



LEHIGH HEAVY FORGE CORPORATION INTERNATIONAL SUPPLIER QUALITY SYSTEM REQUIREMENTS

Special Instructions for International Subcontractors Providing Heat Treatment; Rough and Finish Machining; Associated Visual, Dimensional or Nondestructive Inspections; Certification or Test Reporting; and Packaging and Shipment of Lehigh Heavy Forge (LHF) Corporation Products.

1. **Fraud & Falsification**

- 1.1 Seller agrees that any employee performing work under this P.O. will have to sign a statement (if they haven't already) informing them of consequences of Fraud & Falsification. Such statements shall be retained by the Seller for at least three years after final payment on this purchase order.
- 1.2 Seller agrees to include the following pre-printed statement on manufacturing work instructions, manufacturing records, inspection, and/or test forms generated by Seller to verify or report the performance of any work in conjunction with the subject order.

“NOTE: The recording of false, fictitious, or fraudulent statements or entries on this document may result in legal action.”

2. **Quality System Requirements**

- 2.1 The subcontractor is responsible for developing and maintaining a Quality Management System that complies with or exceeds the requirements of ISO 9001:2015 “Quality Management Systems – Requirements”.
- 2.2 All work performed under purchase orders referencing this clause shall be accomplished under and within the ISO 9001:2015 compliant Quality Management System.
- 2.3 As evidence of the existence of such a Quality Management System, the subcontractor shall either submit a copy of their current ISO registration certification or complete a “Subcontractor Self-Assessment Survey” and forward an uncontrolled copy of the Quality Management System Manual to Lehigh Heavy Forge Corporation Purchasing. On-site reviews and evaluations of the subcontractor’s Quality Management System may be performed, in whole or in part, as reasonably necessary to ascertain compliance with this paragraph.
- 2.4 Lehigh Heavy Forge shall be notified of any changes to Quality Management System or registration status.
- 2.5 Additional Quality System Requirements may be invoked on LHF Purchase Orders.

3. **Calibration or Laboratory Testing Requirements**

- 3.1 All subcontractors of calibration or laboratory testing services shall meet the requirements established in the standards referenced below. In addition, the quality standard shall be documented on the calibration or test analysis certificate.
 - a. ISO 10012, Measurement Management System.
 - b. ISO 10012, Part 1, Metrological Confirmation System for Measuring Equipment.
 - c. ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories.
 - d. ANSI/NCSL, Z540-1, General Requirements for Calibration Laboratories and Measuring and Test Equipment.

4. **General**

- 4.1 Suppliers (management and employees) are contractually obligated to meet all purchase order requirements. Suppliers shall flow down this requirement to all sub-tier suppliers.



- 4.2 Subcontractors may not subcontract any part of this work being performed for LHF while in their facility without first obtaining written authorization from the Lehigh Heavy Forge Purchasing department.
- 4.3 No welding or other repairs shall be performed without the written approval of Lehigh Heavy Forge Technology Department.

5. **Specification Effectivity**

- 5.1 When specifications are invoked (i.e., drawing or specifications listed in the purchase order) and the revisions are NOT indicated, the latest revision issues prior to the purchase order effective date.

NOTE: The revision effectivity date is NOT applicable if the revision IS indicated within the purchase order. Revision requirements may not be the latest revision available.

6. **Order of Precedence**

- 6.1 In the event of any inconsistency in the ordering data, the purchase order takes precedence in conflicts and disputes, including existing specification or drawing requirements.
- 6.2 In the event inconsistencies are discovered the subcontractor shall contact Lehigh Heavy Forge to resolve the conflict. The subcontractor shall not proceed and except at own risk.
- 6.3 Products shall be completed to the drawing(s), specification(s), procedure(s) and/or work instruction(s) specified in the purchase order documents. The supplier shall assume all responsibility when work is performed to unapproved drawings.

