

Summary of Changes

095871 Contract Deliverable Requirements (CDR)

Rev 18

This serves as notification that our BAE Systems Contract Deliverable Requirements (CDR) has been updated. Please note that the changes below are listed with the older version first, then the new revision is below it, unless otherwise noted. Please see the following changes/additions/deletions:

Legend:

- Addition/new
- Change
- Deletion

Also note that CDR 034 has comments added to the thickness tables in place of highlighted changes.

CDR Manual Preface:

The Supplier is required to adhere to assigned CDRs on the PO and deliver requested objective evidence per the data submission instructions and CDR specific requirements. The supplier is required to meet and have available objective evidence to all other SQAM, PO and TDP requirements as applicable.

005 Customer Source Surveillance (CSS)

Source surveillance, inspection, and/or test by a BAE Systems source inspection representative is required for each shipment of this item. The product shall be **presented in the "as defined condition"** with all required contract or TDP requirements met prior to presentation. In order to accommodate BAE Systems source inspection representatives, the Supplier shall make all facilities, equipment, inspection records, and assistance readily available.

The Supplier shall provide five (5) business working days advance notification of requests for source inspection through submission of Form 092245. Requests shall be submitted in accordance with the Data Submission Instructions (located in the SQAM, paragraph 8.12) specified for this item. Unauthorized/unapproved shipment of product without BAE Systems source inspection is cause for rejection, a supplier corrective action request may be issued and product may be returned to the Supplier at the Supplier's expense and withholding of the invoice payment.

If parts are returned for repair or rework, a resubmission of source inspection is required. Parts are not to be shipped until the resubmission for source inspection has been approved and the source form is annotated with 'Repair or Rework', and lists the NCR number on the form as applicable.

005 Customer Source Surveillance (CSS)

Source surveillance, inspection, and/or test by a BAE Systems source inspection representative is required for each shipment of this item. The product shall be presented with all required contract or TDP requirements met prior to presentation. In order to accommodate BAE Systems source inspection representatives, the Supplier shall make all facilities, equipment, inspection records, and assistance readily available.

The Supplier shall provide a **minimum** five (5) business working days advance notification of requests for source inspection through submission of Form 092245. Requests shall be submitted in accordance with the Data Submission Instructions (located in the SQAM, paragraph 8.12) specified for this item.

Unauthorized/unapproved shipment of product without BAE Systems source inspection is cause for rejection, a Supplier corrective action request may be issued and product may be returned to the Supplier at the Supplier's expense and withholding of the invoice payment.

If parts are returned for repair or rework, a resubmission of source inspection is required. Parts are not to be shipped until the resubmission for source inspection has been approved and the source form is annotated with 'Repair or Rework', and lists the NCR number on the form as applicable.

007 Welding-Combat Vehicles

PRIOR to the start of fabrication (or repair to raw material, casting, forgings, etc.), the Supplier **SHALL** review WE-005 Weld Supplier Approval and Weld Procedure Submittal Process, submit, and gain approval for all procedure(s) per the Purchase Order Part Number. The Supplier **MAY** utilize BAE Systems Weld Procedure Specification(s) (WPS) in the event that the Supplier has completed the BAE Systems required Weld Procedure Training and Weld Process Audit.

In the event that the Supplier is **NOT** approved to utilize BAE Systems Weld Procedures and/or BAE Systems **DOES NOT** have applicable Weld/Braze Procedure(s) to fabricate the Weldment/Brazement to fulfill the Purchase Order, the Supplier **SHALL** be responsible for providing and/or qualifying Weld/Braze Procedure(s) **PRIOR** to fabrication. BAE Systems Weld Engineering **SHALL NOT** be responsible for providing additional procedure qualifications for the sole use of our Suppliers.

The Supplier **SHALL** submit the WPS/BPS(s) intended for part fabrication to BAE Systems Weld Engineering for review and approval via the CDR007 Supplier Welding Procedure Submission Form (BMS 089136) **PRIOR** to the start of welding/brazing and fabrication. The latest version of the form **SHALL** be utilized and is accessible via the BAE Systems P&S Supplier Website. Each Weldment/Brazement Part Number and the applicable WPS/BPS(s) **SHALL** be submitted individually.

In the event that the Supplier provides a non-BAE Systems qualified Weld Procedure, The Supplier **SHALL** submit the following documentation to BAE Systems for review and approval:

- **Welding Procedure Specification (WPS)/Braze Procedure Specification (BPS)**
- Supporting **Procedure Qualification Record (PQR)/ Braze Procedure Qualification Record (BPQR)**- to include Non-Destructive and Destructive Supporting Test Data
- Any **additional supporting documentation** that is required for submittal in accordance with the applicable drawing and/or specification

All Weld Procedures and/or Welding Procedures to be utilized **SHALL** be approved **PRIOR** to use; which **SHALL** include tack welding and weld rework. Supplying product to BAE Systems with an unapproved, rejected, and/or incorrect WPS/BPS is a violation of the BAE Systems Purchasing Agreement and **SHALL** be considered non-conforming and parts are subject to rejection and **MAY** be returned to the Vendor (RTV) at the Supplier's expense.

