

<b>HOWMET AEROSPACE: CLEVELAND OPERATIONS SPECIFICATION</b>		<b>Document Identification:  CLE-QA-016</b>	
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**1.0 PURPOSE & SCOPE:**

This document is the property of Cleveland Operations (*previous referred to as Arconic Forged Products or Alcoa*) located in Cleveland, Ohio. This document is issued with the understanding that neither this document nor any of the information it contains shall be reproduced, copied, used for the manufacture of any apparatus, or otherwise disclosed to anyone outside the recipient's business organization without prior written consent of Cleveland Operations.

This document establishes the minimum quality system requirements for suppliers necessary to ensure that purchased products, materials and services meet the required quality level for Cleveland Operations.

The requirements of this document are generic and are intended to be applicable to all organizations doing business with Cleveland Operations, regardless of the type, size, product, process or service provided. Exclusions or exceptions to these stipulated requirements shall be submitted in writing and accepted in writing by the company's Quality and Procurement organizations. Verbal authorizations shall not be permitted. Requirements that cannot be applied due to the nature of an organization and its product will be considered for exclusion, providing such exclusions do not affect the organization's ability or responsibility to provide product that meets Cleveland Operations and statutory and regulatory requirements. The quality requirements referenced herein apply in addition to any general terms and conditions or quality/specification requirements detailed on the Cleveland Operations Purchase Order.

**2.0 REFERENCED DOCUMENTS:**

Document Identification	Title
CLE-AL-013	Extruded Stock Specification
CLE-AL-014	Forging Stock Procurement Aluminum Ingot Stock
CLE-NDT-001	Procurement of NDT Testing Services
CLE-QA-018	Supplier Sawing of Alcoa Forged Stock
CLE-TI-012	Forging Stock Procurement Specification Ti 6-22-66S
CW-1	Titanium Forging Stock Requirements

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CW-2	Alcoa Billet Specification for Ti-10V-2Fe-3Al
QUA-039	Inspection Light Illumination Form
SCM-200	Supplier Non-Conforming Material Request for Deviation
SCM-002	Supplier DPD-MBD-PAS Equipment Self-Assessment Audit Form
SCM-005	Control Plan
See Section 4.2	Industry Standards

**3.0 DEFINITIONS**

Howmet - Cleveland Operations, Cleveland, Ohio

P.O. – Purchase Order

NDT – Non-Destructive Testing

PAS – Product Acceptance Software

MBD – Model Base Definition

DPD – Digital Data Definition

NIST – National Institute of Standards and Technology

NADCAP - National Aerospace and Defense Contractors Accreditation Program

Escape – Any product, documentation or process escapes released by an internal/external supplier or sub-tier supplier that is subsequently determined to be nonconforming to contract and/or product specification requirements.

F.O.D. – Foreign Object Debris is a substance, debris or article alien to a system which may potentially cause damage to the part(s) or material. It includes, but not limited to, any loose articles, scrap parts and product test parts, mixed parts, coupons, metal tags, scrap or metal shavings.

**4.0 APPLICABLE SPECIFICATIONS AND DOCUMENTS:**

**4.1** The documents listed below form a part of this specification. Additional specifications/requirements may be defined on the purchase order, drawing, Table 1, or other quality or processing instructions. It is expected that suppliers work to the most current revisions unless otherwise specified or negotiated.

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**4.2 Industry Standards:**

ASTM		AMS / Misc.		AS / ISO / Cleveland Operations	
ASTM A521	Standard Specification for Steel, Closed-Impression Die Forgings for General Industrial Use	AMS-STD 2154	Ultrasonic Inspection	AS9100	International Standard for Quality Management Systems for Aerospace
ASTM A668	Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use	AMS 2644	Penetrant Materials	AS9201	Nut, Plain, Hex, Boss Connection, Corrosion Resistant Steel
ASTM A788	Standard Specification for Steel Forgings, General Requirements	AMS 2750	Pyrometry	AS6279 (Where Applicable)	Standard Practice for Production, Distribution and Procurement of Metal Stock
ASTM B91	Magnesium Stock	AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials	AS6174	Counterfeit Material; Assuring Acquisition of Authentic and Conforming Material
ASTM B557	Tensile Testing of Aluminum	AMS 4928	Titanium Alloy Bars, Wire, Forgings, and Rings 6Al - 4V Annealed	AS9131	Aerospace Series - Quality Management Systems - Nonconformance Data Definition and Documentation
ASTM B594	Ultrasonic Inspection	AMS 5659	Steel, Corrosion Resistant, Bars, Wire, Forgings, Rings, and Extrusions 15Cr - 4.5Ni - 0.30Cb (Nb) - 3.5Cu, Consumable Re-melted, Precipitation Harden-able	ISO 9001	International Standard for Quality Management Systems
ASTM B645	Fracture Toughness Testing of Al	AMS 6257	Steel Bars, Forgings, and Tubing 1.6SI -	ISO 10012-1	Quality Assurance Requirements for Measuring

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			0.82Cr - 1.8Ni - 0.40Mo - 0.08V (0.40 - 0.44C) Consumable Electrode Vacuum Re- melted Normalized and Tempered		Equipment
ASTM E8	Tensile Testing of Metallic Material	AMS 6414	Steel, Bars, Forgings, and Tubing 0.80Cr - 1.8Ni - 0.25Mo (0.38 - 0.43C) (SAE 4340) Vacuum Consumable Electrode Re-melted	ISO14000	Environmental Management System
ASTM E10	Standard Test Method for Brinell Hardness of Metallic Materials	AMS A8625	Anodic Coatings for Aluminum and Aluminum Alloys	CW-1	Titanium Stock Requirements
ASTM E23	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials	AMS H6875	Heat Treat (Steel)	CW-2	Alcoa Billet Specification for Ti-10V-2Fe-3Al
ASTM E34	Standard Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys	AMS H- 81200	Heat Treatment of Titanium and Titanium Alloys	CLE-AL-013	Alcoa Extruded Stock Specification
ASTM E35	Standard Test Methods for Chemical Analysis of Magnesium and Magnesium Alloys	AMS QQ-A- 40		CLE-AL-014	Procurement Aluminum Ingot Forging Stock
ASTM E47		AMS QQ-A- 367	Aluminum Alloy Forgings	CLE-NDT-001	Procurement of NDT Testing Services
ASTM E74	Standard Practices for Calibration and Verification for Force-	ASME B89.1.9	Gauge Block Tolerances Specification	CLE-QA-018	Supplier Sawing of Alcoa Forged Stock