7. **Inspection at Subcontractor Facility**

- 7.1 Lehigh Heavy Forge and LHF customers reserve the right to audit processes and systems and to verify the conformance of the item(s) and services to the purchase order at any location, including Sub-Tier Suppliers and any stage of development or manufacturer.
- 7.2 The supplier shall provide assistance to LHF and LHF customers during source inspection, audits, or other activities as may be specified by contract. This will include, but not be limited, to the following:
 - 7.2.1 Cooperation in establishing dates and times of visits to the plant facilities.
 - 7.2.2 Providing requested information, documents, and escorts during audits, surveys, and shop inspections or tours.
 - 7.2.3 Providing calibrated Measurement & Test Equipment to the Purchaser to check product compliance.
- 7.3 The supplier/subcontractor is responsible for performing or having performed all inspections and tests necessary to substantiate that the materials or services furnished under this contract conform to the contract requirements, including all applicable technical requirements for the specified manufacturers' parts. The supplier/subcontractor shall prepare records evidencing all inspections or tests made and the outcome. These records shall be kept complete and made available to LHF during the contract performance and for as long afterwards as the supplier / subcontractor's records retention schedule requires.

8. **Notification of Nonconformance**

- 8.1 Supplier shall provide Lehigh Heavy Forge immediate informal notification (i.e. phone call or email) with confirmed receipt (verbal or email response acknowledgement) within 24-hours of discovery of any nonconformance or latent defect discovered after delivery to Lehigh Heavy Forge.
- 8.2 A formal Letter of Advisement (LOA) is required to be sent to Lehigh Heavy Forge following immediate informal notification.



9. **Supplier Corrective Action Request (SCAR)**

- 9.1 Supplier Corrective Action Requests (SCAR) may be requested by Lehigh Heavy Forge for significant or systemic nonconformances. SCARs responses shall include root cause(s), corrective action(s) and preventive action(s), and verification of effectiveness.
- 9.2 SCAR's shall be provided within time frame specified on the SCAR. Extensions to the required due date may be requested.

10. **Documentation**

- 10.1 Corrections of official records shall be made by drawing a single line through the incorrect entry, and initialed and dated (in ink) by the original personnel or supervisor that made the entry. Erasure or other obliteration of information on official records is prohibited.
- 10.2 The use of ditto marks and continuation arrows are not acceptable for repeated data, initials or signatures.
- 10.3 When a document is retyped, in portion or completely, to correct or add information, it shall be identified as a "CORRECTED COPY" and all changes shall be identified (e.g. *). The document shall be resigned and dated. The original date shall remain or be re-identified, i.e. re-added.
- 10.4 Certifications shall be based on personal observations, other certified records, or direct reports from assigned personnel. Original raw inspection data sheets shall be retained when data are transcribed or summed on other forms.
- 10.5 Documentation shall be submitted with dated signatures or initials and badge numbers or inspection stamps.
- 10.6 Statements on certification documents must be positive and unqualified. Words such as "to the best of our knowledge" or "we believe the information contained herein is true" are not acceptable.

11. **Electronic Signatures**

- 11.1 The supplier/subcontractor may use electronic signatures, provided that they are not prohibited or restricted by governing specifications, and provide the following:
 - a. The signer must take a distinct action to "sign" electronically.
 - b. A means to delegate signature authority which allows the delegated individual to utilize their own electronic identification (i.e., integrity of each person's electronic signature must be preserved).
 - c. A means to identify the signer by name and as 'digitally signed' when printed as the paper OQE version of the document.

NOTE: Should a subcontractor/supplier's system not identify that each applied electronic signature is digitally signed when printed on paper, the signatory must physically sign each occurrence, or the supplier must provide attestation in the Certificate of Conformance that their system meets all other stated requirements.

- d. Preservation of unauthorized access to electronic identifications.
- e. An established password policy to change electronic identification and not share electronic identification.
- f. Reviews to ensure proper use of electronic signatures.
- g. A means to identify an electronic signature on a record as an electronic signature.
- h. Electronic signature applications shall not allow unauthorized users to change electronically signed



documents, or records. All changes to electronically signed documents, or records made by authorized users shall be revision controlled, identify the person making the change, and shall clearly reflect that the document, or record has been revised.

- i. It is Lehigh Heavy Forge's responsibility to ensure that their Suppliers or sub-contractors have a policy that addresses changes to electronically signed documents and ensures that changes are only performed by authorized personnel and all changes to electronically signed documents, or records are properly documented.