The Supplier **SHALL** resubmit the CDR007 Supplier Welding Procedure Form to BAE Systems Weld Engineering in the event that the Base Material, Weld/Braze Procedure(s), and/or the Part Number Configuration changes from the previously approved form. The form **SHALL** also be resubmitted if the BAE Systems Purchasing Agreement Part Number changes throughout configuration, regardless if all other variables have remained consistent from the previous approval.

The Supplier **SHALL** be responsible for maintaining all supporting documentation including, but **NOT** limited, to the following; Performance Qualifications, Sub-Tier Supplier Certifications, Machine Calibration Documentation, and other applicable documentation required to demonstrate compliance in accordance with the requirements per the BAE Systems Purchasing Agreement. All documentation **SHALL** be made available, as requested, to BAE Systems at all times.

For Base Metal Repairs, the Supplier **SHALL** submit all Standard and Non-Standard Repair Procedure(s) via the Vendor Information Request (VIR) Form 097908 for review and approval **PRIOR** to use.

007 Welding-Combat Vehicles

PRIOR to the start of fabrication, the Supplier **SHALL** review WE-005 Weld Supplier Approval and Weld Procedure Submittal Process, submit, and gain approval for all procedure(s) per the Purchase Order Part Number. Unless otherwise specified and/or prohibited by the applicable Purchase Order, Contract, Drawing, and/or Specification, authorized Suppliers **MAY** utilize BAE Systems Weld Procedure Specification(s) (WPS) in the event that the Supplier has received authorization by completing the BAE Systems required Weld Procedure Training and subsequent Weld Process Audit.

Note: CDR007 submittals in accordance with [Mil-STD-3040](#) and/or [Mil-STD-3057](#), along with subsequent document revisions, strictly prohibit the use of BAE Systems Weld Procedures. For Purchase Orders, Contracts, and/or Drawings requiring welding in accordance with [Mil-STD-3040](#) and/or [Mil-STD-3057](#), the Supplier **SHALL** qualify and provide Weld Procedure(s) and Supporting Documentation in accordance with the requirements listed in the applicable specification.

In the event that the Supplier is **NOT** authorized to utilize BAE Systems Weld Procedures and/or BAE Systems **DOES NOT** have applicable Weld/Braze Procedure(s) to fabricate the Weldment/Brazement to fulfill the Purchase Order, the Supplier **SHALL** be responsible for providing and/or qualifying Weld/Braze Procedure(s), in accordance with the specified code, **PRIOR** to fabrication. BAE Systems Weld Engineering **SHALL NOT** be responsible for providing additional procedure qualifications for the sole use of our Suppliers.

The Supplier **SHALL** submit the WPS/BPS(s) intended for part fabrication to BAE Systems Weld Engineering for review and approval via the [CMS Supplier Weld/Braze](#) Procedure Submission Form (BMS 089136) **PRIOR** to the start of welding/brazing and fabrication. The latest version of the form **SHALL** be utilized and is accessible via the BAE Systems [CMS Supplier Website](#). Each Weldment/Brazement Part Number and the applicable WPS/BPS(s) **SHALL** be submitted individually.

In the event that the Supplier provides a non-BAE Systems qualified Weld Procedure, or is not authorized to utilize BAE Systems Weld Procedures, the Supplier **SHALL** submit the following documentation, as required per the applicable code and/or specification, **PRIOR** to the start of welding/brazing and fabrication:

- **Welding Procedure Specification (WPS)/Braze Procedure Specification (BPS)**
- Supporting **Procedure Qualification Record (PQR)/ Braze Procedure Qualification Record (BPQR)**- to include Non-Destructive and Destructive Supporting Test Data
- Any **additional supporting documentation** that is required for submittal in accordance with the applicable drawing and/or specification

All Weld Procedures and/or [Braze](#) Procedures to be utilized **SHALL** be approved **PRIOR** to use; which **SHALL** include tack welding [and/or](#) rework. Supplying product to BAE Systems with an unapproved, rejected, and/or incorrect WPS/BPS is a violation of the BAE Systems Purchasing Agreement [and SQAM](#) and **SHALL** be considered non-conforming.

The Supplier **SHALL** be responsible for resubmitting the form in the event that any changes in Base Material, Weld/Braze Procedure(s), the Part Number Configuration, and/or any other changes that impact the Welding/Brazing processes from the previously approved submittal. The form **SHALL** be resubmitted if the BAE Systems Purchasing Order Part Number changes throughout configuration, regardless if all other variables have remained consistent from the previous approval.

The Supplier **SHALL** be responsible for maintaining all supporting documentation including, but **NOT** limited, to the following; [Procedure Qualifications](#), Performance Qualifications, Sub-Tier Supplier Certifications, Machine Calibration Documentation, and other applicable documentation required to demonstrate compliance in accordance with the requirements per the BAE Systems Purchasing Agreement. All documentation **SHALL** be made available, as requested, to BAE Systems at all times.

For [weld repairs and/or clarifications regarding weld/braze drawing requirements](#), the Supplier **SHALL** submit a Vendor Information Request (VIR) Form ([BMS 097908](#)) for review and disposition **PRIOR** to use.

007B Welding- Combat Vehicles: Additional Weld Requirements

The Supplier **SHALL** reference the applicable code [designated on the BAE Systems Purchase Order and Contract Quality Requirements](#) and its entirety. The Supplier **SHALL** be responsible for reviewing **AND** adhering to **ALL** requirements listed in the designated Weld Code.