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	Measuring Instruments				
ASTM E120	Standard Test Methods for Chemical Analysis of Titanium and Titanium Alloys	ANSI/NCSL Z540-1	Calibration Laboratories and Measuring and Test Equipment		
ASTM E127	Ultrasonic Reference Blocks	NAS 410	Qualification of NDT Personnel		
ASTM E207	Thermal EMF Test	MIL-STD-120	Gage Inspection		
ASTM E220	Calibration of Thermocouples				
ASTM E230	Standard Specification and Temperature EF Tables	ASTM E1444	Magnetic Particle Examination		
ASTM E317	Ultrasonic Instruments				
ASTM E399	Fracture Toughness Testing of Metallic Materials				
ASTM E1004	Standard Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy Current) Method				
ASTM E1417	Liquid Penetrant Examination				

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**4.3 Purchase Order and Customer Requirements Flow-Down:**

**4.3.1 Critical Suppliers:** An organization that directly affects or potentially affects form, fit, function or quality characteristics of Cleveland Operations end-product and/or its affect is not easily detected in final product.

*(Note: "X" identifies what documents(s) are required for Flow-Down)*

Product or Service	CLE-QA-016	Control Plan	Drawing	Test Sheet
Raw Material	X			
Special Processes <ul style="list-style-type: none"> <li>• NDT</li> <li>• Heat Treat</li> <li>• Testing</li> </ul> <i>Note: Includes Thermocouple Suppliers.</i>	X			X
Etch / Pickling	X	X		X
Machining	X	X	X	
Calibration	X			

**4.3.2 Non-Critical Suppliers:** An organization that has a minimal effect on form, fit, function or the critical quality characteristics of the Cleveland Operations end-product and/or its affect can be readily identified in product by the receiving inspection. Purchase Order and Customer requirements are handled through Supplier Quality Systems Procurement Specification – CLE-QA-016.

**5.0 REQUIREMENTS:**

- 5.1** All Cleveland Operations approved suppliers shall maintain, at a minimum, Quality Systems compliance with ANSI/ASQC/ISO 9001/AS9100 Latest Revision. Additional quality systems registration requirements are listed in the table below.
- 5.2** Suppliers without the required quality system registration/ certification will be subject to periodic compliance audits by Cleveland Operations or a Cleveland Operations approved 3rd party audit at the supplier’s expense.
- 5.3** Suppliers are required to provide evidence of quality system certification and any changes thereof to Cleveland Operations Quality Systems Department. The supplier

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must notify Cleveland Operations within forty-eight (48) hours of any registration/certification status changes, revocations, or customer-imposed sanctions.

Supplier Type ( <u>ST</u> )	Supplier Type	Certification Required
<b>S1</b>	Aerospace industry specific Product or Service	AS/EN/JISQ 9100 or ISO9001 / AS9100 Latest Revision. Where products are identified as being procured in support of Airbus programs, approval to Airbus GRAMs or compliance with elements of GRAMs is required.
<b>S2</b>	Intentionally Blank	Intentionally Blank
<b>S3</b>	Commercial Product or Service  Raw Materials  Distributors	ISO 9001 Latest Revision or an industry equivalent standard
<b>S4</b>	Special process supplier to the Aerospace Industry	Appropriate Nadcap (National Aerospace and Defense Contractors Accreditation Program) certifications and/or Cleveland Operations customer approval.  Includes: Chemical Processing, Coatings, Composites, Thermal Processing, Materials Testing Laboratory Services, Non-Destructive Testing, Non-conventional Machining and Surface Enhancement, Welding
<b>S5</b>	Laboratory / Testing Facility / Calibrations	ISO/IEC 17025 (Latest Revision), A2LA, Nadcap, and/or Cleveland Operations customer specific approval and traceable to NIST.

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**5.4 Section A: General Quality Requirements Applicable to All Suppliers**

<p><b>5.4.1.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Facility / Product Approval</p>	<p>Supplier's quality control, traceability, inspection, and calibration systems are subject to review and approval at all times by Cleveland Operations, Cleveland Operation’s customers, and applicable statutory and regulatory agencies. Only sources approved by Cleveland Operations may supply material or services to this specification. Once Cleveland Operations has granted supplier approval, no significant changes may be made to the processing or control strategy without notification to, and prior approval of, Cleveland Operations.</p>
<p><b>5.4.2.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Order of Precedence</p>	<p>In the event of conflict, the following order of precedence applies:</p> <ol style="list-style-type: none"> <li>1.) Cleveland Operations Purchase Order or Contractual Agreement,</li> <li>2.) Engineering Drawing, if applicable,</li> <li>3.) QA Instructions supplied with shipment to include Control Plans, if applicable.</li> <li>4.) The specifications/standards/requirements defined in this document.</li> </ol>
<p><b>5.4.3.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Exceptions / Deviations</p>	<p>Exceptions, concessions and/or deviations to specified requirements must be approved, in writing, by Cleveland Operations prior to shipment of affected product or service to Cleveland Operations. Use Form SCM-200, Supplier Non-Conforming Material Request for Deviation or Waiver Form and send to <a href="mailto:CLVQADept@howmet.com">CLVQADept@howmet.com</a>.</p>



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<b>5.4.4.A</b>  <u>ST</u>  (S1-S3-S4-S5)	Processing / Fabrication Requirements and Control	General control requirements, including equipment, personnel training, and process/product control and evaluation of the applicable specification identified in Table 1, apply in addition to the part specific requirements defined by the Purchase Order, the Engineering Drawing, and/or Quality Assurance instructions supplied with shipment (unless otherwise specified).
<b>5.4.5.A</b>  <u>ST</u>  (S1-S3-S4-S5)	Right of Access	Cleveland Operations, Cleveland Operation’s customers, and applicable statutory and regulatory authorities reserve the right of access and entry to supplier's facility and/or supplier’s subcontractor’s facility to verify the quality of Cleveland Operations purchased material/service at any point of manufacturing, inspection, and/or testing. All supplier material, records, routers, inspection and test facilities shall be subject to review. Suppliers shall provide equipment, facility and necessary personnel for all on-site verifications of contract/purchase order compliance.
<b>5.4.6.A</b>  <u>ST</u>  (S1-S3-S4-S5)	Use of Subcontractors	All manufacturing, critical processing, inspection, and testing used in performance of Cleveland Operations purchase order must be accomplished by sources approved by Cleveland Operations and Cleveland Operation’s customer as applicable. Use of sub-contractors requires notification to, and prior approval of, Cleveland Operations.