12. **Certification and Test Reporting**

- 12.1 Subcontractors shall supply test reports as applicable or required. LHF Technology may specify the report forms required for each product unless some other arrangement has been agreed to between the subcontractor and LHF.
- 12.2 Material certification data (chemical analysis, mechanical or physical testing) shall be recorded on official letterhead and shall bear the name, title, and signature of the authorized representative.
- 12.3 When the subcontractor completes the applicable reports, three (3) copies of the Inspection Reports are to be forwarded to LHF for review and approval prior to shipment. Any product or process deviations by the subcontractor shall be highlighted on the applicable report.
 - 12.3.1 The Supplier/sub-contractor shall contact the Purchasing Department or shop contact person, a minimum of three (3) days prior to release of any out-of-specification material for shipment to Lehigh Heavy Forge, for deviation approval from the Operating and/or Technical organization.
 - 12.3.2 The Supplier/sub-contractor shall document and highlight on the Certificate any deviation from the specified requirements on the purchase specification or drawing and indicate the individual approving the deviation.
 - 12.3.3 Upon determination that the material specification cannot be met for any period of time, notify the Lehigh Heavy Forge Purchasing Department immediately for resolution.
- 12.4 The following information shall be on the inspection report as applicable for roll product:
 - a. Milling Report - Insuring flats are on center and are to specified size.
 - b. Journal & Neck Dimensions - verifying the diameters are to specification.
 - c. Land Diameters - Insuring shrink diameters and special grind lengths are to spec.
 - d. Finish Grind TIR Report - Reporting the Total Indicator Runout (TIR) check results.
 - e. Final Hardness - Recording final hardness test results. All hardness tests shall be performed using Equotip LD - NO CONVERSIONS - unless instructed otherwise.
 - f. Dimensional Report - Record of all roll dimensions not previously covered.
 - g. Final Ultrasonic Report - if applicable
 - h. Hardness & Retained Austenite Report - Testing done after heat treatment - if applicable.
- 12.5 The following information shall be on all Certificates of Analysis and Certificates of Inspection:
 - a. Supplier name and address. Supplier letterhead is acceptable.
 - b. Address material is shipped from (if different from #1 above).
 - c. Issue Date of the Certificate.
 - d. Purchase Order Number.
 - e. Lot/heat/batch number(s) or other unique identifier of material or services supplied, as appropriate.
 - f. In the case of Certificates of Analysis, report the analysis of material including the percentage (or appropriate unit) for all elements specified on Material Specification, at a minimum. Control charts without supporting data for each specified element or reference to the lot/heat/batch number will not be accepted.
 - g. In the case of Certificates of Inspection, include a statement of compliance with all specifications and/or drawings referenced on the purchase order or in attached documentation.
 - h. Signature and title of person authorizing the Certificate of Analysis or Inspection.
 - i. Certificates of Analysis or Inspection must be provided for each delivery and must be received either with the shipment or prior to delivery.

**13. Record Retention & Destruction**

- 13.1 Test records shall be retained for a period of **10**-years after completion of the last item of the contract.
- 13.2 Test records shall be made available to LHF and LHF customers within 36-hours upon request.
- 13.3 Destruction of test, inspection, quality records, and objective quality evidence must be approved by Lehigh Heavy Forge.

14. Associated Visual, Dimensional or Nondestructive Inspections

- 14.1 Visual and/or dimensional inspections are required for all heat treatment, rough and finish machining Purchase Orders.
- 14.2 Subcontracted heat treatment orders require a visual inspection of all heat-treated surfaces to ensure the surfaces are free of cracks or other injurious defects resulting from or occurring during the heat treatment cycle.
- 14.3 Dimensional inspections after heat treatment may be required to ensure conformance to drawing and acceptance of any distortion.
- 14.4 Subcontractors performing ultrasonic testing as part of the purchase order requirements shall perform the testing in accordance with the LHF procedure specified in the purchase order. A test report shall be issued to LHF Technology, as appropriate as soon as the test is completed. The test shall be performed before the product is finished turned.
- 14.5 When required, nondestructive or other inspections shall be performed by inspection personnel qualified to industry or contract specific specifications or standards.

