AMEC 267 MEETING AGENDA

The Two Hundred Sixty Seventh Meeting of the
Aerospace Metals Engineering Committee
taking place on April 18-19, 2023
in Nashville, TN

AMEC Chairman: R. Adkins

AMEC EC/Secretary: K. Groeneveld

Schedule

Wednesday, January 18

AMS2759/6	Discussion of 28D ballot comments
AMS2759/9	Discussion of issues with proposed changes
AMS2759/10	Discussion of 28D ballot comments
AMS2759/11	Discussion of 28D ballot comments
AMS2759/12	Discussion of 28D ballot comments

Thursday, January 19

AMS2745	Discussion of project status
AMS2750	Discussion of proposed changes in the next revision
ARP1341	Discussion of project
MIL-STD-1537	Discussion of proposed ASTM standard

ATTENDANCE

Anti-Trust Statement/IP/Patent Disclosure Statement

Approval of Meeting No. 265 Minutes from January, 2023.

ALUMINUM TECHNOLOGY

MIL-STD-1537, Electrical Conductivity Test for Verification of Heat Treatment of Aluminum Alloys, Eddy Current Method Sponsor: C. Thomas

248: C. Thomas brought up conductivity testing standard MIL STD 1537 which was last issued in June 2002. The standard requires a minimum instrument warm-up time. This is not consistent with many direct read digital instruments. There are no reporting requirements for instrument calibration or standards verification. There is no requirement that states the results of instrument standardization be documented. There is no description of the verification of reference (working) standards and their required frequency. There needs to be a better description of the correlation requirements with bare conductivity/hardness results relative to acceptance of clad parts. Currently, only BAC 5651 (Boeing) provides a reasonable description. The sampling for conductivity testing does not agree with AMS2770. Suggestions for improving the existing standard need to be addressed by Wright-Patterson Air Force Base, Ohio 45433-7101 who I suspect has no interest in successive revisions.

250: Continue

251: Continue. Chair to contact Rade Savija and Colin Thomas.

252: Continue

254: Continue. Chair to contact Katrina Boos, Rade Savija & Colin Thomas.

255: Continue

7-22-2020 C. Thomas email

256: C. Thomas and M. Niedzinski need to work with WPAFB. AMS2770 states that ASTM E1004 can be used as an alternate to MIL-STD-1537. D. Schuler to contact C. Thomas and J. Calcaterra.

10-7-2020 email from Colin: I was not aware that a required action was to contact WPAFB (perhaps I should have read the meeting minutes). I will contact WPAFB. It should be noted that although ASTM E1004 is referenced in AMS2770 it should not be interpreted that ASTM E1008 is a rigorous standard; it is not. I will let you know what progress I make with WPAFB to determine if conductivity testing should be a discussion item in November.

257: Continue

1-15-2021 Thomas email stating asking what else needs to be done to initiate a project to write a new AMS conductivity testing.

1-18-2021 email asking for justification and that I will formally initiate the project.

258: email from C. Thomas: “WPAFB is in agreement with creating a new standard. I have a draft prepared, but I am waiting for AMEC approval and the assigning of a draft number designation.” Approval has been obtained from AMEC and committee D.

Title: Electrical Conductivity Testing for the Verification of Aluminum Alloys using Eddy Current Methods

Rational: MIL-STD-1537 has been the industry standard specification for conductivity instruments/standards and the testing of aluminum alloy parts. The standard was issued by Wright Patterson Airforce Base (WPAFB) in 2002 and, in its present form, is not consistent with current instrument capabilities, instrument standardization and testing methods. Communication with WPAFB has verified that they would accept SAE/AMEC efforts to create a new standard.

Designation: AMEC21AA

2-8-2021 email from Thomas stating the draft is still being worked on

259: Continue

6-11-2021 email to Thomas asking about status. Sponsor is working on the draft.

260: Continue

261: Continue

262: Continue. EC to inquire regarding status

2-11-2022 email to sponsor asking status – Response is that draft may be ready by end of March.

263: On hold with the sponsor.

264: On hold with the sponsor.

9-29-2022 Committee K has expressed interest in this new document. Need to have Katrina Petro discuss this topic with John Brausch at WPAFB.

265: On hold till sponsor is finished working on AMS2750/2.

266: Continue

3-18-2023 email from sponsor stating that ASTM may be creating a new standard for this.

267:

AMS2772 Heat Treatment of Al Alloy Raw Material Sponsor: D. Boley

9-13-2022 28D LSB closed with no “T” comments

EC to issue 14D ballot for “I” comment and moving paragraph

See Boley email dated 9-28-2022.

10-19-2022 email to A. Warren asking about “I” comment.

10-20-2022 email to A. Warren asking her to resolve “I” comment.

No AMEC action required.

11-21-2022 email to A. Warren asking about balloting “I” comment

11-30-2022 Warren suggests a 14D ballot.

12-15-2022 14D ballot closed without comment

EC to prepare AC ballot

2-28-2023 AC ballot closed without comment

3-8-2023 Published

AMS3025 Polyalkylene Glycol Heat Treat Quenchant R. Eybel

It is proposed that AMEC take on the project of revising this specification as it would benefit from a rewrite for clarity including better use of tables. Also, It is difficult to find small quantities of material from multiple producers and heats.