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<b>5.4.7.A</b>  <u>ST</u>  (S1-S3-S4-S5)	Quality Records and Record Retention	Critical processing, inspection, and test records shall be retained for a minimum of at least eighty (80) years. At the end of the 80-year retention period, Cleveland Operations must be notified prior to removal or destruction of such records. Cleveland Operations, Cleveland Operation’s customers, and applicable statutory and regulatory agencies reserve the right of access to supplier's facility to review quality records at any time during the specified retention period. Records shall be maintained in an appropriate environment and shall be available upon request within two (2) business days.
<b>5.4.8.A</b>  <u>ST</u>  (S5)	Calibration System Expectations	Cleveland Operations approved suppliers for calibration and/or testing services only, shall be certified to ISO 17025 or equivalent (Latest Revision). Calibration laboratories or service suppliers shall meet or exceed ISO 10012-1, ANSI/NCSL Z540-1 (Latest Revision) and must be traceable to National Institute of Standards and Technology (NIST).
		5.4.8.1 For inspection/test gages, standard (typical industry) calibration accuracies apply unless noted otherwise on the Cleveland Operations Purchase Order.
<b>5.4.9.A</b>  <u>ST</u>  (S1-S3-S4-S5)	Notification of Changes	The Supplier shall notify Cleveland Operations of changes that affect the operational proficiency of a facility; alterations in upper management or organization restructuring; alterations in the business name, location or ownership; processing capabilities, alterations to 3rd party or customer registration/certification status, and any other pertinent changes that could hinder the capacity to conduct customary business activities.

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<p><b>5.4.10.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Identification and Traceability</p>	<p>The Cleveland Operations Job Number, and serial number (when applicable) must be maintained on each forging throughout all processing unless otherwise specified on the drawing or processing instructions supplied with shipment. It is the responsibility of the supplier to verify the availability of traceability information prior to processing. Marking of the forging or finished part shall be in accordance with the latest drawing.</p>
<p><b>5.4.11.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Processing, Inspection or Test Instructions</p>	<p>All work shall be performed in accordance with the latest revision of any/all applicable drawings, standards, specifications, and processing/inspection/test instructions.</p>
<p><b>5.4.12.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Trade Compliance Statement</p>	<p>The Parties agree to comply with all applicable U.S. export control laws and regulations, including, without limitation, (i) the Arms Export Control Act (22 U.S.C. 2751-2794), including the International Traffic in Arms Regulation (ITAR) (22 C.F.R. 120 et seq.) and (ii) the Export Administration Act (50 U.S.C. app. 2401-2420), including the Export Administration Regulations, 15 C.F.R. 730-774 and agree to obtain any export license or agreement, if required by any U.S. export laws or regulations. Any diversion contrary to the law of the United States is prohibited. For ITAR-Controlled products/technical data Supplier will maintain their DDTC Registration (and verify to Cleveland Operations via the Export Control Certification) and advise Cleveland Operations of any change in DDTC Registration Status.</p>
<p><b>5.4.13.A</b> <u>ST</u> (S3)</p>	<p>SDS</p>	<p>Safety Data Sheets are required for raw materials. ‘Chemical’ SDS’s are handled and controlled by Cleveland Operations EHS Department.</p>

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<p><b>5.4.14.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Control of Cleveland Operations Owned / Supplied Equipment and Tooling</p>	<p>Includes gages, test equipment, tooling, fixtures, templates etc. supplied by Cleveland Operations or made by the supplier, for supplier use to complete purchase order requirements.</p> <p>Supplier shall:</p> <p>Use Cleveland Operations supplied items on Cleveland Operations Purchase Orders only and for only those purchase orders for which the items were supplied.</p> <ul style="list-style-type: none"> <li>• Identify all Cleveland Operations supplied items, unless size or use prohibits, with identification tag(s) ensuring legibility and permanency, which states the ownership designation as “Property of Cleveland Operations” upon receipt or fabrication.</li> <li>• Obtain written approval from Cleveland Operations prior to making modifications or changes.</li> <li>• Maintain, protect and preserve. Maintain for three (3) years after the Cleveland Operations Purchase Order is complete unless Cleveland Operations directs otherwise.</li> <li>• Contact the Cleveland Operations Buyer before transfer between supplier facilities (address location) or to other suppliers.</li> <li>• Report changes in calibration status to Cleveland Operations. Do not use items that have expired calibrations.</li> <li>• Report to Cleveland Operations any supplied items that becomes excess to the needs of the purchase order.</li> <li>• Obtain written approval from Cleveland Operations before disposal or destruction.</li> <li>• Report all cases of loss, damage or destruction of Cleveland Operation’s property to the Cleveland</li> </ul>
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		<p>Operations Buyer as soon as such facts become known.</p> <ul style="list-style-type: none"> <li>Maintain a record (Tool List) of all Cleveland Operations supplied tools or gages. The list must be traceable back to the Cleveland Operations tooling purchase order and job number.</li> </ul>
<p><b>5.4.15.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Preference for Domestic Specialty Materials</p>	<p>Supplier agrees to comply with Defense Federal Acquisition Regulation Supplement DFAR 252.225-7014 and Alternate I, Preference for Domestic Specialty Metals when this clause is specified in the Purchase Order. Use of foreign specialty metals may only be used with written authorization from Cleveland Operations Procurement. Material substitutions are prohibited without formal approval by Cleveland Operations.</p>
<p><b>5.4.16.A</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Cleveland Operations Purchase Orders for U.S. Government Contracts</p>	<p>U.S. Government owned gages and tooling supplied by Cleveland Operations are Government Property and are subject to the provisions of the Federal Acquisition Regulation (FAR) 52.245-2 (FP) or 52.245-5 (CP), or 52.245-1. U.S. Government owned gages shall be clearly identified with a tag that states the ownership. U.S. Government-owned gages/tooling/test equipment should be treated as Cleveland Operations owned and follow the same requirements identified above. The Supplier shall keep property records as shown in Federal Acquisition Regulation (FAR) 45.505-5 or 52.245-1.</p>