Aluminum:

In addition to the requirements specified in CDR007, [additional Aluminum Weld Requirements](#), the following requirements **do NOT encompass ALL changes implemented** within the specified Weld Code:

- Weld Procedure Qualifications: the requirements for utilizing Multiple Welding Processes within a single procedure [has updated](#)
- Operator Qualifications: the requirements for the Number of Electrodes an Operator is qualified to utilize [has updated](#)

Steel:

In addition to the requirements specified in CDR007, additional Steel Weld Requirements, the following requirements **do NOT encompass ALL changes implemented** within the specified Weld Code:

- Weld Procedure Qualifications: the requirements for Preheat/Interpass Temperature, Travel Speed, Heat Input, and Charpy V Notch (CVN) Testing have updated
- Non-Destructive Testing (NDT): Following welding, for all high strength steels and armor grade steels greater than 0.25" (6mm) in thickness, the final NDT examination for acceptance shall be conducted no less than 48 hours after the final weld has cooled to ambient temperature. Preliminary NDT examinations are advisable to avoid production related delays by identifying defects not related to delayed hydrogen cracking. These defects can be addressed before the 48 hour hold is complete, restarting the 48 hour period. Defects identified and addressed following the first 48 hour hold shall be subject to an additional 48 hour hold. Alternative strategies to mitigate delayed hydrogen cracking must be supported by data and shall be submitted to the procuring activity for review for acceptability prior to amending the length of this hold time.
- Procedure Transfers: It is allowable to transfer qualified and approved welding procedure (s) between an entity and its sub-entities, for all classes of welds. The receiving transferee (Supplier and/or Fabricator) **SHALL** create an initial validation test plate using the WPS parameters to qualify for welding with the WPS in accordance with the applicable Weld Code.

- The sub-entity **SHALL** submit the BAE Systems Validation Test Plate Data Sheet and document the applicable information as required. Failure to provide the necessary information **SHALL** result in the ineligibility to utilize the entity's Weld Procedure(s).
- A re-Validation Test **MAY** be required to demonstrate that the sub-entity is capable of adhering to the requirements specified in accordance with the Weld Procedure in question, as a result of the following events:
 - Non-conformance (s) identified during a Weld Process Audit conducted by BAE Systems' Supplier Quality Team
 - Non-conforming welded part (s) received by BAE Systems

007B Welding- Combat Vehicles: Additional Weld Requirements

The Supplier **SHALL** reference the applicable Code and/or Specification designated by the applicable Purchase Order, Contract, and/or Drawing and its entirety. The Supplier **SHALL** be responsible for reviewing **AND** adhering to **ALL** requirements listed in the designated Weld Code.

Aluminum:

In addition to the requirements specified in CDR007 [Welding-Combat Vehicles](#), the following requirements **have updated** within the specified Weld Code:

- Weld Procedure Qualifications: the requirements for utilizing Multiple Welding Processes within a single procedure
- Operator Qualifications: the requirements for the Number of Electrodes an Operator is qualified to utilize

Steel:

In addition to the requirements specified in CDR007 [Welding-Combat Vehicles](#), the following requirements **have updated** within the specified Weld Code:

- Weld Procedure Qualifications: the requirements for Preheat/Interpass Temperature, Travel Speed, Heat Input, and Charpy V Notch (CVN) Testing have updated
- Non-Destructive Testing (NDT): Following welding, for all high strength steels and armor grade steels greater than 0.25" (6mm) in thickness, the final NDT examination for acceptance shall be conducted no less than 48 hours after the final weld has cooled to ambient temperature. Preliminary NDT examinations are advisable to avoid production related delays by identifying defects not related to delayed hydrogen cracking. These defects can be addressed before the 48 hour hold is complete, restarting the 48 hour period. Defects identified and addressed following the first 48 hour hold shall be subject to an additional 48 hour hold. Alternative strategies to mitigate delayed hydrogen cracking must be supported by data and shall be submitted to the procuring activity for review for acceptability prior to amending the length of this hold time.
- Procedure Transfers: It is allowable to transfer qualified and approved welding procedure (s) between an entity and its sub-entities, for all classes of welds. The receiving transferee (Supplier and/or Sub-Tier Weld Supplier/Fabricator) **SHALL** create an initial validation test plate using the WPS parameters to qualify for welding with the WPS in accordance with the applicable Weld Code.
 - The sub-entity **SHALL** submit the BAE Systems Validation Test Plate Data Sheet and document the applicable information as required. Failure to provide the necessary information **SHALL** result in the ineligibility to utilize the entity's Weld Procedure(s).
 - A re-Validation Test **MAY** be required to demonstrate that the sub-entity is capable of adhering to the requirements specified in accordance with the Weld Procedure in question, as a result of the following events:
 - Non-conformance (s) identified during a Weld Process Audit conducted by BAE Systems' Supplier Quality Team

- Non-conforming welded part (s) received by BAE Systems

008 Welding-Weapon Systems

PRIOR to the start of fabrication (or repair to raw material, casting, forgings, etc.), the Supplier **SHALL** submit and gain approval for all procedure (s) per the Purchase Order Part Number. The Supplier **SHALL** be responsible for qualifying and providing Weld/Braze Procedure (s) **PRIOR** to fabrication.

