp) or connector contacts (solder or crimp) that use M23053/5 type of sleeving may be substituted with M23053/8 type sleeving.

1.5. CABLE AND HARNESS WIRE BRAID

Wire braid diameter size can be changed one size up or down within the same base material number. This is to allow for cable bundle diameter variability. Braid families use the same material, coatings, and wire gauge. Wire braid can be spliced together using Workmanship Standards once every 10 feet without being on the drawing provided that the braid size is not changed. Material type, optical coverage, and finish can NOT be changed without an approved ECR.

Cable build facilities that have automated braiding machines may use their machine braiding process in place of using braid QQ-B-575 or federal specification A-A-59569 called out on the drawing. The braid produced by the automated braiding machine shall have a minimum optical coverage of 90% per federal specification A-A-59569 and use the same gauge wire, base material, and finish of the braid called out on the cable/harness part list. The shield shall be continuous coverage over the entire cable per the current revision of IPC-A-620. Braid Wire 40014467-XXX may be used as an alternate to QQ-B-575 and A-A-59569 braid material in this case.

Mylar tape per MIL-I-631, Type G Form Tf, Class 1, CSW MN 40014831-XXX may be added between the cable bundle and shield as a binder. Teflon tape per ASTM D3308 Type I or II Grade 1, CSW MN 40014561-XXX, Polyimide tape (Kapton) CSW MN 7913714-XXX or Silicone Tape CSW MN 4001436204 or 4001436205 may be added to a cable assembly to secure the ends of the Mylar tape. These materials may be left in the cable assembly as “leave behind” manufacturing aids. See section 1.12

1.6. CABLE AND HARNESS MARKER IDENTIFICATION

Marker identification tube sleeving, CSW MN 7183869-XXX or 40014396-XXX, diameter can be changed one size up or down within the same base material number to allow for cable bundle diameter variability. Marker Tube sleeving, CSW MN 7183869-XXX or 40014396-XXX and wrap-around marker(s) CSW MN 7191589-XXX or 40014509-XXX are interchangeable with each other when the following conditions are met: The marker color remains the same and when wrap around marker(s) 7191589-XXX or 40014509-XXX are used as a substitute for 7183869-XXX or 40014396-XXX, clear overwrap 40014516-XXX or M23053/18 Class II clear shall be used to completely cover the wrap around marker(s). This requirement applies to new build, as well as rework conditions.

Heat shrink sleeve markers/labels called out on drawings can be interchanged with heat shrink markers/labels that comply with SAE-AMS-DTL-23053/5 Class 1 material of the same color with shrink ratios of 2:1, 3:1 or 4:1.

When clear sleeving, M23053/5-XXX-C or M23053/8-XXX-C, used to cover markers has to be removed for rework and cannot be re-installed, 40014516-XXX or M23053/18 Class II clear may be used in place of the clear sleeving.

CSW MN 40014516-XXX or M23053/18 Class II clear may be used as a covering for marker identification sleeving within CSW assemblies.

For manufacturing traceability purposes a shop order marker (JOM label) may be placed on a cable assembly using tube sleeving or wrap around sleeving using marker identification part numbers CSW MN 7183869-XXX, 40014396-XXX, 7191589-XXX, or 40014509-XXX with the following condition: When wrap around marker(s) CSW MN 7191589-XXX or 40014509-XXX are used, clear overwrap CSW MN 40014516-XXX or M23053/18 Class II clear shall be used to completely cover the wrap around marker(s).

1.7. TANGED/TANGLESS INSERTS

Standard tanged helicoil inserts (MS21209) can be exchanged for tangless helical inserts (NAS1130) if they are the same material, finish and type (self-locking/free running). One length size down may be used in areas where the material is too thin for the specified length insert or where the hole would break through (no break through requirement).

1.8. CABLE AND HARNESS SHRINKABLE SOLDER FERRULES

Solder ferrule diameters, including those supplied with an integral pick off wire, can be changed one size up or down within the same base material number to allow for wire bundle diameter variability. Wire gauge and the type of integral pick off wire may not be altered.