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<p><b>5.4.17.A</b></p> <p><u>ST</u></p> <p>(S1-S3-S4-S5)</p>	<p>Corrective Action</p>	<p>When requested by Cleveland Operations, Cleveland Operation’s customer(s), or applicable statutory and regulatory authority, suppliers shall complete formal corrective actions within requested timeframes. At a minimum, corrective actions shall include a comprehensive root cause analysis, detailed action/correction plans, applicable preventive measures, and verification of effectiveness.</p> <p>When Cleveland Operations receives customer charges for a supplier caused corrective action or nonconforming material, those charges will be debited to the supplier.</p> <p>Cleveland Operations reserves the right to charge suppliers administrative fees associated with internally processing supplier corrective actions. At this time, those fees would be limited to incidents that are repetitive in nature, have significant impact to either Cleveland Operations or Cleveland Operation’s customers, or require additional Cleveland Operations resources such as supplemental audits, additional inspections or tests, document reviews etc.</p>
<p><b>5.4.18.A</b></p> <p><u>ST</u></p> <p>(S1-S3-S4-S5)</p>	<p>Qualified Personnel</p>	<p>Suppliers must be able to demonstrate suitable training and/or qualification of personnel appropriate to the level of work being performed for Cleveland Operations. Suppliers must be able to provide objective evidence to support that suitable training has been completed by personnel.</p>

**5.4 Section B: General Quality Requirements - Applicable When Specified**

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<p><b>5.4.19.B</b> <u>ST</u> (S1)</p>	<p>Cleveland Operations Source Inspection</p>	<p>Source Inspection by a Cleveland Operations Quality Representative is required for this order prior to shipment from your facility. Contact your Cleveland Operations Quality Representative prior to the start of production to establish the manufacturing process steps, Control Plan, and requirements for onsite Cleveland Operations source inspection.</p>
<p><b>5.4.20.B</b> <u>ST</u> (S1)</p>	<p>Government Source Inspection</p>	<p>Government inspection is required prior to shipment from your facility. Upon receipt of this order, promptly notify your Government Representative to plan the inspection. Furnish a copy of this order to your Government Representative, or to the nearest Army, Navy, Air Force, or Defense Supply Agency inspection office. In the event a Government representative or inspection office cannot be located, notify the Cleveland Operations purchasing agent immediately.</p>
<p><b>5.4.21.B</b> <u>ST</u> (S1)</p>	<p>Customer (End-User) Source Inspection</p>	<p>Source Inspection by Cleveland Operation’s customer is required for this order prior to shipment from your plant. Contact your Cleveland Operations Quality Representative, prior to the start of production, to establish the manufacturing process steps and requirements for Cleveland Operation’s customer source inspection.</p>
<p><b>5.4.22.B</b> <u>ST</u> (S1)</p>	<p>First Article Sample Submittal and Approval</p>	<p>A first article sample is required on the first article lot. Submit the sample to the Cleveland Operations Quality Representative for approval prior to proceeding with further production run processing. Cleveland Operations and Cleveland Operation’s customers reserve the option to review the sample, for approval, at the processor’s facility.</p>

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<p><b>5.4.23.B</b> <u>ST</u> (S1)</p>	<p>First Article Inspection/Approval (AIP)</p>	<p>Cleveland Operations approved suppliers for First Article Inspection/Approval services only, shall maintain systems that meet or exceed AS9102. A first article layout inspection for each dimension on the latest drawing is required on the first article piece. Submit the layout inspection report to <a href="mailto:CLVQADept@howmet.com">CLVQADept@howmet.com</a> approval prior to proceeding with further production run machining or processing. Cleveland Operations and Cleveland Operation’s customers reserve the option to review and approve this layout at the processor’s facility.</p> <p>When First Article Inspection is determined by a CMM or scanned method using CAD Model verification of conformance the layout report will depict inspection results through the use of a graphical format.</p>
<p><b>5.4.24.B</b> <u>ST</u> (S1)</p>	<p>PPAP Requirement</p>	<p>Follow as customer specified</p>



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<p><b>5.4.25.B</b> <u>ST</u> (S1, S3, S4)</p>	<p>Control Plan &amp; Inspection Plan Submittal/Approval</p>	<p>A Control Plan and/or Inspection Plan defining processing sequence, in-process inspection, final inspection, test requirements, characteristics, and frequencies must be submitted to Cleveland Operations for approval prior to performance against this purchase order. Control Plans may be written for families of parts, where typically the only difference in the parts is dimensional, not form, application or function. The Control Plans must be submitted using Cleveland Operation’s form SCM-005 model. Submit AIP plans to <a href="mailto:CLVQADept@howmet.com">CLVQADept@howmet.com</a> . Any changes to an approved plan must be approved by Cleveland Operations in writing, prior to implementation. Cleveland Operations, Cleveland Operation’s customer, and/or applicable statutory and regulatory agencies may define Mandatory Inspection Points for inclusion in the Control and/or Inspection Plan.</p>
<p><b>5.4.26.B</b> <u>ST</u> (S1, S3, S4)</p>	<p>SPC Implementation and Data Submission</p>	<p>Critical manufacturing processes used to support fulfillment of this order shall be controlled using appropriate Statistical Process Control (SPC) tools. The supplier’s SPC systems shall meet or exceed the requirements of recognized SPC specifications or standards such as BOEING D6-82479, Addendum #1. SPC data and charts shall be traceable to the Cleveland Operations product by item number, job number, or other suitable means. Key process or product characteristics as defined by the purchase order, drawing, or specification shall be measured for control and capability. The supplier shall define key characteristics when they are not defined by Cleveland Operations. SPC records shall be available to Cleveland Operations on request. Quarterly SPC data submittals may be specified by Cleveland Operations purchase order.</p>

