

Summary of Changes

095871 Contract Deliverable Requirements (CDR)

This serves as notification that our BAE Systems Contract Deliverable Requirements (CDR) has been updated. Please see the following changes/additions/deletions:

Legend:

- Addition
- Change
- Deletion

Added verbiage, "paragraph 8.12" to the following CDRs: 001, 003, 004, 005, 011, 012, 013, 015, 016, 017, 018, 020, 025, 026, 027, 032, 033, 034, 041, 057, 058, 059, 060, 084, 085

Added "and documented" to 007A and 008

Added "prior to" to 014, 016, 017, 018, 020, 033, 034

Added "or with the" to 015, 016, 017, 018, 020, 033, 034

Added "shipment of product" to 015, 016, 017, 018, 020, 033, 034

Added "and bake the temperature and time values" to 016

Added "for this part" to 032, 034, 084, 085

Changed 034 firing records from aluminum forgings to just forgings and reworded the whole section

034 Ballistic Requirements- Metal and Composite Materials

FIRING RECORDS (Plate and Composite):

The Supplier shall provide a copy of the:

- Physical and Chemical Test Reports
- Government Ballistic Test Certification, including firing number for each heat/lot of ballistic material. Results shall be submitted in accordance with the Data Submission Instructions (located in the SQAM) paragraph 8.12 for this item prior to or with the product shipment.

FIRING RECORDS (CASTING):

- For armor castings and extrusions, the Supplier shall maintain a listing of Government approved firing numbers for all material recipes supplied to BAE Systems. Results shall be submitted in accordance with the Data Submission Instructions (located in the SQAM) paragraph 8.12 for this item prior to or with the product shipment.

FIRING RECORDS (FORGINGS):

- Aluminum Armor [Forgings](#) require ballistic test for each lot, including longitudinal and transverse tensile tests per MIL-DTL-45225 and the material certificate of analysis.
- Ferrous Armor [Forgings](#) require ballistic test for each lot, including results for all testing specified in the ballistic test specification and the material certificate of analysis.

Results shall be submitted in accordance with the Data Submission Instructions, (located in the SQAM) for this item.

THERMAL CUTTING OF STEEL ARMOR PLATE:

Shall meet the following requirements:

- Parts produced by thermal cutting of plate material shall be subject to process qualification. Submission of parts which are thermally cut, shall meet the following requirements:

APPLICABILITY

- Thermal cutting processes include any methods which rely on, or result in, the generation of temperatures in excess of 1,300 °F at the point of cutting. These processes include (but are not limited to) laser, plasma, and the family of oxy-fuel cutting processes. These processes do not include abrasive cutting methods such as waterjet, abrasive disk or saw, and machining. Products that are first cut by thermal process (such as plasma) and then finished to final dimension by abrasive method (such as machining or grinding) are still subject to the qualification requirements for thermal cutting processes.
- MIL-DTL-46100 materials, all tempers.
- MIL-DTL-12560 materials, Class 1, Class 2, Class 4a, and Class 4b. Qualification for cutting of Class 1, Class 4a, or Class 4b material shall be applicable to cutting of Class 2 material. Class 3 armor is not intended for use in vehicle applications and is exempt from the requirements of this section.
- MIL-DTL-32332 materials, all tempers.

PROCEDURE:

- Supplier shall have a written and controlled Procedure for cutting steel armor. Documentation of the Procedure shall be made available to BAE Systems on request.
- Initial Procedure Qualification Test: The supplier shall produce a production quality sample in order to verify that the Procedure is capable of achieving edge quality in accordance with the applicable material specification. Documentation for this test shall be submitted to BAE Systems representatives for acceptance prior to working on production parts. The required tests for initial procedure qualification are as follows:
 - Sample coupons shall be cut with process to be qualified. Coupons may be on a production part, a sample attached to a production lot, or an independent sample.
 - Visual inspection, no indications of cracking along cut plate edges is acceptable.