1.9. BAND-IT CLAMPS

Band-it clamps, CSW MN 7185011-000 thru -003, may be used to replace backshell shield termination devices when cable or harness rework is required or wire shield terminations cannot be properly secured by the backshell shield termination devices (spring ring/C-clip or crimp ring) provided with the backshell with the following conditions: The size of the Band-it clamp should fit within the groove on the backshell and the cut end of the Band-it clamp shall be covered with adhesive CSW MN 7182144-000, 7910812-002, 7917693-000 thru -001 or UV cure adhesive 40014414-XXX. An accelerator CSW MN 7919206-001 may be used with adhesive CSW MN 7182144-000.

Band-it clamps specified on the drawing may be substituted for Band-it clamps with the same width and thickness but different lengths when other properties of the clamp remain the same and the end is cut to length. Band-it clamps come with the option of being either pre-coiled or straight. Band-it clamps called out on CSW drawings may be substituted for Band-it clamps that are pre-coiled or straight, but otherwise have the same properties.

The cut end of any Band-it clamp may be covered with epoxy CSW MN 7182144-000, 7910812-002, 7917693-000 thru -001 or UV cure adhesive 40014414-XXX. An accelerator CSW MN 7919206-001 may be used with adhesive CSW MN 7182144-000.

1.10. SECURING CABLES AND HARNESSES WITHIN AN ASSEMBLY

Low profile tie wraps, CSW MN 7192682-XXX, may be used to replace standard profile tie wraps (MS3367). Low profile cable tie sizes may be changed to fit the wire bundle diameter per Table 2 below. The largest width cable tie that will tighten on the cable should be used. Lacing/tying tape CSW MN 7910884-000 thru -006, and -008 thru -009 or lacing/tying tape meeting specification A-A-52080 finish B or C may replace tie wrap CSW MN 7192682-XXX and MS3367 for wire bundle sizes that do not fit within Table 2 below or when interferences are encountered with the low profile tie wraps.

Table 2 – Tie Wraps vs. Bundle Diameter

WIDTH	MATERIAL NUMBER	BUNDLE DIAMETER
.300	7192682-001	1 to 4 inches
.178	7192682-000	.50 to 1.75 inches
.142	7192682-003	.25 to .75 inches
.098	7192682-002	.13 to .37 inches

Lacing/tying tape CSW MN 7910884-000 thru -006, and -008 thru -009 or lacing/tying tape meeting specification A-A-52080 finish B or C and/or low profile cable ties CSW MN 7192682-002 and -003 or silicone self-fusing tape CSW MN 7186328-XXX may be added to an assembly for the purpose of dressing and securing cable/harness bundles together within electronic assemblies.

Cable loop mounting plates CSW MN 2214656-001 may be used as manufacturing aids to secure and route cable bundles on the internal surfaces of an enclosure or inside rack assemblies (Subset of Class D surface, internal only, per WS-022). Mounting plates may be secured to a surface using CSW MN 7182144-000. An accelerator CSW MN 7919206-001 may be used with adhesive 7182144-000.

1.11. CABLE AND HARNESS ADHESIVE FOR SLEEVING

Harnessing epoxy, CSW MN 7917693-XXX, may be applied to sleeving of a cable assembly at any overlap, junction, or splice to meet the requirements of WS-003.

1.12. CABLE BUILD UP TAPE AND TIE WRAP

The use of silicone self-fusing build up tape meeting A-A-59163, CLASS 1, TYPE I (CSW MN 7186328-XXX or 40014362-XXX) can be used within a cable or harness assembly to maintain adequate grip on wire bundle inside a cable clamp or backshell. Adequate grip limits the lateral motion of the wire bundle within the clamp or backshell and provides strain relief. Build up tape should be placed to the edge(s) of the clamp or backshell and should not extend more than .25 inches beyond the clamp or backshell.