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<p><b>5.4.27.B <u>ST</u></b> (S1, S3)</p>	<p>Control of Digital Product Definition, Model Based Definition and Product Acceptance Software (DPD/MBD/PAS)</p>	<p>Suppliers receiving Cleveland Operations and their customer produced DPD/MBD/PAS, shall have processes to ensure media security, traceability, software control/ validation, control of Data Exchanges, User Training, Problem Reporting and corrective actions that are compliant with the standards of Boeing (D6-51991), Spirit Aerosystems (MAA110009-1), Safran (SREQ-SLS-014) and/or Triumph (SQR-004). DPD sub tiers are required to complete SCM-002 Supplier DPD-MBD-PAS Self-Assessment Audit Form annually to ensure DPD synchronization of systems, media traceability and security. Periodic on-site assessments will be performed by Cleveland Operations to ensure compliance to above stated specifications. Suppliers shall send notification to Cleveland Operations of any change to software and equipment for DPD, CAD, CAI, CATIA, PAS, etc.</p>
<p><b>5.4.28.B <u>ST</u></b> (S1-S3-S4-S5)</p>	<p>COUNTERFEIT MATERIAL PREVENTION: Counterfeit Materials &amp; Conflict Minerals</p>	<p>Supplier must have a policy to assure that procured materials are authentic and conforming throughout the supply chain received from legally authorized suppliers through the use of controls such as inspection, material testing, and validation of their supplier’s submitted documentation. The procedure must address and meet the requirements of AS6174 Counterfeit Material Assuring Acquisition of Authentic and Conforming Material. In the event of counterfeit material being detected, the Supplier shall immediately report findings to Cleveland Operations. The Supplier shall take all necessary measures to comply with the Conflict Minerals provision (Section 1502) of the Dodd-Frank Wall Street Reform and Consumer Protection Act.</p>

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<p><b>5.4.29.B</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Application of Acceptance Authority Media (AAM)</p>	<p>Supplier shall comply with the AS/EN/JISQ 9100 requirements and 14CFR Part 21.2 regarding the application of the Acceptance Authority Media (AAM) requirements. Supplier shall, within its organization and its supply chain, ensure that the use of AAM is clearly defined within its Quality Management System (QMS). Supplier shall, upon Cleveland Operation’s request, be able to demonstrate evidence of communication to its employees and to its supply chain; use of AAM must be considered as a personal warranty of compliance and conformity. Supplier shall maintain compliance to the AAM requirements by assessing its process and supply chain as part of its internal audit activities. The areas of focus of this assessment shall include but not limited to:</p> <ul style="list-style-type: none"> <li>• Authority Media Application Errors (i.e. Omission, Typos, Legibility, etc.)</li> <li>• Authority Media Application Untimely Use (i.e. Documentation is not completed as planned, “Stamp/Sign as you go,”) etc.</li> <li>• Authority Media Application Misrepresentation (i.e., uncertified personnel, Falsification of documentation, work not performed as planned, etc.)</li> <li>• Authority Media Application Training Deficiencies (i.e. Ethics, Culture awareness, Proper Use of authority media, etc.)</li> </ul>
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**6.0 General Certification Requirements (Applicable to all suppliers)**

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<p><b>6.1</b> <i>ST</i> (S1-S3-S4-S5)</p>	<p>Certifications</p>	<p>Certifications of Conformance to the Applicable material/process specification(s) are required. <b><i>The Certificate of Conformance must accompany shipment and be identified to the Attention of Quality Assurance Engineer. The Certificate of Conformance must also be emailed to <a href="mailto:CLVQADept@howmet.com">CLVQADept@howmet.com</a></i></b> . Failure to provide proper, accurate and timely certifications may result in payment being withheld until proper certifications have been received.</p>
<p><b>6.2</b> <i>ST</i> (S1-S3-S4-S5)</p>	<p>Certification Content</p>	<p>The completed Certificate of Compliance must contain, as a minimum, the following information:</p> <ul style="list-style-type: none"> <li>• Date</li> <li>• Cleveland Operations Purchase Order Number and Revision Level</li> <li>• Supplier Name and Address</li> <li>• Suppliers’ Manufacturing and Inspection Plan Number and Revision, if Applicable.</li> <li>• Actual test results including: Ingot Chemistry, Mechanical Properties, Sonic and Dimensional Data as applicable.</li> <li>• Statement of compliance to this Cleveland Operations Specification</li> <li>• Number and Revision</li> <li>• Product or Process Description, including applicable material and/or process specifications and revisions.</li> <li>• Item/ Die Number, Part Number, Alloy/Temper, and/or Size/Stock Code, as Applicable.</li> <li>• Quantities supplied or processed by heat number, lot number, and/or serial number, (including quantities accepted and rejected), as Applicable</li> <li>• Engineering Drawing, and Revision, if applicable.</li> <li>• Copies of any and all Deviations, with the appropriate Cleveland Operations or Cleveland Operation’s customer Approvals</li> <li>• Identification of sub-contractors used for critical processing, inspections, or tests, if Applicable.</li> </ul>

