



Premium Quality Titanium Qualification Overview

28 July 2020

GE Designated: CONFIDENTIAL – authorized distribution only

On-Site Review

Dependent on travel limitations due to COVID-19

- Process walk, hazard review
- Fixed process review



Seeded Heats

Per S-425, Appendix B

Supplier must demonstrate the capability of the hearth furnace being qualified to eliminate defects. For a new hearth melt supplier or an existing hearth melt supplier introducing a new hearth design, at least one seeded heat must be melted in accordance with the requirements of Appendix B with zero surviving seeds prior to moving forward with the unseeded heat portion of the qualification.



P1TF73 Requirement

4.1.1 Hearth Melt Qualification. A hearth melt Supplier will be considered for qualification for an alloy after producing at least 500,000 lbs. of hearth melted product that has been melted and converted into bar per P1TF73 and following ultrasonic inspection per P3TF34 has been found to be free of inclusions. The process shall have a demonstrated capability for removal of Type I Hard Alpha and other deleterious inclusions.

This material does not ship to GE as PQ bar. Can be sold to any customer so long as the inspections are recorded.



Minimum Requirements

Hearth, Initial Qualification: New Furnace Type

Seeded heats:

- 1 per alloy with nominal diameter 2 inch maximum
- One (1) residence time trial per hearth.
- Ultrasonic, Radiographic, Characterization of indications
- Chemical Composition (ingot top and bottom)

Note: Ti17 approves Ti-64 and Ti-6242, Ti-64 approves Ti-811 if processed the same. Any other alloy may require an additional seeded heat trial for approval.

Unseeded Heats:

- 10 Bar Heats (16 square inches maximum)
- Ultrasonic (all heats, all alloys, all VAR sources) (characterization of indications)
- Five (5) Chemical composition surveys (any VAR source)
- Five (5) Macroetch and microetch survey (any VAR source)
- Normal release testing (balance of heats)
- 50 Billet heats (10 inch diameter maximum)
- Ultrasonic (all billets, all alloys, all VAR sources) (characterization of indications)
- Five (5) Chemical composition surveys (any VAR source)
- Five (5) Macroetch and microetch survey (any VAR source)
- Normal release testing (balance of heats)

Material may be shipped to GE
following final review of results



Forging Part Cut-ups

- Qualification material released to forger(s)
 - Tested per GE-A cut-up drawings: mechanical testing, metallography
- GE reviews
- Follow-on heats released on NCR, SPC tracking



DFO Approval

Following a successful qualification, melt supplier would be added to DFO (Data For Ordering).

DFO lists melt supplier approval by alloy. Forgers may order from any melt supplier on DFO for GE-A end use applications.



Ti-17

Following successful qualification efforts in Ti-64, qualification program could begin on Ti-17