- Non-destructive testing (NDT) per ASTM E1417 or ASTM E1444 or equivalent. Acceptance criteria in accordance with the applicable material standard.
- Heat affected zone hardness (HAZ) to be determined by hardness indentation at the mid-length of the cut edge. 5 measurements shall be taken, equally spaced, from the cut edge to a distance of 1.2T or .625 inches (whichever is less).
- Procedure Documentation: Once the Supplier has completed the evaluations outlined by the Initial Procedure Qualification Test, documentation of the test results shall be submitted to BAE Systems for final review and approval. This report shall contain form 089475 and the following information at minimum:
 - Material documentation: Includes material standard, temper, heat or lot number, and material thickness tested.
 - Process documentation: Includes process type (e.g. plasma, laser, oxy-fuel), method of cutting (manual or automatic), and environment (e.g. ambient condition, water immersion, controlled non-reactive environment).
 - Major Processing Parameters: Includes the primary processing parameters affecting the quality of the cut edge. Some examples are shown below but should not be considered to be an exhaustive list.
 - Laser: Beam source, cutting power, travel speed, primary shielding gas, travel speed, minimum pre-heat & post-heat (if applicable).
 - Plasma: Electrode type, voltage, primary cutting gas, travel speed, minimum pre-heat & post-heat (if applicable).
 - Oxy-Fuel: Cutting gas, gas pressure, travel speed, minimum pre-heat & post-heat (if applicable).
 - Secondary Processing: In some cases, suppliers may elect to use secondary tempering, grinding, or machining processes to ensure the quality of the cut edge and decrease the propensity for cracking. In these cases, suppliers shall submit their secondary processing as part of the qualification for their thermal cutting procedure. This information may include time and temperature of tempering, or method of material removal (grinding or machining) and amount of material removed from the cut edge.
 - Documentation shall be provided with the results of visual inspection and NDT in accordance with the Initial Qualification Test. Supplemental documentation may be attached to support NDT results.
 - Documentation shall be provided with the results of the Initial Qualification Test. Supplemental documentation may be attached to support the results of NDT and hardness testing.
 - Date, printed name, and electronic or hard-copy signature shall be included to confirm the validity of the test results from the contracted vendor's authorizing authority. In instances where a vendor sub-contracts work to a secondary shop, the authorizing signature shall be provided by the primary vendor. In these cases, the primary vendor will be responsible for maintaining the qualification records and is accountable for products contracted to them, but processed by that secondary shop.

PROCEDURE APPROVAL & PERIOD OF QUALIFICATION

- Supplier shall have the Procedure Qualification for Thermal Cutting of Steel Armor Form number 089475 completed and approved by BAE Systems Materials Engineering prior to shipment of product. This should include all provisions of the Procedure Documentation listed.
- The form shall be submitted per Data Submission instructions (located in the SQAM) paragraph 8.12 for this part.
- After final approval, period of qualification shall be indefinite unless there is reason to believe that the Qualified Procedure is no longer capable of meeting the edge quality requirements of the applicable material specification.
- Rejection of a submitted Procedure Documentation for qualification, or revocation of an existing qualification, shall be followed by corrective action for requalification by BAE Systems.

EFFECTIVITY OF QUALIFICATION

- A qualified procedure is applicable to the following ranges. For a given tested material thickness, that process qualification shall be sufficient for the same process used on materials applicable to the qualification test.
 - $.380 < T$
 - $.380 \leq T < .625$
 - $.625 \leq T < 1.000$

- $T \geq 1.000$
- Example: Vendor A qualifies a laser cutting process, using a CO₂ beam source at 4,500 Watts, at 100 IPM on .500 on Class 1 MIL-DTL-46100 material. That qualification is sufficient to cover MIL-DTL-46100 Class 1 materials, to a minimum thickness including .380 and a maximum thickness excluding .625.
- Procedures qualified prior to Rev 09 shall remain in effect under the provisions of this release unless there is reason to believe that the Qualified Procedure is no longer capable of meeting the edge quality requirements of the applicable material specification.

PROCESS INSPECTION:

- Only qualified inspection personnel shall conduct visual and NDT process inspections. Documentation of inspection personnel's qualification shall be kept and provided to BAE Systems on request.
 - Inspection personnel shall be certified per a written practice in accordance with ASTM SNT-TC-1A, AWS QC1, CSA W178.2, or comparable.
 - Alternatively, an engineer or technician who by training and experience in metals fabrication, inspection, and testing, is competent to perform the inspection of thermally processed material (welding, cutting, and/or heat treating) may be considered qualified inspection personnel for the purposes of this process inspection.
- Process inspection shall consist of the following:
 - Visual inspection to be performed by qualified personnel, conducted in accordance with the supplier's procedure. Inspection frequency shall be 100%.
 - Non-destructive testing (NDT) in accordance with ASTM E1417, ASTM E1444, or equivalent. Frequency shall be inspection level II, AQL 2.5%, spec ANSI/ASQ Z1.4 (i.e. for Lot = 50, Inspection Level D =5 samples rejected). If rejectable indication is found, institute 100% inspection of subject lot.

DEFINITION:

Lot – Shall mean “inspection lot” or “inspection batch” of parts of the same material, the same thickness and processed continuously under one Procedure.

Example – Supplier A cuts 10 Part Numbers, with different quantities, all from the same thickness of high hardness armor. If they are processed (cut) in a constant continuous process, then the collection of parts can be inspected as one Lot.