4-11-2022 NPR initiated

4-12-2022 Approved

4-26-2022 SAE draft

5-3-2022 draft to sponsor

5-19-2022 draft from sponsor

7-4-2022 28D AMEC ballot closed with 12 “T” comments

7-5-2022 email comments from DuBois Chemicals

264: After a lengthy discussion and review of the history, complexity of the testing, and difficulty of getting material and difficulty in obtaining compliance the sponsor has withdrawn the balloted draft.

The history of the original spec being created (reliability and robustness was the concern in 1980). This led to very conservative requirements. State of the art tends to be more associated with cooling curves as outlined in the ASTM’s 6200, 6482 and 6549 not mechanical testing was the formulators’ opinion to control consistency.

There was skepticism expressed about changing the testing model with respect to cost, material availability and technical improvement. Removal of ASTM D6200 was considered the removal of the fundamental document. Based upon all the comments, the sponsor withdrew all changes and set up a subcommittee to review the document by a team consisting of the sponsor, Scott Mackenzie, John Duggan, and Jeff Koss. The original sponsor, George Totten, is copied.

The team is to investigate cooling curve consistent versus mechanical testing approaches. The team is to investigate amending AMS3025 versus the creation of a new specification or perhaps both.

The following commentary by George Totten was provided to the sponsor after the AMEC meeting:

Some years ago, Dr. Charles Bates developed for ASTM and Boeing (after Jim Staley's work) Quench Factor Analysis to link cooling curves and various mechanical properties. Isam Mudawar at Purdue University used this methodology in his published Spray Quenching work and Murat Tiryakioglu has done much deeper analysis of this methodology as part of his PhD research. I encourage you to discuss with Mudawar and Tiryakioglu (m.tiryakioglu@unf.edu). Other work on this topic has been done in Germany (with Olaf Kessler's group). Of course, Scott MacKenzie and Joe Newkirk did excellent work in the area as well. (I do not have Charlie Bates current email, but you can get it from Scott or ASM.) By the way, we did a lot of work

with Charlie Bates using Quench Factor analysis when I was at Union Carbide. That work was validated successfully.

By the way, I don't know why ASTM D6200 would be cited in AMS 3025. It was developed specifically for UNAGITATED petroleum oils. The general Guide for Quench Testing of Polymer Quenchants with Agitation is ASTM D6666. I would think the more appropriate standard most relevant for ALUMINUM cooling curve analysis would be: ASTM D7646. It was written specifically for this application. .

Well, those are my comments. I am well familiar with ASM 3025 historical development work especially during the late 80s and 90s.

The major limitation in this work, as per my experience, is that the aluminum alloy C-curves vary with alloy chemistry. Murat Tiryakioglu has studied this. Also, in 2022, C-curves can be quite well predicted, the process of which could be specified which would be a substantial improvement over AMS 3025 as it currently exists.

9-20-2022 resent draft to sponsor

265: Presentation by R. Eybel and J. Duggan, Dubois Chemicals on Table 1 properties (attached). Review of what needs to be changed in the draft.

Team to work on a new draft to ballot within AMEC. Likely not to happen till after the January 2023 AMEC meeting.

266: Continue

267:

AMS2770 Heat Treatment of Wrought Aluminum Alloy Parts Sponsor: H. Falcone

Proposal for new project to revise this specification. Parking lot changes and any items from the brazing project. Heather Falcone to be the sponsor. A team will be put together to work on this project to include J. Koss, Rico, S. De Cenzo, M. Timco, Y. Romero, A. Perfetti.

2-9-2023 initiated NPR in AMEC. Approved

2-8-2023 email to Warren and Parzuchowski asking for approval of this project. Responded that they would like some D members to be on the team. Responded that that would be great.

2-9-2023 draft to sponsor

267:

Aluminum New Business

FERROUS TECHNOLOGY

AMS2759 Series

AMS2759/1 Heat Treatment of Carbon and Low-Alloy Steel Parts Minimum Tensile Strength Below 220 ksi (1517 MPa)

265: Discussion of question regarding surface contamination testing. Agreed that this needs attention, but place in parking lot for the next revision. See presentation from R. Eybel.

266: S. Radford discussion of quench media after tempering. Review Table 1 for clarification of "condition" column in regard to it being prior to tempering and not after. Next revision.

AMS2759/2 Heat Treatment of Low-Alloy Steel Parts, Minimum Tensile Strength 220 ksi (1517 MPa) and Higher

265: Discussion of question regarding surface contamination testing. Agreed that this needs attention, but place in parking lot for the next revision. See presentation from R. Eybel.

AMS2759/3 Heat Treatment, Precipitation-Hardening Corrosion-Resistant, Maraging, and Secondary Hardening Steel Parts

258: Lee Gearhart: AMS2759/3 Table 4 soak times. Proposed to make Note 1 applicable to sheet & strip only. Proposed to leave Note 2 as is but add applicable to all forms except sheet & strip. Move references to these notes to the column heading and delete from specific alloys. Change column title to "Minimum Soak Time..." for both columns. This would be put off till the next revision.

AMS2759/4 Heat Treatment, Austenitic Corrosion-Resistant Steel Parts Sponsor: J. Koss

266: This specification is up for 5 year review. Are there any changes or updates needed?