The use of silicone self-fusing tape meeting A-A-59163, CLASS 1, TYPE I (CSW MN 40014362-XXX, 4001436204 or 4001436205) may also be used within cable assemblies as a leave behind manufacturing aid under the cable's outer jackets to build up cable diameter, to improve strain relief, and smooth out transitions.

PTFE Tape CSW MN 40014561-000, Polyimide Tape (Kapton) CSW MN 7913714-XXX, or silicone self-fusing build up tape CSW MN 4001436204 or 4001436205, may be added under an outer jacket of a cable or harness assembly in a limited application, as a manufacturing aid (binder), to facilitate wire lead dressing. These tapes shall not be used as a primary insulator unless specified on the drawing.

Lacing/tying tape CSW MN 7910884-000 thru -006, and -008 thru -009 or lacing/tying tape meeting specification A-A-52080 finish B or C, Build-Up Tape CSW MN 40014362-XXX, PTFE Tape CSW MN 40014561-000, or Polyimide Tape (Kapton) CSW MN 7913714-XXX may be added to a cable or harness assembly as a manufacturing aid to facilitate wire lead dressing inside a backshell.

1.13. CABLE AND HARNESS FILLER WIRE

Fill wire may be added to the Manufacturing Bill Of Material (MBOM) to meet the Circular Mil Area (CMA) range for machined contacts or Closed Barrel terminals per IPC/WHMA-A-620. The fill wire conductor shall have as a minimum, the same material and plating as the signal conductor. Where the wire specification is known the fill wire shall meet the same specification.

1.14. PAINT MASKING NOTE UPDATE

Where painted parts have a print note calling for no paint in holes, non-threaded through holes for screws and bolts do not need to be masked for paint keep out. All clearance holes which will be used for screws or bolts may have paint overspray inside the hole, but full coverage inside the hole to recommended coating thickness is not required. This exception does not apply to holes for tight tolerance or press fit hardware such as pins and press-in studs. Holes for connectors should be masked or painted according to print and notes. This paragraph does not apply to holes with countersinks or counter bores.

1.15. CABLE AND HARNESS MOLDING NOTE UPDATE

CSW cable and harness assemblies have different types of mold notes depending on when they were created. See 60112799 (Mold Specification) for approved mold materials, methods and allowances.

1.16. PCB RETAINERS (WEDGE-LOK)

It is permissible to replace the following parts as required: PCB wedge-lok retainers 7182542-002 and -003 and 1000421322 may be replaced with 1000437750. PCB wedge-lok retainer 7175260-003 may be replaced with 1000084818.

1.17. CABLE DESIGN LASH SOLDER (NASA) SPLICE

Bus Wire AA59551S30S1T and AA59551S36S1T may be added to the bill of material of a cable/harness assembly to create a lash solder splice (NASA lash) per IPC-620 section 8.1.4. The 30 AWG wire is recommended on spices with 20 AWG wires and larger. The 36 AWG wire AA59551S36S1T is recommended on splices with 22 AWG wires and smaller.

1.18. TRANSIT CASE FOAM ADHESIVE

Spray contact adhesive, CSW MN 7186030-000 (3M 90 aerosol) may be added to transit case assemblies to rework loose or separated foam located inside transit cases. The adhesive should not be used to repair torn, gouged or damaged foam in instances where the structural rigidity of the foam may be compromised.

1.19. STANDARD MILITARY HARDWARE PART NUMBER ALTERNATIVES

Military or National Aerospace Standard hardware parts documented in the CSW Material Number System with a dash as part of the part number may be replaced with the same Military part documented in the CSW MN Number System without the dash. For example screw CSW MN NAS662-C2R5 may be replaced with screw CSW MN NAS662C2R5 which is the same part.

1.20. MODULAR PLUG RJ 45

Modular Plug RJ 45 connectors MN 40008197-006 with a loading bar can be used as a replacement for MN 40008197-000 which come without loading bars.