The Supplier **SHALL** submit the following documentation to BAE Systems for review and approval via the CDR008 Weld Procedure Request Form (BMS 091721), accessible via the **BAE Systems** P&S Supplier Website, **PRIOR** to the start of welding/brazing and fabrication:

- **Welding Procedure Specification (WPS)/Braze Procedure Specification (BPS)**
- Supporting **Procedure Qualification Record (PQR)/ Braze Procedure Qualification Record (BPQR)** - to include Non-Destructive and Destructive Supporting Test Data
- **Personnel Performance Qualifications***-to include Welder/Welder Operator Performance Qualification (WPQ) and Brazer/Braze Operator Performance Qualification (BPQ)*submittals **ONLY** required for personnel executing the respective welding and/or brazing operations
- Any **additional supporting documentation** that is required for submittal in accordance with applicable drawing and/or specification

All Weld/Braze Procedures to be utilized **SHALL** be approved **PRIOR** to use. Supplying product to BAE Systems with an unapproved, rejected, and/or incorrect WPS/BPS is a violation of the BAE Systems Purchasing Agreement and **SHALL** be considered non-conforming and parts are subject to rejection and **MAY** be returned to the Vendor(RTV) at the Supplier's expense.

The Supplier **SHALL** be responsible for maintaining all supporting documentation including, but **NOT** limited, to the following; Performance Qualifications, Sub-Tier Supplier Certifications, Machine Calibration Documentation, and other applicable documentation required to demonstrate compliance in accordance with the requirements per the BAE Systems Purchasing Agreement. All documentation **SHALL** be made available, as requested, to BAE Systems at all times.

008 Welding-Weapon Systems

PRIOR to the start of fabrication, the Supplier **SHALL** submit and gain approval for all procedure(s) per the Purchase Order Part Number. The Supplier **SHALL** be responsible for qualifying and providing Weld/Braze Procedure (s) **PRIOR** to fabrication.

The Supplier **SHALL** submit the following documentation, as required per the applicable code and/or specification, to BAE Systems for review and approval via the **CMS** Supplier Weld/Braze Procedure Submission Form (BMS 089136) accessible via the BAE Systems CMS Supplier Website, **PRIOR** to the start of welding/brazing and fabrication:

- **Welding Procedure Specification (WPS)/Braze Procedure Specification (BPS)**
- Supporting **Procedure Qualification Record (PQR)/ Braze Procedure Qualification Record (BPQR)**- to include Non-Destructive and Destructive Supporting Test Data
- **Personnel Performance Qualifications***- to include Welder/Welder Operator Performance Qualification (WPQ) and Brazer/Braze Operator Performance Qualification (BPQ) *submittals **ONLY** required for personnel executing the respective welding and/or brazing operations
- Any **additional supporting documentation** that is required for submittal in accordance with applicable drawing and/or specification

All Weld/Braze Procedures to be utilized **SHALL** be approved **PRIOR** to use; which **SHALL** include tack welding and/or rework. Supplying product to BAE Systems with an unapproved, rejected, and/or incorrect WPS/BPS is a violation of the BAE Systems Purchasing Agreement and SQAM and **SHALL** be considered non-conforming.

The Supplier **SHALL** be responsible for maintaining all supporting documentation including, but **NOT** limited, to the following; Procedure Qualifications, Performance Qualifications, Sub-Tier Supplier Certifications, Machine Calibration Documentation, and other applicable documentation required to demonstrate compliance in accordance with the requirements per the BAE Systems Purchasing Agreement. All documentation **SHALL** be made available, as requested, to BAE Systems at all times.

For weld repairs and/or clarifications regarding weld/braze drawing requirements, the Supplier **SHALL** submit a Vendor Information Request (VIR) Form (BMS 097908) for review and disposition **PRIOR** to use.

013 Nondestructive Examination Procedures

When the Purchase Order specifies Nondestructive Examination such as radiography, magnetic particle, liquid penetrant, or ultrasonic inspections, the data shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item. The procedure shall be submitted within thirty (30) days after receipt of the Purchasing Agreement. If the submittal is requested during performance of the Purchasing Agreement, the Supplier shall submit the procedure within three (3) days of receiving the request.

All changes to the approved procedure shall require re-submittal and approval. The revised procedure shall not be implemented until written approval is received from BAE Systems.

013 Nondestructive Examination Procedures

When the Purchase Order specifies Nondestructive Examination such as radiography, magnetic particle, liquid penetrant, or ultrasonic inspections, the data shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item. Approval of procedure is to be completed by or with oversight from BAE Systems, level 3 personnel. The procedure shall be submitted within thirty (30) days after receipt of the Purchasing Agreement. If the submittal is requested during performance of the Purchasing Agreement, the Supplier shall submit the procedure within three (3) days of receiving the request.

All changes to the approved procedure shall require re-submittal and approval. The revised procedure shall not be implemented until written approval is received from BAE Systems.

018 Physical and Chemical Test Reports

The Supplier shall provide the raw material certification including all actual chemical, mechanical, and/or physical test results pertaining to the material or finished product shipped under this Purchasing Agreement with traceability to the original mill/manufacturer, heat lot, and country of origin, as applicable prior to the product shipment. For material subject to the SQAM paragraph 6.6 Traceability of Specialty Metals, evidence of compliance shall be included. The data shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.