J. Koss to sponsor a review. EC to initiate an NPR.

2-8-2023 NPR initiated in SW2. Approved

2-10-2023 draft to sponsor

267:

AMS2759/5 Heat Treatment Martensitic Corrosion-Resistant Steel Parts

Question from user asking about "mandatory" in Table 3, Note 7. R. Houghton suggested that it means that the 550 °F is the mandatory set point. This needs to be addressed in the next revision.

AMS2759/6 Gas Nitriding of Low-Alloy Steel Parts Sponsor: R. Houghton

This slash sheet is up for 5 year review and update. There are a few editorial changes that need to be made. Here are previous notes:

256: B. Wentland to look at adding a statement to /6 stating that /10 can be used in place of /6. R.

256: R. Houghton is willing to take over being a sponsor or a contact for questions on AMS 2759/6. As far as putting a reference in the scope of this to allow the use of AMS 2759/10 as a direct replacement (upgrade), I think that will be ok.

EC to get a copy of /10 for review by the sponsor. / Done

7-31-2020 R. Houghton email stating

Compared /6 requirements to /10 and agree with B. Wentland that /10 should be considered as an acceptable alternate/upgrade to AMS2759/6. So, it would make sense to add a statement in the SCOPE of AMS 2759/6 that "Processing to AMS 2759/10 will meet all the Quality Assurance Provisions specified in AMS 2759/6 and is an acceptable alternate process specification". It would not be appropriate to add the same note in AMS 2759/10.

EC to ??? email to Rick & Roy asking if this warrants a revision

8-10-2020 email to Rick asking about Gonzalez customer assist request 7-23-2020.

8-10-2020 R. Houghton & R. Adkins agree to place this change in the parking lot for the next revision. Houghton email dated 8-10-2020.

9-11-2022 SAE draft received

9-14-2022 EC edited.

265: EC to send draft to sponsor.

11-10-2022 draft to sponsor

1-9-2023 28D AMEC ballot closed with 4 "T" comments

1-10-2023 SoR sent to sponsor

266: Discussed comments from ballot.

3.4.1/Ferry: Sync with AMS2759/10.

3.4.2/Ferry: Accept comment but do so by changing AMS2759/11 from 100 °F under to 50 °F under aging temperature.

3.4.3/Vernault: It was agreed upon that gloves of any sort are not needed. Do not accept.

3.4.7.3/Ferry: Accept by changing "shall" to "should".

3.4.7.3/Engelhard: Accept by adding "…or aging." to the end of the 2nd sentence.

3.4.7.4/Vernault: Accept by changing "depth of case" to "case depth".

3.6.1/ Himmelblau: Accept by adding "then" to "If the engineering drawing and/or purchase order specifies a case depth but does not specifically state that it is to be an effective case depth, then total case depth, as defined below, shall apply."

3.6.5/Vernault: Accept by adding "…including the amount to be removed when applicable" to the end of the 4th sentence.

4.3.1/Kusher: Restore 4.3.2 and reword 4.3.1 first 2 sentences as "Each lot of parts nitrided in each furnace load shall be accompanied by at least one part or section of parts produced from the same lot of material or at a minimum process control specimen of the same alloy."

4.2.3/Engelhard: Do not accept.

4.4.1/Radford: Number of renitriding should not be limited to once. Accept

OI/Engelhard: Change 5th bullet to "Last tempering or aging temperature actually used."

OI/Engelhard: Add bullet to require an engineering drawing.

Title/Ferry: Change title to "Gas Nitriding of Steel Parts" and 1.1 as well.

Sponsor to issue 28D redraft.

3-1-2023 28D AMEC redraft ballot closed with 11 "T" comments

267:

AMS2759/8 Ion Nitriding **Sponsor J. Ludeman**

This slash sheet is up for 5 year review and update. There are a few minor editorial changes that need to be made.

265: EC to initiate NPR.

11-10-2022 draft to sponsor

266: Sponsor stated that a draft will be coming out in the next 45 days.

267:

AMS2759/9 Hydrogen Embrittlement Relief (Baking) of Steel Parts Sponsor: R. Panza-Giosa

Proposed changes to AMS2759/9 are detailed in the 260 July 2021 minutes.

260: Agreed to hold off on revision till next 5 year review. See previous meeting minutes for details

263: Presentation by Salim Brahimi, Technical Director of the Industrial Fasteners Institute

Proposal

Currently AMS2759/9 contains the following application provisions in 1.2.

AMS2759/9 Hydrogen Embrittlement Relief of Steel Parts

1.2 Application

This specification is applicable, but not limited to, the following types of parts:

- Carbon, low alloy, and martensitic stainless steel parts heat treated to a minimum strength of 180 ksi (1241 MPa), or a minimum hardness of 40 HRC or equivalent.
- Threaded fasteners made from carbon, low alloy, or martensitic stainless steels heat treated to a minimum strength of 150 ksi (1034 MPa), or a minimum hardness of 34 HRC or equivalent.
- Parts made from high strength precipitation hardening stainless steels other than A-286 (see Table 1 for specific tempers).
- Steel parts which have been case hardened (carburized, nitrided, nitrocarburized, or carbonitrided).
- Other parts that specify AMS2759/9.

