

APICAL INDUSTRIES, INC.

REPORT NUMBER AI332-3

FLOAT BUOYANCY SUBSTANTIATION REPORT

APICAL INFLATABLE EMERGENCY

HELICOPTER FLOAT KIT

EUROCOPTER AS332C, L and L1

FAA PROJECT NUMBER ST8539LA-R

PREPARED BY Mike Lonnecker 10/31/00
Date

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PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. i
DATE 10/31/00			
CHECKED BY	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729 20730	REPORT NO. AI332-3
DATE			

Log of Revisions

<u>Date</u>	<u>Rev.</u>	<u>Page No.</u>	<u>Description</u>	<u>Approval</u>
11/8/00	N/C	All	Initial Release	D.V. Hitzfield
04/02/02	A			D.Parrott
		4.1	Correct Typo to 72382.25 and 92.9 in formula	
		5.1	Add Data	

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PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. ii
DATE 10/31/00			
CHECKED BY	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729 20730	REPORT NO. AI332-3
DATE			

Table of Contents

	<u>Page</u>
Log of Revisions	i
Table of Contents	ii
References	iii
1.0 Scope	1.1
2.0 Introduction	2.1
3.0 FAR Part/Subpart Method of Showing Compliance	
3.1 29.751 Main Float Buoyancy	3.1
3.2 29.753 Main Float Design	3.1
3.3 29.801 Ditching	3.1
3.4 29.1301 Function and Installation	3.2
4.0 Buoyancy Calculation	
4.1 Buoyancy of Nose Float 20729	4.1
4.2 Buoyancy of Main Float 20730	4.2
4.3 Buoyancy Summary	4.3
4.4 Buoyancy of Float With Damaged Compartment	4.4
5.0 Buoyancy Verification	
5.1 Comparison of Floats	5.1
5.2 Conclusions	5.2

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. iii
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20716	REPORT NO. AI332-3
CHECKED BY		20717	
DATE			

References

1. Apical Dwg 20729 & 20730
2. Apical Document II332-1 Installation Instructions
3. Apical Document ICA332-1 Instructions for Continued Airworthiness
4. Apical document AI332-2 Strength, Deformation and Shock Absorption Limit Analysis Plan and Report
4. FAR Part 29
5. Reeves International Specification TX-93012 Certificate of Compliance
6. MIL-HDBK-5F

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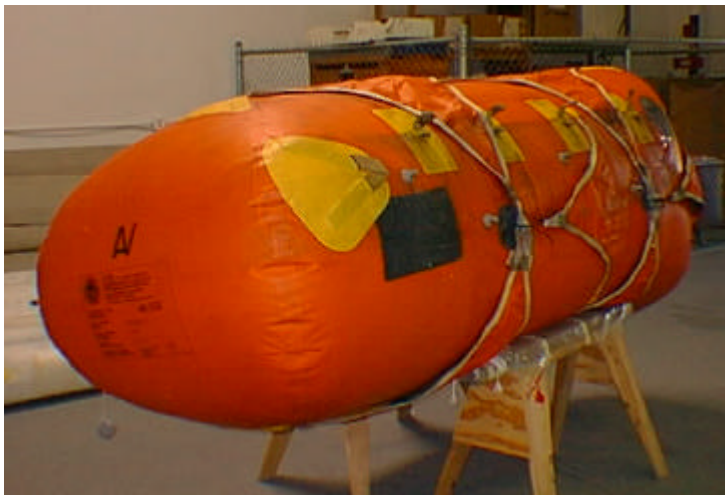
PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 1.1
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729	REPORT NO. AI332-3
CHECKED BY		20730	
DATE			

1.0 Scope

The purpose of supplying this report is to obtain an FAA Supplemental Type Certificate for Apical Industries, Inc.'s (Apical) replacement inflatable emergency helicopter floats. The Apical replacement inflatable emergency floats, Nose Float P/N 20729 and Main Floats P/N 20730, are direct replacements for Aerazur's Fwd Float P/N 158820 and Aft Floats P/N 158565 and 158566 for the Eurocopter AS332. The Apical replacement emergency floats are dimensionally and functionally identical to the Aerazur floats.

The AS332C, L and L1 have a current maximum gross weight of 18960 pounds.

Take off after executing an emergency water landing is not permitted.



