

Foundry Operations

Note: This audit checklist has been broken into three sections:

1. The first section is directed to Quality Assurance management.
2. The second section is directed to foundry operation and supervision.
3. The third section is directed to the chemical and mechanical testing.

SECTION # 1 – FOUNDRY QUALITY ASSURANCE MANAGEMENT:

ATTRIBUTES:	SAT	UNSAT	N / A
1. What is the current quality system implemented and maintained by the foundry?			
2. Has the foundry ever been subjected to a 3 rd party quality audit? If so, by whom? (provide documentation of these audits).			
3. Is there a documented procedure/process to control the suppliers of raw materials? (i.e., ingot, alloying additions, purchased scrap)?			
4. Is there a documented procedure/process to determine the acceptability of raw materials and its traceability? (i.e., ingot, alloying additions, purchased scrap)?			

Add information for the casting processes that the foundry performs:

CASTING PROCESS	MATERIAL	PERCENTAGE
SAND		
INVESTMENT		
CENTRIFUGAL		
CONTINUOUS		

SECTION #2 - FOUNDRY PROCESS AUDIT CHECKLIST:

ATTRIBUTES:	SAT	UNSAT	N / A
<p>5. What are the foundry's critical processes?</p> <p>Are there approved written detailed procedures for each critical casting process that the foundry performs and is there a first article qualification requirement for each? Identify procedure number(s) and revision(s).</p>			
<p>6. Is there a process change control procedure including validation / first article re-qualification of acceptability and 1st article test report approval from the customer, when applicable?</p>			
<p>7. Do melting and pouring procedures exist for each alloy group that the foundry melts?</p>			

ATTRIBUTES:	SAT	UNSAT	N / A
8. What equipment is being used for melt and pour temperature control and is there evidence of calibration?			
9. Is there a procedure that identifies that back scrap, revert, re-melt, or internal scrap material be marked with the Heat Number and Alloy?			
10. Is purchased, pre-certified alloy ingot used for melts? and if so, is chemistry verified prior to melting for casting use?			
11. Is there a procedure that identifies when and how many chemical and/or mechanical test coupons are poured to confirm the melt? Does the procedure identify that a chemical check analysis is required prior to releasing the melt for pouring?			
12. Does the melt procedure specifically forbid adding material to the melt after the test coupons have been poured?			
13. Is there a procedure for the disposition of heats that do not meet chemical and/or mechanical requirements?			

ATTRIBUTES:	SAT	UNSAT	N / A
14. Is there a procedure that identifies how to control excess material after the pour is complete?			
15. Is remaining/excess material after each pour labeled with the Heat Number and Alloy?			
16. Are certified ingot, back scrap, revert, and alloying additions used to formulate foundry heats segregated, identified, and controlled within the foundry in order to prevent cross contamination of alloys and elements?			
17. Is there a procedure or method for identification and segregation of crucibles and ladles to prevent cross contamination, including associated tools such as stirring rods and skimmers?			
18. Are there limits on size of melts or pour times?			
<p>19. Is there a procedure that identifies that for each heat the following minimum data shall be recorded and kept on file?</p> <ul style="list-style-type: none"> • Name of the individuals supervising and performing the melt and pour • Time, date & heat number • Weight of purchased raw material (ingot or alloying elements) added • Weight of back scrap or revert added • Heat number and / or alloy of purchased raw material (ingot or alloying elements) if possible • Heat number and / or alloy of added back scrap or revert <p>Sample records to verify that the minimum data is being recorded and maintained on file.</p>			

ATTRIBUTES:	SAT	UNSAT	N / A
<p>20. a. Does the foundry use thermal blankets? If so, how does the foundry prevent contamination caused when different materials from different heats touch the underside of the blankets?</p> <p>b. What method is used to minimize loss of light elements from the melt?</p>			
<p>21. Is there a documented procedure for heat number traceability? How is heat number traceability on finished product controlled?</p>			
<p>22. Does the foundry use a documented procedure to select/evaluate subcontracted test lab(s) performing mechanical and chemistry testing?</p>			
<p>23. Does the foundry shot blast castings? If so, what type of medium is used, is it recycled, and is the same shot blast used on all alloys? If not, how are castings cleaned after removal from the mold? Is this covered in a procedure?</p>			

ATTRIBUTES:	SAT	UNSAT	N / A
<p>24. Are procedures and instructions available at the foundry working level? Is work performed in accordance with the applicable procedures and instructions?</p> <p>Are internal audits performed to verify procedure compliance? Verify by reviewing sample records.</p> <p>.</p>			
<p>25. Is there a documented training program to assure personnel are adequately trained in their assigned tasks prior to performing the task?</p> <p>.</p>			

SECTION # 3 - FOUNDRY CHEMICAL AND MECHANICAL TESTING AUDIT
CHECKLIST:

ATTRIBUTES:	SAT	UNSAT	N / A
26. Who performs the analysis of chemistry coupons? What are their credentials and experience? Are qualifications maintained and capabilities and results validated periodically?			
27. Do training procedures and documented training records exist for personnel analyzing the chemistry coupons?			
28. What type of equipment is used to analyze chemistry coupons and is an operational procedure available?			
29. Is there a documented procedure describing how the chemistry sample is taken from the chemistry coupon?			
30. To what industry standard is the chemistry equipment calibrated?			
31. How often is the equipment standardized, calibrated, validated?			
32. Are the standards used to calibrate and validate the chemistry equipment sufficient and from known NIST standards?			
33. What is the practice /convention for rounding decimals when taking percent composition readings?			
34. Who tests the mechanical and weldability (if applicable) test coupons?			

ATTRIBUTES:	SAT	UNSAT	N / A
35. Are there training procedures and documented training records for personnel performing mechanical testing?			
36. Is the yield strength calculated in accordance with the specification called out in the purchase order (0.2% offset or 0.5% extension under load)?			
37. What types of equipment are used to perform mechanical and weldability (if applicable) testing?			
38. Is the mechanical test equipment calibration certification current?			
Additional Comments:			