Proposal to reword the first bullet point and to delete the second bullet point as follows:

- Carbon, low alloy, and martensitic stainless steel parts, including threaded fasteners, heat treated to a minimum strength of 180 ksi (1241 MPa), or a minimum hardness of 40 HRC or equivalent.
- ~~Threaded fasteners made from carbon, low alloy, or martensitic stainless steels heat treated to a minimum strength of 150 ksi (1034 MPa), or a minimum hardness of 34 HRC or equivalent.~~

Rationale

The mandatory requirement to bake fasteners with a hardness of 34 HRC and above while only requiring to bake ***all other high strength steel parts*** beginning at 40 HRC is inconsistent and contradictory to (i) the fundamental principles of hydrogen embrittlement mechanism, (ii) to the research, and (iii) to the lived experience of the fastener manufacturer and user communities.

- This proposal is supported by years of published research and by actual experience in the fastener industry, and notably IFI's Division II members.

- As reference, ISO TR 20491 is an ISO Technical Report on Hydrogen Embrittlement in Steel Fasteners, published by ISO TC 2 (Technical Committee on Fasteners) in 2019. This technical report is a consensus document that was peer reviewed in excruciating detail by experts from around the world. It describes in concise yet complete manner the phenomenon of HE, especially as it related to steel fasteners. ISO TR 20491 includes a detailed bibliography.
- Specifically on the topic of baking, ISO TR 20491 unequivocally explains that baking is not required nor is it beneficial for electroplated fasteners below hardness of 39 HRC.

263: R. Panza-Giosa has agreed to sponsor the next revision of AMS2759/9. EC to initiate NPR. Include presentation in the meeting minutes.

5-4-2022 NPR initiated

5-17-2022 SAE draft received

5-25-2022 draft to sponsor

264: Discussion of AMS 2759/9 Hydrogen Embrittlement (HE) relief of steel parts, which is undergoing a 5- year review. At meeting #263, a motion was passed to remove the requirement for HE baking of threaded fasteners with UTS=150 ksi and higher. A separate meeting involving a subcommittee of interested parties was held in May to discuss the 150 ksi fastener change. Several parties expressed reservations about this proposed change and had questions about the extent of the data used to justify the proposed change. Upon review, it seems the requirement to bake fasteners was established at the specification's first issue, i.e., Rev A. Roger Eybel explained that the requirement had originated from fastener failures experienced by McDonnel Douglas. The principal argument for removing this requirement was provided by Salim Brahimi, who argued that steels with strength below 180 ksi are not susceptible to HE. He presented data from material and fastener susceptibility tests which supported his claim. One concern with fasteners is that the threads represent a higher notch sensitivity. Furthermore, Marilea Manzini argued that fasteners are typically barrel plated and hence more susceptible to HE. Both these points were dismissed on the basis that the stress intensity factor associated with thread root is not applicable as steels in strength level lower than 180 ksi are not susceptible to HE. This proposed change was also discussed in terms of recent fastener industry drive to move from Zinc plating and Cadmium plating to Zn-Ni plating, Zn-Ni being considered to possess the same or lower HE potential. Mark Timko highlighted the near-surface increase in strength/hardness resulting from thread rolling processes commonly used in manufacturing aerospace fasteners. Salim responded that HE susceptibility is governed by the thermally developed strength/hardness and therefore local HE susceptibility is unaffected or possibly improved as dislocations impede hydrogen mobility.

Attention was called to AMS-QQ-P-416 specification for Cadmium Plating, which upon review, was seen to contain a similar requirement for HE baking fasteners with UTS above 150 ksi. Roy Adkins explained that if AMS 2759/9 is changed to remove this baking requirement, then QQ-P-416 would also need to be changed, and this would require a dialogue with SAE committee B. After this discussion the Committee decided that the Draft specification with the highlighted changes presented be put to an AMEC 28-day ballot. The other major change being proposed is the removal of the requirement to increase the baking time with increasing thickness, a change introduced at last revision - which is not in line with industry practice and deemed unwarranted.

9-30-2022 Next AMEC meeting need to discuss baking of PH SS with hardness above HRC 40 but HT condition not listed in Table 1.

10-30-2022 28D AMEC ballot closed with 13 "T" comments

265: Continue. To be discussed during the January AMEC meeting. It was agreed that it would be good if S. Brahimi and C. Willan could be there. Sponsor would like sent to him any technical reports of HE failures of fasteners with strength below 180 ksi.

266: After a discussion, J. Koss stated he will research Boeing's position regarding the proposed change to AMS 2759/9 Hydrogen Embrittlement Relief (Baking) of Steel Parts, paragraph 1.2, essentially striking the second bullet, applicable to threaded fasteners. K. Sabo will be asked to do the same for LMCO. These positions to be presented during the April AMEC meeting.

3-2-2023 Discussion of whether /9 should be a "how to" or decision maker for baking or not.

3-15-2023 email to Sabo & Koss asking if they will be ready to discuss during April meeting. Response: Koss will be ready.

3-16-2023 email to sponsor requesting status and what is next.

3-21-2023 email dated 3-20-2023 change "15-7PH" to "PH 15-7Mo"

267:

AMS2759/10: Automated Gaseous Nitriding Controlled by Nitriding Potential
Sponsor: J. Ludeman

This specification is up for 5 Year Review. Does AMEC want to review this or let it go thru committee B?

263: Nitrex it the primary processor. Sarah to find a contact at Nitrex. T. Morrison to investigate. EC to send email to Tom.

5-6-2022 reminder email sent out.