Main Float (Right Hand Looking Outboard)



Nose Float (Only Right Hand Half Shown)

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 2.1
DATE 10/31/00			
CHECKED BY	SUBJECT	REF. DWG. NO.	REPORT NO.
DATE	FLOAT BUOYANCY SUBSTANTIATION REPORT	20729 20730	AI332-3

2.0 Introduction

Apical Industries, Incorporated (Apical) currently holds STC's for helicopter inflatable emergency float installations. The inflatable emergency floats are for installation on the Eurocopter AS332. These floats are similar in construction and materials to the other floats for which Apical has obtained certification.

SEE NON-DISCLOSURE NOTICE ON COVER PAGE

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 3.1
DATE 10/31/00			
CHECKED BY	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729 20730	REPORT NO. AI332-3
DATE			

3.0 Method of Showing Compliance

- | | | | |
|-----|--------|---------------------|---|
| 3.1 | 29.751 | Main Float Buoyancy | <ul style="list-style-type: none"> (a) The Apical emergency float buoyancy is shown to be 0.92 times the maximum weights. The Apical float volumes, and thus the buoyancy, are exactly equal to the Aerazur floats. See paragraph 4.1 and 4.2. (b) Despite the loss of buoyancy caused by one flooded compartment, there is adequate reserve buoyancy to minimize the probability of capsizing. Each float is divided into five separate compartments. Again, this was demonstrated during the original helicopter type certification. |
| 3.2 | 29.753 | Main Float Design | <ul style="list-style-type: none"> (a) (1) The maximum pressure differential that might be developed at the maximum operating altitude is with a relief valve installed in each chamber of the float. These valves open at 5.0 psi to relieve internal pressure. (2) See Report AI332-2. |
| 3.3 | 29.801 | Ditching | <ul style="list-style-type: none"> (a) (c) Certification with ditching provisions is not requested. (b) An emergency water landing will result in the bottom of the doors being above the water line. This was demonstrated during the original type certification. (d) The emergency flotation devices with flotation from watertight compartments in the fuselage of the helicopter is designed with over 100% buoyancy in accordance with FAR 29.751. Equal buoyancy side to side is provided. Equal buoyancy forward to aft of the normal vertical CG is provided. |

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PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 3.2
DATE 10/31/00			
CHECKED BY	SUBJECT	REF. DWG. NO.	REPORT NO.
DATE	FLOAT BUOYANCY SUBSTANTIATION REPORT	20729 20730	AI332-3

3.0 Method of Showing Compliance (Continued)

3.3 29.801 Ditching (Continued)

(e) Demonstrated at the original type certification.

3.4 29.1301 Function and Installation

(a) thru (d) The Apical floats are the same in materials and construction as previously certified floats. They have the same functional requirements. Thus, the effect of temperature on the performance of the floats is expected to be the same.

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 4.1
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729	REPORT NO. AI332-3
CHECKED BY		20730	
DATE			

4.0 Buoyancy Calculation

4.1 Buoyancy of nose float P/N 20729

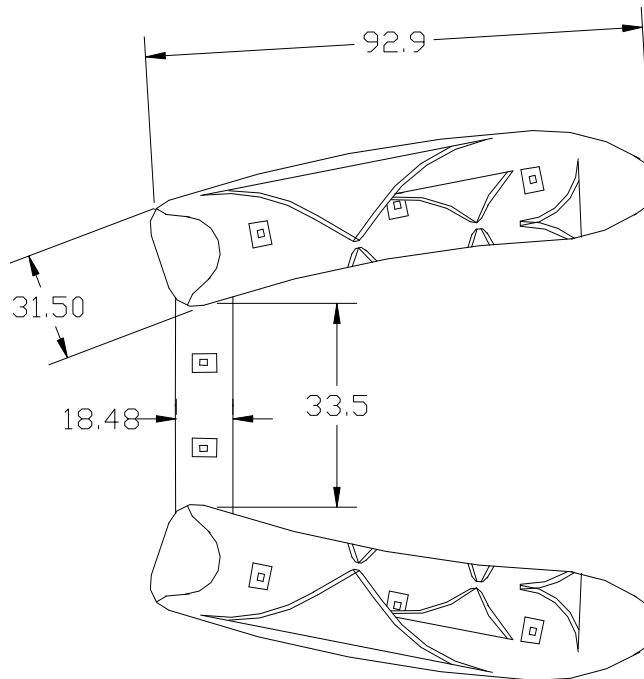


FIG.1 Nose Float (Top View)

The nose float consists of two large cylindrical tubes interconnected by a smaller tube at their leading edge.

The volume of the Aerazure Nose Float is 88.99 Ft³ per the Aerazure Maintenance Manual No. 25.69.18. The Apical floats are exact replacements with identical dimensions; therefore the volume of the Apical Nose Float P/N 20729 is 88.99 Ft³.