15. Detrimental Material Control

- 15.1 Subcontractors shall restrict the use of detrimental materials or consumables that are placed in contact with a forging during thermal treatment or transfer to a cleaned surface, and may have a harmful effect on the forging because they contain prohibited or restricted elements, which exceed the prescribed limits.
- 15.2 Mercury contamination controls apply at ALL stages of manufacture. Contact with mercury and mercury compounds, and consumable products or devices containing mercury in excess of 10 ppm, is prohibited. Lights containing mercury, such as mercury vapor, sodium vapor, and fluorescent lights shall have a secondary boundary or complete cover when used in such a manner that their breakage could contaminate the forging with mercury, and/or used within 20 feet (4 sides and above the forging).
- 15.3 Unauthorized Items - Do NOT use any items which have not been previously approved.
 - Do not re-use containers until they have been cleaned.
 - Do not use files or other hand tools which may have been previously used on forgings with lower chemical requirements.
 - Do not use any tools previously used on lead, or on materials containing lead compounds.
 - Do not use any tools which may be cadmium or zinc plated.
- 15.4 Transfer of aluminum, copper, silver, or their alloys to final surfaces that may subsequently exceed 600° F shall be prohibited. For subcontract machining, consider that all final surfaces may subsequently exceed 600°F. Transfer is considered not to have occurred if final surfaces are verified to be visibly free of the metals or alloys.
- 15.5 Mercury controls are in effect every time a contract calls for any detrimental materials control requirements.
- 15.6 Exposure or potential exposure to mercury or its compounds through the normal use of materials, consumables or broken/damaged lighting must be reported to Lehigh Heavy Forge Quality Assurance immediately and the forging held from further processing. Possible sources of mercury:
 - Chemical solutions
 - Instrumentation such as thermometers and manometers



- Mercury vapor, sodium vapor, and fluorescent lights (overhead portable and drop lights). These lights should have a secondary boundary or complete cover that when used in such a manner that their breakage could contaminate the hardware with mercury or used within 20 feet (4 sides and above) of the forging. A secondary boundary or cover shall be such that if breakage takes place, no part of the lighting shall become free.
- No-bounce hammers
- Electrical switches and relays

15.7 The subcontract machining source may choose to maintain a summary report on the elemental content of mercury, low melting point metals, sulfur, phosphorous, halides, and boron as applicable or in the absence of discreet analysis a certification that mercury or the applicable detrimental materials are not present in the products beyond the allowable limits. In the alternative, the subcontract machining source may use materials in processing “special purpose” forgings that are analyzed and approved by Lehigh Heavy Forge. A listing of “NDT Couplants, Solvents, Other Liquids, Inspection and Marking Materials” analyzed for mercury, sulfur and phosphorous will be provided by Lehigh Heavy Forge upon subcontractor request.

15.8 Low melting point metals include antimony, arsenic, bismuth, cadmium, lead, magnesium, tin, and zinc, and are prohibited during thermal treatments of forgings with machined surfaces and on finished or cleaned surfaces of forgings offered for acceptance. In addition, phosphorous and sulfur in excess of specified limits are prohibited during thermal treatments, including heating and hot working, and on finished or cleaned surfaces of corrosion resistant material forgings.

- Halides include chloride, fluoride, and bromide.
- Boron may be required for materials contacting corrosion resistant special purpose forgings.
- Any elements exceeding allowed maximums will be highlighted on the report. Additional notation will identify excesses, which could affect corrosion-resistant materials.

15.9 Certifications of shop hand, assembly, and general shop tools and/or products are excluded when the tools and/or products are composed of acceptable materials. Acceptable materials include; chrome plated steel, carbide tools, corrosion resistant steel, nylon (natural/uncolored), silicon carbide, nickel plated steel, hardened tool steel, aluminum oxide.

15.10 Cutting tools shall be visually clean (except for any appropriate machining coolant) and free of burrs, slivers, chips, shavings, etc., before use.

15.11 Contacts by liquids (other than water or snow), pastes, adhesives, and tapes are materials which are considered to transfer to a forging. These may be removed by an approved cleaning method if:

- Mercury contamination is not suspected.
- Neither the forging nor the contacting material was in excess of 200 degrees F.
- Following removal and visual inspection, there is no evidence of harmful effects.

15.12 The cleaning of all hardware surfaces (both internal and external) shall be cleaned with a solvent or water conforming to Table I requirements.

TABLE I. Cleaning Solvents

Solvent	Specification	Note
Acetone	ASTM D 329	Unused or Redistilled
Denatured Alcohol	27-CFR-21	Denatured ethanol according to formula 3-C, 23-A or 30
Isopropyl Alcohol	TT-I-735	No note
NOTE: American Chemical Society reagent grade solvents meeting the purity requirements of the above specifications may also be used.		

NOTE: All forgings will be returned to LHF after subcontractor machining for final NDT and dimensional inspection and certification. After final inspection at LHF, all forgings are cleaned in accordance with an approved cleaning procedure before shipment.