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		<ul style="list-style-type: none"> <li>Statement of compliance to Specification(s) and Revisions defined by the Cleveland Operations Purchase Order.</li> <li>Signature of person responsible for Certificates of Conformance</li> </ul>
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<b>6.3</b> <u>ST</u> (S4, S5)	Certifications - Calibrations	The supplier shall provide a certificate that states the accuracy of the subject item(s), the source performing the calibration, the as found and as left conditions, traceability of calibration to NIST, date of last calibration, test or report number(s), calibration method (ANSI, federal standard, etc.) and the environmental conditions during the calibration actions Where non-conformances are found, the noted discrepancy shall be prominently displayed (e.g. Highlighted, asterisk, etc.).
<b>6.4</b> <u>ST</u> (S3, S5)	Certifications – Catalog Items	A packing list type certification is acceptable provided a signed statement is included. A reference to the Cleveland Operation’s purchase order number, manufacturer name and product number (no revision level required) is required for each item listed.
<b>6.5</b> <u>ST</u> (S4, S5)	Certifications – Chemical & Metallurgical Analysis	Actual test results that are required by the specification, such as mechanical test data, chemical properties, hardness, etc., shall accompany the certification (i.e., Certificate of Analysis)
<b>6.6</b> <u>ST</u> (S3, S4, S5)	Certifications – Distributors	All distributor items require a copy of the original source or producer’s certification to be supplied with each lot/shipment. If additional verification testing is performed by the distributor, copies of both certifications are required and shall accompany each lot/shipment.
<b>6.7</b> <u>ST</u> (S1-S3-S4-S5)	Certifications – Qualified Products List (QPL)	The supplier shall state the manufacturer of items ordered and certify that the manufacturer is on U.S. Government or customer specific Qualified Products/Producers List.

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<p><b>6.8</b> <u>ST</u> (S3, S4, S5)</p>	<p>Certifications – Shelf Life Items</p>	<p>For limited shelf life (age/environmental sensitive materials) items, the Certificate shall contain the specification number, if applicable, lot or batch number of the material, date of manufacture and/or cure date (month/year or quarter/year), the shelf life expiration date and any environmental storage conditions that apply. Distributors shall not ship materials with less than 75% of the required remaining shelf life to Cleveland Operations facilities unless approved in writing by the Cleveland Operations purchasing or quality representative.</p>
<p><b>6.9</b> <u>ST</u> (S4, S5)</p>	<p>Certifications – NDT</p>	<p>A certificate shall be issued for each item number inspected which includes, as a minimum: job number, heat number/serial numbers, specifications, class or grade of inspection, number of pieces accepted and rejected. For round bar and plate stock, also list the actual dimensions of the pieces inspected. CLE-NDT-001 may also apply.</p>

**7.0 Nonconforming Materials and Scrap Metal**

<p><b>7.1</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>NCM &amp; Scrap Metal</p>	<p>Material that departs specified requirements shall be properly identified, segregated and controlled to prevent unauthorized use or delivery to Cleveland Operations or other designated destinations.</p>
<p><b>7.2</b> <u>ST</u> (S1-S3-S4-S5)</p>	<p>Review &amp; Disposition Authority</p>	<p>The Supplier shall not exercise Material Review or disposition authority without written approval by Cleveland Operation’s Quality organization. Action shall not be taken on any nonconformance which could affect safety of personnel; adversely affect performance durability, interchangeability or reliability, materially affect weight; or otherwise result in failure of the end article to perform its intended function.</p> <p><b>7.2.1 Review Submittal:</b> All doubtful cases shall be submitted to Cleveland Operations for review. Supplier deviations shall be requested using form SCM-200 and submitted to <a href="mailto:CLVQADept@howmet.com">CLVQADept@howmet.com</a>.</p>

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7.3 <u>ST</u> (S1, S4, S5)	Escape to Cleveland Operations	The supplier shall provide prompt notification to Cleveland Operations if nonconforming product, documentation or process escapes are identified after shipment. The notification shall include part numbers, traceability (lot, serial, and manufacturer numbers), ship dates, quantities, and a description of the nonconformance. This applies to any nonconformance that deviates from the drawing, specifications, purchase order requirements, etc. The supplier shall initiate a formal corrective action process departs from the drawing, specifications, purchase order requirements, etc. The supplier shall initiate a formal corrective action process. Follow AS9131 (Latest Revision) requirements when reporting an Escape to Cleveland Operations .
7.4 <u>ST</u> (S1-S3-S4-S5)	Containment	When a nonconformance is discovered or the Supplier is notified of a discrepancy, the Supplier shall take immediate action to determine if the condition exists on any other work in process, in storage at the Supplier’s facility, or in prior shipments. Containment action shall be taken and documented prior to the next shipment of the part number involved. The Supplier shall not wait for the discrepant product to be returned to begin an investigation. The services of a 3 <sup>rd</sup> party sorting company, at the supplier’s expense, may be required.
7.5 <u>ST</u> (S1-S3-S4-S5)	Cost Recovery	Cleveland Operations reserves the right to recover all related costs incurred associated with nonconforming product, service or documentation produced from the responsible supplier(s).
7.6 <u>ST</u> (S1-S3-S4-S5)	Scrap – Metal	All scrap metal shall be returned to Cleveland Operations unless otherwise specified. Scrap metal shall be segregated by Alloy. Scrap cannot be mixed and must be separated by alloy.

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7.7 <u>ST</u> (S1, S4, S5)	<b>F.O.D:</b> Foreign Object Detection/Debris/Damage	Supplier is responsible for prevention of any foreign object damage related to Cleveland Operations supplied product. Foreign Object Debris: Supplier is responsible for preventing foreign object damage and the introduction of foreign object debris (FOD) to the material manufactured and/or processed at the supplier’s facility.
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**8.0 Supplier Performance**

8.1 <u>ST</u> (S1-S3-S4-S5)	Performance	Critical and/or high-risk sources (ex.: metal, machine sources, die fabricators etc.) will be monitored and evaluated based on performance. Typical performance indicators are delivery/schedule performance and quality (nonconforming product, CARs etc.). A supplier exhibiting poor performance may be put on a probationary status (Restricted or Pending) until performance improves. Suppliers may also be disqualified (Unapproved) for poor performance. Scorecards will be provided at a minimum semi-annually to critical suppliers. Quality and Delivery performance goals will be listed on the scorecard. Suppliers not meeting the minimum performance measures may be placed on probation and may be disqualified at the discretion of the Cleveland Operations Quality Manager and or designee.
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**9.0 Awareness**