018 Physical and Chemical Test Reports

The Supplier shall provide the raw material certification including all actual chemical, mechanical, and physical test results **required by the TDP for** the material or finished product shipped under this Purchasing Agreement with traceability to the original mill/manufacturer, heat lot, and country of origin, as applicable prior to the product shipment. For material subject to the SQAM paragraph 6.6 Traceability of Specialty Metals, evidence of compliance shall be included. The data shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.

022A Material Traceability – Weapon Systems - VPM

For Legacy Weapon Systems, VPM program, the following requirements apply:

- Supplier SHALL comply with all provisions of sow EB5638.
- Material verification SHALL be accomplished upon receipt and prior to delivery.
- Photographic evidence of product condition as received and as shipped MUST be provided.

030E High Strength Fasteners for Naval Products

The following is a Legacy Weapons Systems requirement for all High Strength Fasteners

THIS IS A HIGH STRENGTH FASTENER. ALL HIGH STRENGTH FASTENERS (HSF) OF THIS TYPE ARE REQUIRED TO MEET THE FOLLOWING REQUIREMENTS: ANY OF THE HSF ITEMS NOT MEETING THE BELOW REQUIREMENTS IS CAUSE FOR REJECTION, WITHOUT EXCEPTION.

*****NOTE: ALL OF THE LISTED CDR REQUIREMENTS MUST BE APPROVED PRIOR TO DELIVERY. NO EXCEPTIONS. ANY DELIVERY WITHOUT APPROVAL WILL BE REJECTED AND RETURNED TO SUPPLIER*****

HIGH STRENGTH FASTENER SPECIAL REQUIREMENTS

High strength fasteners (HSF) currently can only be zinc or zinc/nickel plated to (96-11402, only when the drawing states this requirement) and must be plated at Nico plating (Minneapolis, MN).

All other HSF: The following applies:

- Plating for all HSF must be completed by:

NICO PRODUCTS
2929 1ST AVENUE SOUTH
MINNEAPOLIS, MN 55408
(PH) 612-822-2185

When placing these on order with Nico Products, the PO to Nico Products must state that these are for BAE Systems, Weapons Systems, and that these instructions must be flowed down to Nico Products.

Supplier Quality Assurance Provisions per BAE Systems Supplier Quality Assurance Manual (SQAM) must be adhered to.

(All specifications referenced shall be compliant to the latest revision)

The delivered documentation package shall contain the following:

- A C of C confirming that the part was manufactured to the requirements of FF-S-86 or related ASTM B18 specification and ANSI/ASME B18.3 for dimensional compliance.
- A chemical and physical certification, (material must be melted in the USA or a qualifying country per DFARS requirements, an actual mill certification with the country of origin listed is required).
- The oven charts required for hydrogen embrittlement pre and post plate baking operation, after plating from the plater.
- NDT test certification after heat treating required, prior to plating.
- A document that states the parts are mercury free when completed.
- All certifications traceable to the appropriate BAE Systems PO, on each required document.
- The special plating restrictions are as follows (certification is required to document compliance as listed):
 1. No cathodic or acid cleaning allowed.
 2. The minimum workable current density shall be used in the zinc bath. Cyanide zinc and other low efficiency baths SHALL NOT be used.
 - 2.1 Practice of zinc activation, post hydrogen embrittlement, bake relief, by immersion in zinc plating bath with electric current is prohibited. Only weak acid per ASTM B6333 are allowed.
 3. Hydrogen embrittlement bake @ 400 +0/-25 deg F for 24 hours within 3 hours.
 4. Plating thickness, adhesion, corrosion resistance, hydrogen embrittlement relief and workmanship shall be verified IAW ASTM B 633.
- A metallurgical NDT inspection per ASTM E 1444, after stress durability testing of samples parts used for testing. (Magnetic Particle (MP) Inspection).
- A stress durability test, per AIA/NAS NASM-1312-5, 200 hours, 80% of the rated minimum tensile strength (ref ASTM A574 or ASTM A574M) sample size IAW SHALL BE completed after plating, (a minimum of 5 parts must be tested).
 - The locking patch (when required) SHALL BE per MIL-DTL-18240, except prevailing and breakaway torques per IFI-124 (when required by DWG).
 - A First Piece Inspection per the CDR manual must be in compliance, after the first piece and as long as this item has been in continuous production for the last 24 months, an in-process inspection must be completed and submitted for our review to show compliance after the first article and during the remainder of the 24 month period.

- All items must be completed per the requirements and submitted for source inspection. The Supplier must receive written BAE Systems permission to ship. A copy of the permission SHALL BE included with all items being shipped.
 5. A Pre-approved plating rework procedure is required and must be approved by BAE Systems, for all parts. Rework must be identified using a punch mark, (x), located on the head of the fasteners.
 6. BAE SYSTEMS, WEAPONS SYSTEMS DIVISION, must approve the "Plating Process Control Procedure" prior to plating high strength fasteners. Written evidence of approval is required to be available upon demand.
 7. Any detail that is not documented as described, herein, is cause for rejection, return, and replacement as needed. It is the responsibility of the SUPPLIER to review, for compliance, all items prior to submittal. There are no allowable exceptions to HSF, all items must be provided, and be in compliance as noted. All rejections are at the cost to the SUPPLIER, with provided conforming items.