5-11-2022 email to Karl at Nitrex asking for a review of the AMS. Follow up email to D. Graves who signed up to sponsor 5-yr review in B.

5-20-2022 J. Ludeman email asking to sponsor revision. Replied accepting offer.

4-7-2022 SAE draft

6-1-2022 draft sent to sponsor

264: Continue

265: Sponsor stated that a draft will be sent to the EC by November 18 so that balloting can be completed prior to the January AMEC meeting.

11-21-2022 email to sponsor asking about the draft? Will send by end of Nov

12-1-2022 draft received from sponsor.

1-2-2023 28D AMEC ballot closed with 5 "T" comments

266: Continue

267:

AMS2759/11 Stress Relief of Steel Parts **Sponsor: R. Eybel**

This slash is up for 5 year review and update. Does AMEC want to review it? Yes.

264: Chair to send out email to AMEC asking members to review for any updates or changes.

9-1-2022 R. Eybel responded that he would be willing to sponsor.

9-11-2022 SAE draft received

9-20-2022 draft sent to sponsor

10-20-2022 AMEC 28D ballot closed with 2 “T” comments

1-10-2023 SoR sent to sponsor

265: The comments from the 28D LSB were discussed as follows:

Vernault/1.2: M&2nd to add "When required stress relief should be performed to reduce residual stress that may affect fatigue performance.". Passed.

Timco/Table 1: M&2nd to a note to Table 1 similar to the following. Passed

“If the PH stainless steel is aged at less than 1025 F, then caution should be exercised for the stress relief temperature due to stress corrosion cracking potential. Consult with CEO for guidance. Informationally MIL-STD-1587 is reference as it provides design guidance.”

Ludeman/Table 1: M&2nd to change from “800 F” to “325 to 800 F provided it is as least 100 F below the nitriding temperature.” Passed.

Editorial comments per SoR.

EC to issue AMEC 28D LSB.

12-11-2022 28D AMEC ballot closed with 3 “T” comments

12-23-2022 email to sponsor with questions regarding comment resolution.

266: Discussion of 28D ballot comments:

3.4.1.2/Ferry: Accept by adding “…equivalent to air fan cooling or slower.”

3.4.1.4/Quaglia: AMEC did not accept. In Table 1 for “Quenched and tempered” and for “age hardened” add “”</=” and for “age hardened” change from 100 °F to 50 °F.

3.4.1.4/Ludeman: Resolved by the changes noted in previous comment.

Sponsor to contact Quaglia to ask that he accept AMEC resolution.

EC to Issue 14D ballot for the above items.

2-11-2023 email from sponsor asking to issue 28D LSB.

2-13-2023 email to sponsor asking what exactly he wants on the ballot.

2-13-2023 draft LSB sent to sponsor for review.

3-13-2023 2nd 28D AMEC LSB closed with 4 “T” comments

267:

AMS2759/12 Automated Gaseous Nitrocarburizing Controlled by Potentials

Sponsor: J. Ludeman

Equations need to be corrected in 8.4.4 and 8.4.5. See email dated 2-22-2021 from Thermex Metal Treatment and from Conybear dated 3-1-2021.

1. Page 9, clause 8.4.4: the second reaction on the right (in the end of the line) is not water gas reaction. It should be mentioned that this reaction is heterogeneous water gas reaction.

   Reaction is $CO+H_2O=CO_2 + H_2$, $KC=pCO*pH_2/pH_2O$

2. Page 9, clause 8.4.5: the square root of PH2, in the formula for Kn, should be removed. $K_N=pNH_3/(pH_2)^{3/2}$

Make the corrections in the next revision.

10-24-2022 draft to sponsor

265: Sponsor will begin work on this after the January AMEC meeting.

266: Sponsor stated that a draft will be ready in the next 2 weeks.

3-14-2023 draft from sponsor

4-12-2023 28D AMEC ballot closes

267:

AMS2759/13 Gaseous Nitrocarburizing **Sponsor: J. Ludeman**

This slash is up for 5 year review and update.

9/29/2022 SAE draft

10-24-2022 draft to sponsor

265: Sponsor will begin work on this after the January AMEC meeting.

266: Continue

267:

AMS2745 Induction Hardening of Steel Parts Sponsor: D. Shuler

AMS2745A “Induction Hardening of Steel Parts” is up for 5-year review in committee E. Needs significant updating. Sponsor needed. Doug Shuler volunteered to sponsor.

EC to initiate NPR

12-1-2021 NPR’s created in E and AMEC

12-16-2021 SAE draft received

EC to edit

Question to AMEC: Should AMS2745 be made a slash sheet of AMS2759?

262: AMEC decided to keep AMS2745 separate, but with pointers to 2759 as needed.

EC to edit and send draft to sponsor

2-16-22 draft sent to sponsor

263: Continue

6-1-2022 Reminder email to sponsor

6-13-2022 2nd reminder sent – Response was that a team to working on the draft

264: Continue

10-24-2022 draft from sponsor

265: EC to ballot draft

28D AMEC ballot closed 11-29-2022 with 3 “T” comments

266: EC to bring this spec up in committee E for any users. AMEC has a number of concerns with how this AMS is written. If AMS2745 is used, it will need a complete revision. J. Koss to bring this up in the next Nadcap task group to ask if anyone is using AMS2745.

