

1-16(b)

M.242

12th April, 1962.

Mr. G.H. Foster,
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S.N.E.C.M.A.,
70 Boulevard Kellerman,
PARIS 13,
FRANCE.

Magnesium alloy castings in G.A.9. material.

Dear Sir,

Receipt is acknowledged of your letter P.483 on the subject of magnesium alloy castings in G.A.9. material and we have noted the various comments in respect to heat treatment and the proposal for substitution of G.A. 9. with Z.R.E.1.

From the points covered in your letter we would like to make the following comments.

(a) Gas atmosphere.

It is noted that the atmosphere referred to is CO₂ and we feel that this could possibly be a typographical or translation error, as the atmosphere normally applied to magnesium is SO₂.

The gas atmosphere is used primarily to reduce oxidation, which may lead to local weakening of the metal structure (i.e. oxidation of the Mg - Al constituent) and consequent greater fire risk during heat treatment.

While we cannot comment greatly on the use of CO₂ it is thought that this could possibly have an adverse effect on the intent of atmosphere during heat treatment.

We would be pleased if you could confirm whether the reported CO₂ atmosphere is correct.

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(b) Material.

We do not feel that we would have any trouble in the treatment of G.A.9. castings to obtain the minimum properties required by the specification.

As you are aware, we have, for some years, produced castings to our specification CA.292 which is in fact Magnesium Elektron alloy A.8. solution treated, and we list hereunder the chemical analysis and mechanical property requirements in comparison with those quoted in DTM.415-61 for G.A.9 M&T condition.

<u>CA.292</u>		<u>G.A.9</u>
7.0-8.5%	Aluminium	7.7-8.9%
0.5% Max.	Manganese	0.10-0.60%
1.5% Max.	Zinc	0.4-0.8%
1.0% Max.	Impurities including	
	Si.Cu.Ni.	0.20% Max.
	Silicon	0.20% Max.
	Iron	0.12% Max.
	Copper	
Remainder	Magnesium	Remainder
30,000 p.s.i. (21 Kg/mm ₂ approx.)	Tensile strength (Min.)	14 Kg/mm ₂ (19,913 p.s.i.)
11,000 p.s.i. (7.8 Kg/mm ₂ approx.)	0.2% Proof stress (Min.)	-
	Elongation (Fatigue)	4%
8.6 Kg/mm ₂ (12,232 p.s.i.)	Unnotched	5 Kg/mm ₂ (7,112 p.s.i.)
6.3 Kg/mm ₂ (8961 p.s.i.)	Notched	4 Kg/mm ₂ (5689 p.s.i.)
385°C 8 hours	Heat treatment	390°C 7 hours.
420°C 14 hours		400°C 10 hours.
air cool		410°C 7 hours.

As a comparison, our requirements covered by specification CA.636 (Z.R.B.1.) are, Tensile strength 14 Kg/mm₂ Elongation 2%.

From the above, it will be seen that material to CA.292 is very similar in chemical composition to G.A.9. and in fact can be made to conform with the slightly more restricted range of Aluminium called for in G.A.9.

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We do not have any problem in meeting the much higher mechanical property requirements of CA.292 and consequently feel that we can adequately cope with the requirements of G.A.9. called for in DTM.115-61.

It is felt therefore that the concession to use Z.R.E.1. in lieu of G.A.9. for the castings concerned will not be necessary.

Yours faithfully,

H.H. KNIGHT
Manager

Per:


C. BELLWARD


EH/IG