034 Ballistic Requirements- Metal and Composite Materials

FIRING RECORDS (Plate and Composite):

The Supplier shall provide a copy of the:

- Summary Template for Armor Product 093550.
 - a. Submission of this form is only required for parts fabricated from the following material specifications:
 - i. Aluminum Armor
 1. MIL-DTL-32262
 2. MIL-DTL-32341
 3. MIL-DTL-32375
 4. MIL-DTL-32505
 5. MIL-DTL-45225
 6. MIL-DTL-46027
 7. MIL-DTL-46063
 8. MIL-DTL-46083
 9. MIL-DTL-46192
 - ii. Steel Armor
 1. MIL-A-11356
 2. MIL-DTL-12560
 3. MIL-DTL-32332
 4. MIL-DTL-46100
 5. MIL-DTL-46177
 - iii. Titanium Armor
 1. MIL-DTL-46077
 2. 19207-12933366
 3. 19207-12462708
 - b. Any other items listed with CDR034 who do not make use of these listed specifications are not required to complete the submission form 093550.

c. Completion of this form does not exempt vendor from submission of all other required documentation listed in CDR 034.

- Physical and Chemical Test Reports a. For non-armor options allowed per the print, the supplier shall submit the physical and chemical test reports for the optional material used. BAE Systems shall be notified of the use of the optional material during documentation submittal.
- b. Test reports shall be provided in accordance with the applicable material standard and the definitions and requirements therein.

Government Ballistic Test Certification, including firing number for each heat/lot of ballistic material. Results shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item. All armor material lot and heat certification traceability must be maintained and tracked to the sub-component and or end item the material was consumed in.

- 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 and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.

- FIRING RECORDS (FORGINGS):

- a. 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.
- b. 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 and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.

MACHINING ALLOWANCES FOR ARMOR PLATE

In general, mill certifications and ballistic test certifications are required to be provided at the thickness designated on a drawing's material note. In instances where there is no requirement for the thickness of armor material designated in the material note, the following requirements shall apply –

- If the thickness of the armor material is not specified on the material note, thicker material may be procured and machined to final size with the following limitations.
 - o MIL-DTL-46027 – allowable to machine 25% from the original thickness to meet requirement.
 - o MIL-DTL-32375 (Class 1, All Grades) – allowable to machine 10% from the original thickness to meet requirement.
 - o MIL-DTL-12560 (Class 1) – allowable to machine within the applicable hardness ranges specified in Table 1 in this section.
 - o MIL-DTL-12560 (Class 2 & 4) – allowable to machine 25% from original thickness to meet requirement.
 - o MIL-DTL-46100 – allowable to machine 25% from original thickness requirement.

- When assessing machining allowances per the above requirements, measurements shall be taken from nominal ordered thickness to the nominal measurement at the thickest section of the component as designated on the drawing.
- Exceptions outside of the allowances in this document must be reviewed and approved by BAE Systems engineering and requires the submission of a VIR.

Per previous, these allowances for machining of armor product from thicker procured plates is only applicable when a material thickness is not designated in the material note. Note that Class 3 MIL-DTL-12560 armor is not allowable for use in the fabrication of vehicle product and is typically used for other test and evaluation purposes. As a result, machining allowances for this material require submission of a VIR if procured in a thickness other than that requested in the PO.

Table 1. Machining Allowances for MIL-DTL-12560 Wrought Armor Plate.

Armor Class (MIL-DTL-12560)	Allowable Machining Ranges
1	.098 - .249 incl.
	.250 - .624 incl.
	.625 - 1.125 incl.
	1.126 - 1.999 incl.
	2.000 - 3.999 incl.
	4.000 - 6.000 incl.
2	25% original thickness
4	25% original thickness

MATERIAL REDUCTION OF ARMOR PLATE (STEEL & ALUMINUM)

During the handling and fabrication of armor plates, occasionally small material defects – such as mechanical gouges and scratches – accumulate on the plate surface. In general, surface imperfections that do not affect the functionality of the material or its fitness for fabrication are acceptable and do not need to be repaired. These requirements are outlined in Paragraph 3.11 (MIL-DTL-46027), Paragraph 3.9 & 3.10 (MIL-DTL-32375), and Paragraph 3.2.11 (MIL-DTL-46100 and MIL-DTL-12560).

Given that it is difficult for vendors to assess what surface imperfections may affect the functionality or serviceability of a plate in fabrication, vendors shall assess surface imperfections based on the following criteria –

- Identify indications of surface imperfections visually and determine base material type and thickness per applicable engineering drawing.
- Measure plate thickness at the indication site via ultrasound thickness gage, caliper, or other process approved by BAE Systems SQA representative.
 - Ultrasound thickness gage measurements shall be taken at the deepest area of the surface imperfection. In instances where an indication cannot be assessed in this manner, measurements shall be taken adjacent to the indication.
 - Measurements by caliper or mechanical measurement shall be taken at the plate edge nearest the indication. A depth gage shall then be used to measure the depth of the imperfection at its deepest point and subtracted from the as-measured thickness to determine final thickness in the area of the indication.
 - Imperfections may be deburred in order to allow effective measurement of the indication.
- Compare the measured thickness of the plate to the minimum allowable material thickness per applicable specification. In instances where the thickness at the location of the indication is defined on the drawing, refer to the applicable drawing tolerances for the minimum allowable material thickness.