3-7-2023 SW2 email request sent to B & E.

3-15-2023 Asked committee E if anyone is using this spec. Honeywell specifies AMS2745 (Brian Streich email 3-15-2023). QuesTek Innovations specifies AMS2745 (Jeffrey Lin email 3-15-2023)

267:

AMS2769 Heat Treatment of Parts in a Vacuum

265: Discussion of question regarding surface contamination testing. Agreed that this needs attention but placed in parking lot for the next revision. To be coordinated with AMS2759/1 & /2. See presentation from R. Eybel.

ARP1341 Determining Decarburization and Carburization in Finished Parts of Carbon and Low-Alloy Steels Sponsor C. Reed

T. Morrison: I reached out to MTI's Technical Standards Committee leadership, and they feel this specification is definitely in need of a review.

J. Conybear: I looked over ARP1341. It was also looked at during the preparation of ARP1820 (chord method) and the 2759 work. I agree that, if maintained, it should be updated. There wasn't much earlier interest in a revision because it isn't referenced in the current AMS 2759 series, being mainly replaced by ARP1820. The method of testing (load used, depths) conflicts with the other methods, including ASTM E1077. My personal feeling is that this ARP should be retired, but I would be willing to make it consistent with our other documents if retained.

What does AMEC want to do with ARP1341?

266: C. Reed volunteered to sponsor a review. MTI to propose members who will assist.

EC to send draft to sponsor.

2-8-2023 NPR initiated in SW2. Approved.

2-9-2023 draft sent to sponsor

267:

Fe Tech – New Business:

TITANIUM TECHNOLOGY

AMEC21AE (AMS-H-81200) Heat Treatment of Titanium Raw Material Sponsor: Timco

It is up for 5 year review. Sarah is the sponsor. Lee to inquire with Ron Hahn for any details on updating. EC to talk to Ron Hahn about drafts.

11-9-2017 email to Hahn asking to change sponsor name.

3-15-2018 received draft from sponsor

248: EC to edit for balloting to AMEC.

5-28-2018 AMEC ballot closed.

249: There was a discussion of the comments against the balloted document for use by the sponsor in writing another draft for balloting to AMEC. EC to work with the sponsor for an editorial revision.

10-1-2018 draft from sponsor.

10-2-2018 draft sent back to sponsor with questions. Project is AMEC 18AC.

11-5-2018 28D AMEC ballot closes.

250: Reviewed T comments and AMEC made recommendations for next 28D ballot. EC to send marked up doc's to sponsor.

251: Ballot next draft for the April AMEC meeting.

252: Question was asked by sponsor: Should this doc have product property testing? AMEC decided that it should not. All material property testing is done within the AMS mat'l spec.

254: A new sponsor is needed. Chair will contact Mark Timko to ask him to sponsor.

255: Continue

2-10-2020 M. Timco accepted sponsorship of AMEC18AC

3-10-2020 drafts sent to Timco.

257: Continue

258: Continue

3-17-2021 draft from sponsor

3-19-2021 EC Editing the draft

3-26-2021 edited draft returned to sponsor for comment

259: Continue

6-11-2021 email to Timco asking for status. Response is that the draft will be sent to the EC next week.

260: Continue

10-6-2021 email to sponsor asking status

261: T. Soran from Sandvik gave a presentation on the annealing temperatures of CP Ti tubing and excessive grain size growth. He is requesting that the temperatures in AMS-H-81200 be lowered. It was suggested that data on the effect of lower temperatures on stress relief be developed to address that concern. The presentation is attached.

11-26-2021 2nd email

11-30-2021 received sponsor draft

12-1-2021 Changed designation to AMEC21AE

12-28-2021 28D AMEC ballot closed with 2 "T" comments

262: See SoR for changes. 28D redraft to AMEC.

3.2.3.2/Grzeskiewicz: Accept deleting "300 series". Wording is "…metal such as stainless steel or nickel base alloys." Reasoned that if Ni base alloys are allowed then any stainless steel grade with much lower levels of Ni should be acceptable. M&2nd. Passed.

3.3.3.2/Grzeskiewicz: Accept changing temperature from “1375 °F ±25 °F” to 1350-1400 °F. Reword as: “When water quenching is specified, Ti-6Al-4V, Ti-6-Al-4V ELI, and Ti-6Al-6VSn shall be given a second anneal at a set point selected from 1350 to 1400 °F (732 to 760 °C) ~~1375 °F ±25 °F (746 °C ±14 °C)~~ for 1-4 hours.” M&2nd. Passed.

3.3.4.3/Vernault: Sub paragraphs needed reorganization for instrumentation Types. M&2nd Passed.

3.3.4.1 should be Types D & D+

3.3.4.2 should be Types A & C

3.3.4.3 should be Type B.

3.3.5/Himmelblau: Do not accept comment. Delete paragraph 3.3.6 as it is already stated word for word in 3.2.1.2.

Sponsor to redraft for 2nd 28D AMEC ballot.

2-11-2022 email to sponsor asking status. Will have draft by March 7.

2-28-2022 reminder email sent to sponsor – Still planning on March 7.

3-6-2022 draft from sponsor

4-10-2022 28D AMEC redraft ballot closed with 2 “T” comments and numerous “I” comments

263: Sponsor to issue 28D redraft ballot to AMEC.

