Summary of Replies for AMS6351K

Print

Name	Committee	Comment Type	Section/Paragraph
Charles Himmelblau	AMSE	I	3.3.2

Same comment to 3.3.1 as in my responses to ballot AMS6485K.

Ronald Hahn	AMSE	T	3.3.2

Presumably the control on average grain size was included to determine if each lot of material had been properly processed. There has not been any data presented that ensures that abused (overheated) material will have the proper grain size in the final product. Thus I disagree with changing the sampling from per “lot” to per “heat” and the use of “grain refiners” to qualify a heat until this data is presented.

If either grain size revision is not accepted then the "Report" paragraph will need revision.

Grain size test in AMS specs is a heat capability test

Iul#Dxj#34#4;=3<=77#HGW#5347#e|#**Michael He**

Your T comment appears to be based on a concern that the grain size of the final heat treated condition be verified to ensure fitness for service. “Per Heat” testing certainly does not accomplish that. However, the specification in question does not cover material supplied in the final heat treated condition, so the concern you’ve raised is beyond the scope of this document. If the grain size in the final heat treated condition is truly required, then all AMS Committee E specifications need to be changed to state that. This means whoever supplies the finished component will suddenly have to start reporting grain size in the final heat treated condition. For many materials covered by Committee E, it is not possible to reveal grain size in this condition. What would a supplier do in that case?

Also, if grain size in the final heat treated condition must be reported, then a specific method for evaluating grain size which does not require re-austentization of the specimen must be clearly stated in the specification.

Grain size testing per ASTM E112 is a capability test, which means the result is not dependent on previous heat treatment of the test specimen. Rather, it’s a test to show the material’s response to a lab furnace cycle that is intended to mimic the actual austenitizing temperature that the material would be subject to. Since the specimen is austenized during the preparation phase of the test, the resultant grain size is mainly chemistry dependent. The method outlined in ASTM E112 does not allow a user to draw any conclusions about the quality of the heat treatment applied to the parts but only to conclude that when heat treated in a manner similar to that used on the specimen, the heat is capable of producing the measured grain size.

Grain size capability

Wxh#Dxj#45#3;=69=7;#HGW#5347#e|#**Terry Tressler**

I believe that the germane points have been made by others and are as follows;
For material that is provided without the final heat treatment, a final actual grain size cannot yet be determined.
What can be determined at this semi-finished condition is a grain size that represents the capability of the material given processing simulating that typical of final austenitizing heat treatment.
On this basis the appropriate test frequency is per heat.

Robert Hodder	AMSE	T	3.3.2

Make no changes. See my comments on 3.3.2 of AMS6345D.

Robert Steffen	AMSE	T	3.3.2

Using aluminum content to "prove" grain size < 5 should be supported by more data than "ASTM has accepted this method". AMS needs to be able to point to a technical report to demonstrate this type of control.

Technical justification also needed to demonstrate why "heat" control is sufficient (e.g., why subsequent thermal processes cannot further deteriorate the GS.

Jacque Bader	AMSE	T	3.3.2

agree with other commentors, need more documentation

Roger Sines	AMSE	T	3.3.2

Agree with Steffen, et al, that the grain size premise is not validated.

Shlomo Ramati	AMSE	T	3.3.2

note steffan's notes

Fred Cone	AMSE	I	3.3.2

Need to resolve discussions in other disapproving ballots.

Deborah Fialkowski	AMSE	T	3.3.2

3.3.2 The current requirements for Grain Size requires the austenitic grain size to be evaluated per ASTM E112, McQuaid-Ehn test. This requirement merely shows the worst case capability of the material as all prior heat treatments performed below 1700F are erased. Therefore the delivered condition of each lot is irrelevant with respect to Grain Size evaluation. The as-delivered condition would be the same or finer than that determined by E112. The requirement currently is not defined as the grain size of the as-delivered product, but rather the capability of the steel in the austenitic phase, which is chemistry dependent.

The use of Aluminum as a grain refiner has been studied and documented for over 60 years. One more recent reference is "Steels: Processing, Structure, and Performance" by George Krauss, ASM International, 2005. Chapter 8 contains over 40 references to other technical publications.

General Commentary: The scope of this specification is for material supplied to the parts manufacturer (whether or not via a steel service center). The material as it leaves the mill is to be sphereoidized annealed and soft enough (per the condition paragraph 3.2) for the parts manufacturer to work with to make the parts and to subsequently heat treat the parts as necessary for the final product condition. The material is to have the capability to achieve a fine grained structure based on the prior austenite grain size achieved when a McQuaid-Ehn test is performed. Any heat treatment in excess of the grain coarsening temperature (generally over 1850F), could result in a coarse grain structure, but such post-material specification processes are beyond the scope and control of this material specification requirements. The current spec as written does not protect the material from any abusive heat treatments that occur after the material is supplied.

Patrick Nowak	AMSE	I	ALL

APPROVE

See comments in AMS6385 regrading heat vs.lot testing and role of aluminum as a grain refiner.

Sy Sweet	AMSE	I	All

Waive