9.1 <u>ST</u> (S1, S4, S5)	Awareness	Suppliers must be aware their contribution to the success of Cleveland Operations is directly related to their ability to meet to Cleveland Operations product conformity and product safety requirements in an ethical and safe manner.
9.2 <u>ST</u> (S1, S4, S5)	Employee Awareness	Seller shall ensure that all employees are aware of: -Their contribution to product and service conformity -Their contribution to product safety -The importance of ethical behavior
9.3 <u>ST</u> (S1, S4, S5)	Ethical Behavior	Cleveland Operations requires that external providers adhere to highest standards of ethical behavior, and compliance with all applicable laws and regulations are key to



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		protecting the reputation and long-term success of our business relationship. In doing so, it seeks to take account of all of its stakeholders, including shareholders, employees, customers, suppliers, governments, regulatory bodies and the environment.
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**TABLE 1: SUPPLEMENTAL STANDARD QUALITY REQUIREMENTS**

Material / Process	Controlling Specifications / Quality Requirements
Critical Processes & Products – All (Unless otherwise specified by P.O.)	Manufacturing, inspection and quality system control in accordance with AS9100, ISO 9001, AS9100 ISO17025, Nadcap and ISO 10012-1 Latest Revisions.
Anodizing	Anodize (process and control) per AMS A-8625.
Chem Milling	Chem Milling (process and control) as specified by P.O.
Forge/Stretching	Aluminum forgings controlled per AMS QQ-A-367; Titanium forgings controlled per AMS 4928, Steel forgings controlled per ASTM A668/A521/A788.
Grinding	Process in accordance with Cleveland Operations or customer drawing, or sketch provided by Cleveland Operations Quality Representative.
Heat Treat – Aluminum	Thermal process and control per AMS 2772, using thermal process parameters per Cleveland Operations Heat Treat/Age Process Sheet supplied by Cleveland Operation’s Quality Representative. Equipment pyrometric control per AMS 2750.
Heat Treat – Nickel-base	Thermal process and control per Cleveland Operations Heat Treat specification. Equipment pyrometric control per AMS 2750.
Heat Treat – Steel	Thermal process and control per AMS H6875, using thermal process parameters per Cleveland Operations Heat Treat specification. Equipment pyrometric control per AMS 2750.

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Heat Treat - Titanium	Thermal process and control per AMS H81200, using thermal process parameters per Cleveland Operations Heat Treat Process Sheet supplied by Cleveland Operations Quality Representative. Equipment pyrometric control per AMS 2750
Magnetic Particle Inspection	Magnetic Particle Inspection in accordance with ASTM E1444 unless otherwise specified by Cleveland Operations. Acceptance criteria as specified by Cleveland Operation Quality Representative. Equipment and material control per ASTM E1444, ISO 10012-1 And/or in accordance with specification defined by Cleveland Operations jobs file specification system. Personnel Qualification in accordance with NAS 410 and/or in accordance with specification defined by Cleveland Operations .
Metallurgical Tests	Minimum Quality System requirements per ISO 17025 (Test services only).
Charpy	Testing process and control per ASTM E23.
Chemical Analysis – Aluminum	Testing process and control per ASTM E34.
Chemical Analysis – Titanium	Testing process and control per ASTM E120.
Chemical Analysis – Magnesium	Testing process and control per ASTM E35.
Chemical Analysis – Nickel-base	Testing process and control as specified by P.O.
Chemical Analysis – Steel	Testing process and control as specified by P.O.
Fracture Toughness – Aluminum	Testing process and control per ASTM E399 and ASTM B645, unless otherwise specified by material specification reflected on Fracture Toughness Test Data Sheet supplied with shipment.
Fracture Toughness – Other Metals	Testing process and control per ASTM E399, unless otherwise specified by material specification reflected on Fracture Toughness Test Data Sheet supplied with shipment.
Stress Corrosion – Aluminum	Testing process and control per ASTM G47, unless otherwise specified by material specification reflected on Stress Corrosion Test Data Sheet supplied with shipment

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Tensile Test	Testing process and control per ASTM E8 and ASTM B557, unless otherwise specified by material specification or P.O.
Penetrant Inspection	In accordance with ASTM E1417, Type 1, Method D, Sensitivity Level 2 unless otherwise specified by Cleveland Operations . CLE-NDT-001 may also be specified.
Penetrant System Equipment and Material Control	Penetrant equipment and material control per ASTM E1417 and AMS 2644.
Saw Cutting to Size	Process in accordance with Cleveland Operations CLE-QA-018.
Ultrasonic Inspection	Ultrasonic Inspection in accordance with AMS-STD 2154, unless otherwise specified, and acceptance criteria as defined by Cleveland Operations. CLE-NDT-001 may also be specified.
Ultrasonic System Equipment Control	Equipment control in accordance with AMS-STD 2154, ASTM E 317 and ASTM E127.
Ultrasonic & Penetrant Personnel Qualification	In accordance with NAS 410
Raw Materials: Coating Materials	As specified by Cleveland Operations Purchase Order.
Forging Stock- Aluminum	Process and control in accordance with CLE-AL-013 (extruded stock), CLE-AL-014 (ingot stock), or QQ-A-367 (plate stock).
Forging Stock – Nickel-base	Process and control in accordance with specifications listed on the Purchase Order.
Forging Stock – Magnesium	Process and control in accordance with QQ-M-40.
Forging Stock – Steel: Carbon	Process and control in accordance with AMS6414 & AMS6257.
Forging Stock – Steel: Stainless	Process and control in accordance with AMS5659.
Forging Stock – Titanium	Process/control in accordance with CW-1 (Ti 6-4 & Ti 6-6-2), CW-2 (Ti 10-2-3), or CLE-TI-012 (Ti 6-22-22).