6-1-2022 email to sponsor asking when the next draft will be ready. Response: by July 8

7-12-2022 rough draft received.

264: Continue

9-20-2022 email to sponsor asking about go forward plan

10-24-2022 2nd 28D AMEC ballot closes

265: Discussed comments from the last ballot as follows:

Table 4 Note 1/Xu: Add “15 minutes for each quarter inch of thickness over 1 inch.”

2.5.1/Himmelblau: EC to ask sponsor about this.

2.5.1/Engelhard: So not accept “I” comment but reword for clarity regarding shielding by similar cross section.

2.5.1/Vernault: Sponsor to contact Vernault to discuss comment.

3.2.1.2.5.2/Himmelblau: Accept “I” comment with additional wording that inert gas to be compatible with Ti.

4.3.1.2/Grzeskiewicz: Sponsor to contact Grzeskiewicz to come up with resolution.

4.3.2.3/He: Accept “I” comment by adding “…or other method acceptable to the CEO.”

Title/He: Accept “I” comment by rewording title as “Heat Treatment of Titanium and Titanium Alloy Raw Material ~~Mill, Wrought and Cast Products~~

Next action is for the sponsor to resolve several comments. EC to then reballot to AMEC.

11-21-2022 email to sponsor asking about draft/balloting. Will have redraft by end of November.

12-20-2022 Did not receive a redraft

266: Continue

3-15-2023 email to sponsor asking for status

267:

Beta C Titanium Issues With AMS4957 and AMS4958 Sponsor S. Lombardo

Chuck Pepka with Renton Coil Spring would like to discuss the following items in relation to Ti 38-6-44. (Eybel email dated 11-9-2022)

1. Beta C per AMS4957 and 4958 are very hydrogen tolerant. Spec permits 300 ppm.
2. Parts are typically ages 950F to 1050F.
3. The heat specs conflict with this:
   a) AMS –H-81200 section 3.1.1/3.1.1.1 as it leads to AMS 2801 Table 6 and 6.4.1 restricting to 1000F and hydrogen pick up below the material spec.
   b) Particular para's in AMS 2801 sections are: 3.4.1, 3.4.1.1, 4.2.1, 4.2.3, 8.2.1, 8.4 and 8.5.

266: S. Lombardo will initiate a project to work this issue. Engelhard to assist.

267:

Titanium Technology – New Business

NICKEL & COBALT TECHNOLOGY

AMS2774 Heat Treatment Nickel Alloy and Cobalt Alloy Parts

263: Continue, Haynes is working on the soak times.

6-1-2022 email to L. Labig asking for hold times.

6-16-2022 response from Haynes.

Haynes 242 addition to Table 4

Solution: 2000 to 2100°F, 10-30 minutes, depending on section thickness, after whole workpiece is at temperature, RAC or WQ.

Stabilization: 1850°F/2h/AC

Precipitation: 1450°F/8h/AC

EC to issue 14D ballot

6-23-2022 email to Bader & Labig asking about Haynes 242 & 282.

6-27-2022 email from Bader stating that F is waiting for Haynes to complete the LSB's for 5915 & 5951.

No action is required within AMEC.

OTHER TECHNOLOGIES

AMS2750/1 Non-Metallic Pyrometry Specification Sponsor: A. Bassett

242: EC working on drafts from the task group.

248: Waiting for base to be completed but not published.

249: Doug Matson informed AMEC that this will wait till the next revision of AMS2750 is complete.

256: J. Koss reported that L. Loeks with Boeing will be the new sponsor.

8-25-2020 draft from 2016 ago sent to sponsor

8-26-2020 email from Loeks with go forward plan

257: Continue

258: Continue

2-18-2021 email from Adkins/Loeks kicking off the project/team.

2-19-2021 NPR initiated as AMEC21AC

2-5-2021 draft sent to Loeks

259: Proposed that this is to be a slash doc AMS2750/1. Team (12 members) will take most of this year to work thru issues before coming out with an initial draft for AMEC review.

6-11-2021 email to Loeks asking if this needs to be on the next agenda. Response is that they are making steady progress.

260: Continue

261: The EC K. Groeneveld brought up the issue of proposed classifications within AMS2750/1. It is being drafted that classifications that are not noted in the base document be added to the /1 for the SAT methods and for TUS's. The EC presented to the committee that this should not be allowed. The committee was in full agreement that classifications not noted in the base document should not be allowed for the same items in the slash document.

11-23-2021 email to Loeks regarding edits.

262: Continue

2-28-2022 email to Loeks asking if he will be at the April AMEC meeting to discuss the ballot – Responded that he will be at the B meeting. Might not be ready for the AMEC meeting.

3-1-2022 28D AMEC ballot closed with multiple "T" comments

263: Sponsor to write a 28D Redraft for balloting to AMEC

6-1-2022 email to sponsor asking when next ballot will be ready.

6-10-2022 email from sponsor stating that he hopes to respond after June 20.

264: On 7/20/22 Lance Loeks, who is sponsoring the AMS 2750/1 document, informed the AMEC committee that the team working on the document had decided to withdraw their request to the AMEC committee for further balloting and review. The sponsor stated that the subcommittee developing AMS 2750/1 felt that the quality management system methodologies to invoke risk reductions would significantly delay the release of the specification and result in significate production cost increases. The composites subcommittee from Nadcap has instead decided to petition the SAE P17 Committee Chair to begin working on a new standalone project for pyrometry & pressure measurement standard.