If material is found to meet or exceed the minimum thickness at the deepest point of the defect, it is acceptable as-is and no repair is needed. All surface imperfections deemed acceptable by this method shall be deburred to remove sharp edges. If the material is found to be thinner than the minimum allowable thickness at the deepest point of the defect, the material is non-conforming to specification and shall be rejected. Alternatively, vendors with defective indications may submit a VIR to authorize a repair or use as-is.

Table 2. Thickness Tolerances for MIL-DTL-46027.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Minus Tolerance
.250	.315	.018
.315	.394	.023
.394	.630	.032
.630	.984	.043
.984	1.575	.055
1.575	2.362	.070
2.362	3.000	.100

Table 3. Thickness Tolerances for MIL-DTL-32375.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Tolerances (\pm)
.500	1.000	.043
1.001	1.575	.055
1.576	2.362	.070
2.363	3.000	.100

Table 4. Thickness Tolerances for MIL-DTL-12560.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Tolerances (\pm)
.2500	.3749	.022
.3750	.6249	.025
.6250	.9990	.030
1.0000	1.4990	.035
1.5000	1.9990	.045
2.000	2.9990	.065
3.000	3.9990	.070

Table 5. Thickness Tolerances for MIL-DTL-46100.

Ordered Thickness (Inches)	Allowable Material Reduction from Specified Thickness (Inches)
Specified Thickness	Tolerances (\pm)
.1250-.3125	.019
.313-.750	.023
.751-1.000	.026
1.001-1.1875	.031
1.188-1.4375	.036
1.438-1.5625	.039
1.563-1.750	.043
1.751-2.000	.048

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 not 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.

- MIL-A-11356 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 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 are not required to submit their secondary processing as part of the qualification for their thermal cutting procedure.
- 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 General Inspection level II, AQL 2.5%, spec ANSI/ASQ Z1.4. 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.

034 Ballistic Requirements- Metal and Composite Materials

FIRING RECORDS (Plate and Composite):

The Supplier shall provide a copy of the:

- Summary Template for Armor Product 093550.
 - a. Submission of this form is only required for parts fabricated from the following material specifications:
 - i. Aluminum Armor
 - 1. MIL-DTL-32262
 - 2. MIL-DTL-32341
 - 3. MIL-DTL-32375
 - 4. MIL-DTL-32505
 - 5. MIL-DTL-45225
 - 6. MIL-DTL-46027
 - 7. MIL-DTL-46063
 - 8. MIL-DTL-46083
 - 9. MIL-DTL-46192
 - ii. Steel Armor
 - 1. MIL-A-11356
 - 2. MIL-DTL-12560
 - 3. MIL-DTL-32332
 - 4. MIL-DTL-46100
 - 5. MIL-DTL-46177

iii. Titanium Armor

1. MIL-DTL-46077
 2. 19207-12933366
 3. 19207-12462708
- b. Any other items listed with CDR034 who do not make use of these listed specifications are not required to complete the submission form 093550.
- c. Completion of this form does not exempt vendor from submission of all other required documentation listed in CDR 034.
- Physical and Chemical Test Reports
 - a. For non-armor options allowed per the print, the Supplier shall submit the physical and chemical test reports for the optional material used. BAE Systems shall be notified of the use of the optional material during documentation submittal.
 - b. Test reports shall be provided in accordance with the applicable material standard and the definitions and requirements therein.

Government Ballistic Test Certification, including firing number for each heat/lot of ballistic material. Results shall be submitted and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item. All armor material lot and heat certification traceability must be maintained and tracked to the sub-component and or end item the material was consumed in.

- 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 and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.
- FIRING RECORDS (FORGINGS):
 - a. 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.
 - b. 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 and approved prior to shipment of the item in accordance with the Data Submission Instructions located in the Supplier Quality Assurance Manual (SQAM) paragraph 8.12 for this item.

MACHINING ALLOWANCES FOR ARMOR PLATE

In general, mill certifications and ballistic test certifications are required to be provided at the thickness designated on a drawing's material note. In instances where there is no requirement for the thickness of armor material designated in the material note, **or a part is machined to final dimensions from a thicker section**, the following requirements shall apply –

- If the thickness of the armor material is not specified on the material note, thicker material may be procured and machined to final size with the following limitations.
 - MIL-DTL-46027 – allowable to machine 25% from the original thickness to meet requirement.
 - MIL-DTL-32375 (Class 1, All Grades) – allowable to machine 10% from the original thickness to meet requirement.
 - MIL-DTL-12560 (Class 1) – allowable to machine within the applicable hardness ranges specified in Table 1 in this section.
 - MIL-DTL-12560 (Class 2 & 4) – allowable to machine 25% from original thickness to meet requirement.
 - MIL-DTL-46100 – allowable to machine 25% from original thickness requirement.
- When assessing machining allowances per the above requirements, measurements shall be taken from nominal ordered thickness to the nominal measurement at the thickest section of the component as designated on the drawing.
- Exceptions outside of the allowances in this document must be reviewed and approved by BAE Systems engineering and requires the submission of a VIR.

