

CHEMICAL AND STRUCTURAL INVESTIGATION OF ALUMINUM ALLOYS "2024" FOR AEROSPACE

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Abstract: This paper presents the results of structural and compositional investigations on the aluminum alloys "2024" samples products for the aviation industry ALRO Slatina.

Key words: aluminum alloys "2024", structural and compositional investigation

1. INTRODUCTION

The major objective of the investigations is the assessment these alloys, with specific type (i.e. 2024) of aviation rules [SAE AMS 47N, NA 41100, NA 41101, NA 41110, NA 41 118, EN 515, Aluminium and Aluminium Alloys, Wrought Products, Temper designation], [1.1] In terms of chemical composition subsequent the objectives targeted among other is the assessment of microstructural and grain-hardening effects of natural or artificial aging applied by the manufacturer.

2. PROBLEM FORMULATION

The data presented in the paper are significant for the budget of information provided the manufacturer and users regarding on the effectiveness and reliability of these alloys. Wet chemical analysis, optical metallography investigations were performed in the specialized laboratories of Valahia Universities of Targoviste, Faculty of Materials Engineering, Mechatronics and Robotics. For each of the techniques mentioned the samples were prepared corresponding specific requirements. Preparation of the samples required mechanical cutting, mechanical polishing (grinding, polishing) and chemical attack if necessary. The data and their correlation with the mentioned properties will be specified alloy for each batch separately. Techniques in the place indicated by the analysis of the semi-represented is coding into (Fig.1).

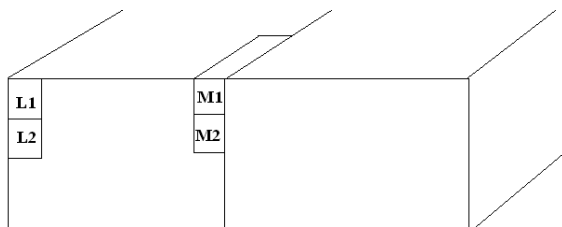


Fig.1.Coding Scheme of cutting samples (where L1, 2 and M1,2 specific the crop in the middle of that side bar).

3. EXPERIMENTAL RESULTS

For wet chemical analysis, the material transforms into powder and for spectrometric analysis, the sample is mechanically polished and finally, is processed on the metal turning lathe.. Mechanically polished and corroded samples required optical metallography. Spectrometric investigation was performed using a spectrometer Foundry-Master. Metallographic investigations were made with NEOPHT-22 metallographic microscope. microstructures were viewed on large areas of the specimen and were used for metallographic analysis reports only representative microstructures.

4. COMPOSITIONAL ANALYSIS OF THE PROBE DA -4084.

The sample under the expertise is a bar with rectangular section 50x50mm. Determination by the wet method was made all the elements specified in according of SR EN 515. Required chemical compositions, determined by the wet and the estimated by spectrophotometry are presented in Table 1. Spectrometry determined compositions are accompanied by uncertainty as U (95%), ie with (95%) confidence level.

In (Fig. 2) are shown schematically employment patterns of determined concentrations compared with concentrations required.

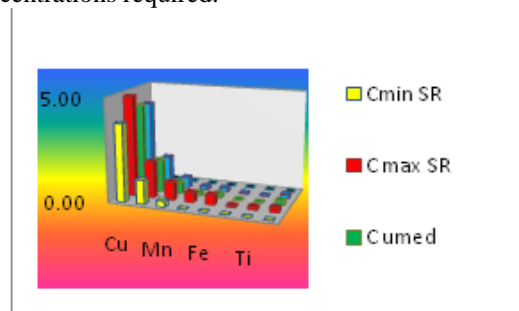


Fig. 2. Comparative representation of the specified concentrations of SR 1423 and dose levels.

5. METALLOGRAPHY ANALYSIS.

Thus, for emphasizing structure, grain, morphology and arrangement of compounds and inclusions in sample were taken according to the codes specified above. They

were polished mechanically and chemically corroded with Keller reagent.

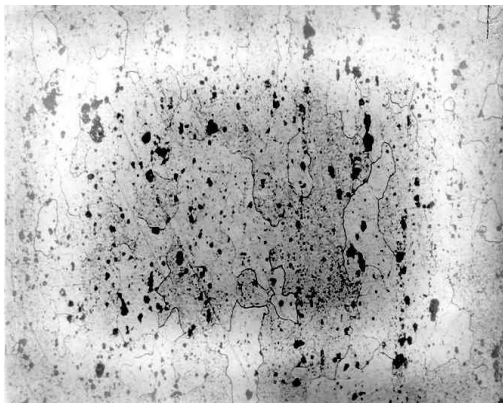
Type material: Aviation aluminum 2024 (AU4G1).
Treatment condition: T 4 (specified by the manufacturer).

Test objectives:

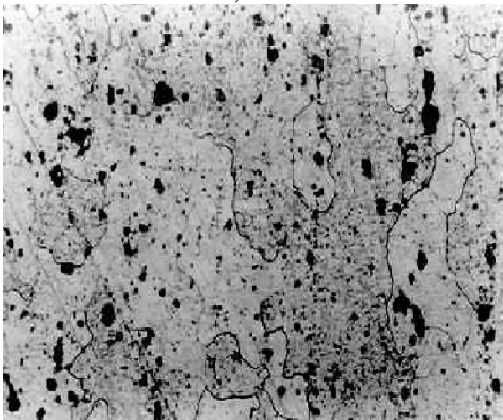
- 1) microstructure visualization,
 - 2) estimation of grain sizes. Method of standards: SR EN 24 499 and 04 503 AIR 9048 and MFA [1.2].
- This paper will present only one of the samples.

Micro test results of DA-4084 sample.

Code sample: 4084-03, L1 Section Position: cross.
Microstructure of sample is shown by the image (Fig. 3).



a) 250 x.



b) 400 x.

Fig. 3. Enlarged image of the microstructure of sample.

Microstructure of (Fig. 3) is characteristic for the cross section of the L1 edge. Compounds have no preferential orientation. According to MFA 04 503[1.3], corresponding to the index grain size VII.

4. CONCLUSION

- In terms of chemical analysis of composition for the sample investigated in this paper can be concluded that the chemical composition of the material is specific to a duraluminum.

- Microstructural arrangement of the images that cross section is composed string. The placement of compounds is so intragranular and intergranular.

REFERENCES

- [1] SAE AMS 47N, NA 41100, NA 41101, NA 41110, NA 41 118, EN 515, Aluminium and Aluminium Alloys, Wrought Products, Temper designation
- [2] SR EN 24 499 *Determinarea Metalografică a microstructurii.*
- [3] MFA 04 503