**16. Heat Treatment**

- 16.1 Subcontractors performing heat treatment shall review with LHF Technology their proposed processes to ensure proper material coverage and body finish material allowances.
- 16.2 The heat treatment shall be performed in accordance with the proposed and accepted plan.
- 16.3 The subcontractor shall certify that the heat treatment was performed in accordance with the heat treatment plan. When required, the subcontractor will provide copies of furnace logs, temperature recorder strip charts or other objective evidence of the successful completion of the heat treatment cycle.
- 16.4 Hardness and other required tests after heat treatment shall be performed after appropriate material has been removed from heat-treated surfaces to account for surface decarburization. The Subcontractor and LHF Technology will agree on the metal removal and test plans.
 - 16.4.1 On roll products only, rolls shall not be finish turned or ground to finish body diameter without approval of the hardness and/or retained austenite test results.

17. Rough and Finish Machining

- 17.1 Rough and/or finish machining shall be performed in accordance with drawings provided by LHF to the subcontractor. Drawing identification and traceability to the purchase order shall be established by LHF and maintained by the subcontractor.
- 17.2 Drawing tolerances and finishes shall supersede standard tolerances and finishes that may be in place at the subcontractor's shop.
- 17.3 Changes to the drawing requirements, including clarity, readability, and the presence or absence of tolerances on critical dimensions shall be identified and brought to the attention of LHF Purchasing prior to the start of any work, whenever possible.
- 17.4 Material Data Sheets, Certified Test Reports or Certificates of Conformance are required for all work completed by the subcontractor. See "Section 14" below for additional requirements.
- 17.5 Supplemental Roll-Specific Requirements:
 - a. Inboard and outboard bearing pads on end of a roll shall be mated within 0.0005".
 - b. Bearings on the operator and drive end of a roll shall be mated within 0.001".
 - c. Surface finish for hardness shall not exceed 50 Ra.
- 17.6 Use of Magnetic Equipment on LHF Product will require a demagnetization operation to bring the magnetic field down below 3 gauss before shipping to Lehigh Heavy Forge.

18. Packaging & Shipping Preparation

- 18.1 Subcontractors shall prepare the product for shipment in accordance with the purchase order requirements.
- 18.2 The following requirements (at a minimum) are applicable to roll products only:
 - a. All machined surfaces must be 100% coated with a rust preventing coating.
 - b. Suggested coating is Rust Veto #342, or any special coating required on the purchase order.
 - c. Bearing journal diameters are to be protected with paper backed aluminum foil and then covered with cardboard.
 - d. Only plain waterproof wrapping and tape may be used. NO SUBCONTRACTOR LOGOS OR NAMES ARE ALLOWED ON ANY PACKAGING MATERIALS.
 - e. All straight bearing journal surfaces must be additionally protected with hardboard and banding.
Note: LHF uses 1/8-inch-thick standard Masonite.
 - f. Product must be tarp protected during shipment. Note: no binders are permitted across bearing journal surfaces.



- 18.3 Subcontractors shall identify all products in accordance with LHF furnished requirements. This may include, as appropriate and stated on the purchase order or instructions:
- a. LHF product or piece identification.
 - b. Special customer identification.
 - c. Special markings on one or both ends of the product.
 - d. Color coding or other surface coating requirements.
- 18.4 Subcontractors must fax a copy of the Bill of Lading or Delivery Report to LHF Purchasing Department as proof of shipment or delivery to the customer.

19. **Authorization for Shipment**

- 19.1 LHF will approve all products for shipment to a customer. A certified test report must be prepared for each product and forwarded to the appropriate LHF personnel, as directed in the purchase order. If the product is released for shipment to the customer, LHF personnel will forward to the subcontractor, the customer's approval to ship with a release for the product to be shipped. The subcontractor shall include the customer's shipment approval and a copy of the subcontractor's approved test report or the LHF test report with the product shipping documents when the product is shipped. LHF manifests, as appropriate, must be used for shipping products to the customer.

20. **Other Commercial / Contractual Requirements**

- 21.1 Subcontractors are required to procure and maintain fire and extended coverage insurance in a company or companies satisfactory to LHF Purchasing department in such amounts as may be necessary to protect the full interest of LHF's property as long as it remains in the possession of the subcontractor. The subcontractor shall cause LHF to be added as a named insured to such policy or policies and shall cause a Certificate of Insurance to be sent to the LHF Purchasing department.