Per previous, these allowances for machining of armor product from thicker procured places is only applicable when a material thickness is not designated in the material note.

Note that Class 3 MIL-DTL-12560 armor is not allowable for use in the fabrication of vehicle product and is typically used for other test and evaluation purposes. As a result, machining allowances for this material require submission of a VIR if procured in a thickness other than that requested in the PO.

Table 1. Machining Allowances for MIL-DTL-12560 Wrought Armor Plate.

Armor Class (MIL-DTL-12560)	Allowable Machining Ranges
1	.098 - .249 incl.
	.250 - .624 incl.
	.625 – 1.125 incl.
	1.126 – 1.999 incl.
	2.000 – 3.999 incl.
	4.000 – 6.000 incl.
2	25% original thickness
4	25% original thickness

MATERIAL REDUCTION OF ARMOR PLATE (STEEL & ALUMINUM)

During the handling and fabrication of armor plates, occasionally small material defects – such as mechanical gouges and scratches – accumulate on the plate surface. In general, surface imperfections that do not affect the functionality of the material or its fitness for fabrication are

acceptable and do not need to be repaired. These requirements are outlined in Paragraph 3.11 (MIL-DTL-46027), Paragraph 3.9 & 3.10 (MIL-DTL-32375), and Paragraph 3.2.11 (MIL-DTL-46100 and MIL-DTL-12560).

Given that it is difficult for vendors to assess what surface imperfections may affect the functionality or serviceability of a plate in fabrication, vendors shall assess surface imperfections based on the following criteria –

- Identify indications of surface imperfections visually and determine base material type and thickness per applicable engineering drawing.
- Measure plate thickness at the indication site via ultrasound thickness gage, caliper, or other process approved by BAE Systems SQA representative.
 - Ultrasound thickness gage measurements shall be taken at the deepest area of the surface imperfection. In instances where an indication cannot be assessed in this manner, measurements shall be taken adjacent to the indication.
 - Measurements by caliper or mechanical measurement shall be taken at the plate edge nearest the indication. A depth gage shall then be used to measure the depth of the imperfection at its deepest point and subtracted from the as-measured thickness to determine final thickness in the area of the indication.
 - Imperfections may be deburred in order to allow effective measurement of the indication.
- Compare the measured thickness of the plate to the minimum allowable material thickness per applicable specification. In instances where the thickness at the location of the indication is defined on the drawing, refer to the applicable drawing tolerances for the minimum allowable material thickness.

If material is found to meet or exceed the minimum thickness at the deepest point of the defect, it is acceptable as-is and no repair is needed. All surface imperfections deemed acceptable by this method shall be deburred to remove sharp edges. If the material is found to be thinner than the minimum allowable thickness at the deepest point of the defect, the material is non-conforming to specification and shall be rejected. Alternatively, vendors with defective indications may submit a VIR to authorize a repair or use as-is.

Table 2. Thickness Tolerances for MIL-DTL-46027.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Minus Tolerance
.250	.315	.018
.315	.394	.023

Commented [JCA(1)]: Added Minus

.394	.630	.032
.630	.984	.043
.984	1.575	.055
1.575	2.362	.070
2.362	3.000	.100

Table 3. Thickness Tolerances for MIL-DTL-32375.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Minus Tolerance
.500	1.000	.043
1.001	1.575	.055
1.576	2.362	.070
2.363	3.000	.100

Commented [JCA(2)]: Added Minus

Table 4. Thickness Tolerances for MIL-DTL-12560.

Ordered Thickness (Inches)		Allowable Material Reduction from Specified Thickness (Inches)
Over	Thru	Minus Tolerance
.2500	.3749	.022
.3750	.6249	.025
.6250	.9990	.030
1.0000	1.4990	.035
1.5000	1.9990	.045
2.000	2.9990	.065
3.000	3.9990	.070

Commented [JCA(3)]: Added Minus

Table 5. Thickness Tolerances for MIL-DTL-46100.

Ordered Thickness (Inches)	Allowable Material Reduction from Specified Thickness (Inches)
Specified Thickness	Minus Tolerance
.1250-.3125	.019
.313-.750	.023
.751-1.000	.026
1.001-1.1875	.031
1.188-1.4375	.036
1.438-1.5625	.039
1.563-1.750	.043
1.751-2.000	.048

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 not 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.
- MIL-A-11356 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 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 are not required to submit their secondary processing as part of the qualification for their thermal cutting procedure.
 - 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 ASTN 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 General Inspection level II, AQL 2.5%, spec ANSI/ASQ Z1.4. 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.

085 First Article Inspection

The Contractor shall conduct First Article Inspection (FAI) in accordance with AS9102B for all provided parts and those not previously subjected to First Article Inspection requirements in accordance with the Supplier Quality Assurance Manual, to ensure Supplier product/processes have the capability of meeting design and/or specification requirements.

FAIs shall be conducted, reviewed, submitted and approved in accordance with the data submission instructions located in the SQAM paragraph 8.12 for this part prior to the first shipment of product. Where changes require only a delta FAI, the delta FAI will be limited to the impact of the change only. The customer reserves the right to review any or all associated FAI documentation at its discretion.