Moving forward, SAE Consultant Jeff Adkins is arranging a meeting with the sponsor, Chairs of AMEC and P17, the EC, and Ken Sabo to discuss the issue.

9-20-2022 email to the above asking about status?

265: L. Loeks is retiring at the end of November. A. Bassett has volunteered to become the new sponsor. I. Jenner, VFE and J. LaFollette GEO to become members of the subcommittee.

266: Continue

267:

AMS2750/2 Hot Isostatic Pressing Sponsor: C. Thomas

6-3-2021 Colin Thomas

The HIP user community is struggling with interpreting the pyrometry requirements for HIP equipment. AMS2750E and F are being used to provide guidance, but it is forcing a square peg into a round hole. When the draft HIP standard was being developed a robust description of pyrometry requirements was established (these may need to be improved based on the sensor requirements defined in AMS2750F). Could a standard be developed (AMS 2750/X) to address specific pyrometry requirements for HIP equipment?

260: C. Thomas presented the need for an AMS2750/2 document for HIP. M&2nd to approve. Passed. C. Thomas will be the sponsor. EC to create an NPR.

There is already an AMEC project working on pyrometry for composites which will be proposed as a slash spec to AMS2750.

This project will result in a revision to AMS2750 which requires committee B approval.

10-7-2021 AMEC NPR

10-15-2021 draft to sponsor

261: Chad Beamer of Quintus Technologies gave a presentation on the current status of Hot Isostatic Pressing. This presentation is included with the minutes. An initial draft has been prepared and viewed by team working on this project. The draft is projected to be balloted and to be closed before the spring 2022 AMEC meeting.

262: Sponsor agreed to have a draft ready to ballot such that the ballot closes prior to the spring AMEC meeting.

2-4-2022 email to Thomas regarding draft. Response is that draft will be ready by March 1.

263: Planning on balloting prior to the July meeting.

1-6-2022 Draft from sponsor

6-2-2022 NPR request

6-30-2022 28D ballot closed with 40 “T” comments

7-6-2022 email from sponsor stating that he will not be ready to discuss this item during the July AMEC meeting.

9-2-2022 sponsor email asking for time on the next agenda to discuss this.

264: Continue

265: Sponsor reviewed the most significant “T” comments and their dispositions. The team will work on the next redraft to be balloted to AMEC.

1-4-2022 28D AMEC redraft ballot closed with multiple “T” comments

2-23-2022 sponsor stated in an email that discussion of this ballot be put off till the spring meeting.

2-7-2023 sponsor email that draft will be ready by end of February

267:

AMEC19AB Review of Proposed Residual Stress Quality Specification/Standard Development Sponsor: D. Ball

261: Not discussed. Continue.

12-1-2021 EC to ballot to committee B

Waiting on resolution of “I” comments by sponsor

See committee B agenda for status

No AMEC action required

AMS2821 Salts, Heat-Treating (For Metals) Sponsor: S. MacKenzie

264: S. MacKenzie. would like to sponsor a revision of this specification. Chair approves. EC to initiate NPR to get a draft. R. Peters and M. Blazejewski to work with the sponsor.

7-26-2022 B NPR

8-8-2022 SAE draft

8-9-2022 draft to sponsor

265: Continue

266: Continue

267:

Nadcap, Monitoring J. Koss

265: J. Koss made the following statements:AC7102/4 ballot comment resolution. Section 7.1 First comment concerned use of test specimens instead of actual parts for testing. A comment was made to address this. Suggestion was to revise 7.2 to address specimen compliance and remove 7.3. Discussion on Racking Requirements Job Audit Sections 15.3 ;14.3.1; 16.3.

AC7102/8 ballot comment resolution. Clarification of Question 2.4.1 of Pyrometry Checklist (AC7102/8) being revised.

Jean-Luc Dupain made the presentation on use of Endothermic Atmosphere for Controlling Carbon Potential during heat treatment or carburizing.

Doug Shuler presented proposed changes being considered for the Rev H of AMS 2750 This included ten items which are clarifications and not conflicting with the existing requirements and a major change to aluminum alloy “radiation survey requirements”. Motion for a creating an AMS2750 List of Issues for “non-conflicting” items was made and seconded. The motion also addresses “maintaining the list of items” to keep abreast of changes to the pyrometry specification every two years.

The 2023 Auditor Conference will be combined into two days prior to the October Heat Treat Task Group Meetings. This was done in order to develop consistency with the training for the International and Domestic Nadcap Heat Treat Auditors.

266: J. Koss stated that AS7102S is currently in a 14D ballot. Next Nadcap meeting is the week of February 27.

267:

Misc. Tech – New Business

ADMINISTRATIVE BUSINESS

Meeting Locations

The following are proposed dates and locations for future meetings.

April 18-19, 2023: MTI to sponsor in Nashville, TN

July 2023: A. Bassett and E. Engelhard to sponsor, Bethlehem, PA

November 2023: Charleston, SC, Jeff Koss

January 2024: S. Radford to sponsor along the CA coast

April 2024:

July 2024: J. Ludeman offered to sponsor a meeting in Waterloo, IA

Roster Update

Membership, Mail, Telephone/Address Changes

Old Business

New Business

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