1.21. METAL P-CLAMPS

P-clamps of the format AS21919 are allowed to go up or down clamp sizes as needed to properly secure harnesses provided that they use the same band, cushion material and mounting hole size.

1.22. MATERIAL IN DIFFERENT PACKAGING SIZES

Material supplied in different packages or container sizes than is specified on the parts list is acceptable as a substitute on the Bill of Material provided the substitute is from the same manufacturer and is the exact same material delivered in a different package or a different size container.

1.23. ALTERNATE COAX WIRE

See CSW MN 1000256792 for allowable subsitutes for .047 diameter coax wire.

Note: Changes are shown in a different color on screen.

END OF DOCUMENT

DOCUMENT INFORMATION

Responsible Organization:	Quality (QA)
Sub-Level Function:	Hardware Quality Assurance (HQA)
Governing Document(s):	Y-001, Quality Management System
Subordinate Document(s):	NA
Related Document(s):	WS-003, Cable Harness Assembly P-750, Configuration Management and Change Control Process 60083155, Specification of Torque and Retention Requirements for Threaded Hardware 60112799, Cable Harness Molded Backshell Design WS-022, Cosmetic Surface Conditions of Assemblies
Related Trainings:	n/a
Approval Requirements:	Manager, Mechanical Design Director, Hardware Quality PCCB Chairman
Review Requirements:	DCMA

REVISION HISTORY SUMMARY:

Revision #	Reason for Update/Revision	Date
New – 11	Initial release	VARIOUS
12	Revised section1.7, band-it section, and added section for Alodine. Specified that repairs are only for aluminum.	11-06-2008
13	24 Month Review. Added section 1.14, Cosmetic defects on Anodized Aluminum surfaces. Changes made are indicated in blue text.	07-27-2010
14	Added Section 1.15 Cable Braid	9/21/2011
15	Total re-write to address DCMA Comments received.	7/3/2012
16	Updated Purpose and Scope and Title. Modified sections 1.1-1.7, 1.9- 1.14. Deleted "if not specified on the engineering drawing or parts list" from section 1.12. Deleted "provided no bare metal is exposed" from section 1.13.Added section 1.15. Changes are indicated with blue text.	2/4/2013
17	Removed sections 1.12 &1.13 (Alodine and Anodize rework covered in W-294 and W-468). Added new section 1.14, Cable Molding Note Update	5/13/2013
NA	Minor revisions made to include: Updated legacy terms with new system terms. Changed part numbers with a "+" to a "-". Changes made indicated in blue text. No revision upgrade necessary.	10/23/2013
18	Updated Purpose and Scope to add comment about Workmanship Standards. Updated section 1.2 on Thread Locking and 1.6 on Cable Harness Marker Identification. Updated section 1.5 to add Kapton tape. Minor changes to each of the other sections. Changes are indicated with blue text.	5/30/2014
19	Updated purpose and scope as well as sections 1.2,1.3,1.5,1.6,1.9,1.10, and 1.12. Added section 1.13 for filler wire. Main point was adding cable mounting plates and tie wraps. Changes are indicated with blue text.	9/29/2014
20	Addressed DCMA comment regarding change without an ECR; Teamcenter will manage changes as required.	10/8/2014

21	Added sections 1.16 through 1.19. Updated L-3 to CSW through out document. Updated sections 1.2, 1.5, 1.6, 1.9, 1.11 and 1.12	2/29/2018
22	Updated company logo and name. Update template. Updated section 1.2 to handle the use of non-wicking thread-lock in some instances of circular backshells. Added sections 1.20 to allow the usage of loading-bar RJ45 connectors and 1.21 to allow for resizing of metal cushioned P-clamps. Added section 1.22 to allow materials in different packaging or container size. Updated sections, 1.5, 1.15 and 1.17. Added section 1.23. Changes highlighted in blue.	10/2/2023