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Calibration Services	Calibration system per ANSI/NCSL Z540-1 and ISO 10012-1. Minimum Quality System requirements per ISO 17025. (Calibration services only). Calibration procedure and acceptance criteria as indicated below and/or as specified by Purchase Order.
BHN Machines	Calibration procedure and acceptance criteria per ASTM E10 (+/- 2% of full scale – 500 Kg load).
BHN Proving Ring	Calibration procedure and acceptance criteria per ASTM E74.
Gage Blocks	Calibration procedure and acceptance criteria per ASME B89.1.9.
EC Meters	Equipment and control per ASTM E1004.
Fixtures	Inspection and acceptance criteria per Cleveland Operations drawing provided by Cleveland Operations Quality or Purchasing Representative.
Dimensional Hand Tools	Calibration procedure per MIL-STD-120. (Acceptance criteria = +/- .003", unless otherwise specified by P.O.)
Inspection Tables	Per industry standards and Vendor procedure.
Weight Scales	Per industry standards and Vendor procedure.
Inspection Fixture Manufacture	Manufacture, inspect/test, and control in accordance with Cleveland Operations or customer drawing provided by Cleveland Operations Quality or Purchasing Representative.

**10.0 CHANGE HISTORY & APPROVALS:**

Revision	Change Date	Description of Change
N/C	09/15/1993	Original issue
A	02/14/1997	Complete re-write
B	02/04/1999	Specification update, modified paragraph 4.8 for special processes and added paragraph 4.8.1.1 and 5.11

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C	05/01/2001	Updated format. Condensed from 18 pages. Changed paragraph 4.8.11 to 4.9. No major content changes.
D	03/01/2002	Changed 4.9 to include calibration must be traceable to NIST.
E	06/08/2004	Specifications Updated
F	06/07/2005	Updated 5.9 to include control plans
G	12/17/2007	Complete revision to document. Updated section 2.0, removed Table 2, merged standard and special requirements. Added: registration and certification clarifications, thermocouple requirements, items 4.22-4.26, sections 5.0 & 6.0.
H	08/10/2011	Separated section 4.0 into sections A (all suppliers) and B (when specified), 4.12.A Trade Compliance statement updated, 4.18.A added, added QA Mailbox requirements in 4.23.B & 4.25.B, updated 6.2, added Form SCM200 in 6.2.1, added 5.7, added references to CLE-NDT-001 in 5.7& Table 1, added section 7.0
J	10/11/2013	Updated specification, changes highlighted in yellow
K	12/27/2016	Added section 4.3 with table to depict how customer/supplier requirements are flowed down to subcontractor. Changed to Arconic Formatting
L	05/08/2017	Added to section 5.4.27.B "...receiving Arconic <b><i>'and their customer produced'</i></b> DPD/Models...".  Added statement to section 5.4.27B <b><i>'DPD sub tiers are required to complete SCM-002 Supplier DPD Audit Form annually to ensure DPD synchronization of systems, media traceability and security.'</i></b>
M	09/21/2017	Update Sections 1.0, 5.4.1A, 5.4.5.A, 5.4.7.A, 5.4.17A, 5.4.25.B  Added Statutory to all areas where Regulatory Requirements was located. Updated reference/approval box with current AS9100 & ISO9001-2015 and updated with new Section 8.4 and updated with

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		current IATF16949-2016 and updated new Section 8.4, Spacing corrected
N	1/16/2019	<p>Updated Sections: 2.0, 5.1, 5.3 Table, 5.4.3.A, 5.4.8A, 5.4.13A, 5.4.26.B, 5.4.27.B, 5.4.28.B New, 5.4.29.B New, 6.0, 7.3, 7.7 New, 9.0, 9.1 New</p> <p>Changed from specific standard references throughout document to the term "LATEST REVISION" and also included IATF for TS16949., Updated form no. QUA-039 to SCM-200., Updated MSDS to SDS, Updated the title box for DPD control &amp; added definitions, Addition of AS9131 and definition of an escape, Addition of requirements for Counterfeit Material Prevention, Acceptance Authority Media (AAM), F.O.D, Supplier's Employee Awareness and Ethics, Reformatted some of the tables throughout the document. Corrected numbering in Certification Section</p>
O	8/26/2019	<p>1.0 Removed Wheels reference in first statement, 3.0 Addition of Escape &amp; FOD definition, 4.2 Industry Standard-added all that apply- 24 additional standards added, included in the 24 standards was AS6279 Standard Practice for Production, Distribution and Procurement of Metal Stock, 4.3.1 added critical supplier definition, and Etch/Pickling flow-down requirements 4.3.2 added Non-critical supplier definition, 5.3 Removed Supplier Type "S2", added "and traceable to NIST in Supplier Type "S5", 5.4.8.A references "Latest Revision", 5.4.13.A SDS are handled via EHS Dept., 5.4.24.B Remove references to Wheels, 5.4.28.B &amp; 5.4.29.B better defined title, 7.3 addition of escape requirement for after shipment, 7.5 Cost recovery rewritten, 7.6 Scrap segregation requirements added, 7.7 Better defined Title added Debris/Damage, 8.1 Scorecards are provided at a</p>

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		minimum semiannually, Table 1 Forge & Stretching added & corrected reference standards AMS4928 & ASTM A668, Updated Approvals, Removed Supplier Type S2 from Supplier Column
P	04/01/2020	Removed Arconic references and replaced with Cleveland Operations, 5.4.2.A addition of 'to include Control Plans', 5.4.15A removed 'corporate', 5.4.18.A Added requirement to provide training objective evidence, 5.4.19.B addition of Control Plan, 5.4.26.B hyphenated Boeing Specification, Updated 5.4.27.B to call out Safran's DPD Supplier requirement document-SREQ-SLS-014, 6.2 addition of 'Date', 7.3 Removes departs with deviates [KML-JAY-TTB]

<b>Primary Approval:</b>	<i>Frank Sikon, Procurement Sourcing Manager</i>	<b>Procurement</b>
<b>Secondary Approval:</b>	<i>Tom Veto &amp; Steve Smereczynsky, AIP Quality Engineer</i>	<b>Quality Engineering</b>
<b>Secondary Approval:</b>	<i>CJ Skinner, Sr Metallurgist H-Plant Quality Lead Matt Byrne, Sr Metallurgist A-Plant Quality Lead</i>	<b>Metallurgy</b>
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<b>Secondary Approval:</b>	<i>Kenneth J Harms, Quality Systems Manager</i>	<b>Supplier Quality</b>
<b>Applicable 3<sup>rd</sup> Party Standards</b>		ISO9001-2015 – Section 8.4
<b>Nadcap as Applicable</b>		AS9100 – Section 8.4