Volume of large tube.

$$V = p \times R^2 \times L$$

$$V = p \times 248 \times 92.9$$

$$V = \frac{72382.25 \text{ in}^3}{1728} = 41.89 \text{ Ft}^3$$

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 4.2
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729	REPORT NO. AI332-3
CHECKED BY		20730	
DATE			

4.0 Buoyancy Calculation (Continued)

4.1 Buoyancy of nose float P/N 20729 (Continued)

Volume of small tube

$$V = \pi \times R^2 \times L$$

$$V = \pi \times 85.5 \times 33.5$$

$$V = \frac{8998.6 \text{ in}^3}{1728} = 5.21 \text{ Ft}^3$$

Total volume of nose float

$$V = 41.89 \times 2 + 5.21 = 88.90 \text{ Ft}^3$$

4.2 Buoyancy of main float P/N 20730

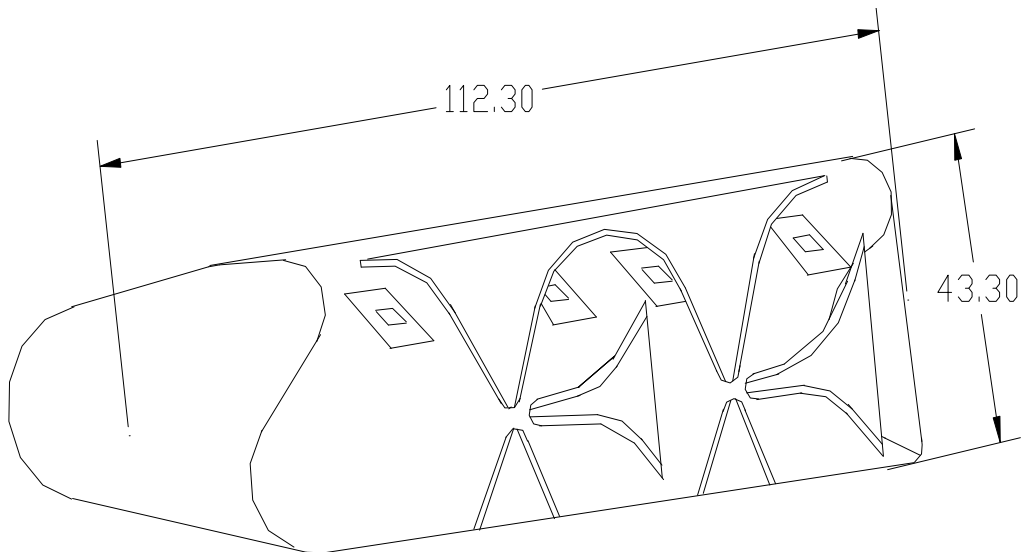


FIG. 2 Main Float With Attachments (Right Hand Looking Outboard)

The volume of the Aerazur Main Float is 95.7 Ft³ per the Aerazur Maintenance Manual No. 25.69.18. The Apical floats are exact replacements with identical dimensions; therefore the volume of the Apical Main Float P/N 20730 is 95.70 Ft³.

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 4.3
DATE 10/31/00			
CHECKED BY	SUBJECT	REF. DWG. NO.	REPORT NO.
DATE	FLOAT BUOYANCY SUBSTANTIATION REPORT	20729 20730	AI332-3

4.0 Buoyancy Calculation (Continued)

4.2 Buoyancy of main float P/N 20730 (Continued)

$$V = p \times R^2 \times L$$

$$V = p \times 468.7 \times 112.3$$

$$V = \frac{165363.4 \text{ in}^3}{1728} = 95.7 \text{ Ft}^3$$

4.3 Buoyancy Summary

Total Float Volume for Nose Float 88.99 Ft³

Total Float Volume for 2 Main Floats 191.40 Ft³

Total Volume 280.39 Ft³

Total Buoyancy = Float volume Ft³ x Wt of Water Lbs/ Ft³

Total Buoyancy = 280.39 Ft³ x 62.4 Lbs/ Ft³ = 17496 Lbs

Gross Take-Off Weight 18960 Lbs

 Buoyancy 0.92
Gross Take-Off Weight

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 4.4
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729	REPORT NO. AI332-3
CHECKED BY		20730	
DATE			

4.0 Buoyancy Calculation (Continued)

4.4 Buoyancy of the Float with a Damaged Compartment

The Apical replacement emergency floats are exact replacements for the Aerazur previously certified emergency floats including compartment size and location. The Apical floats will therefore provide the same stability as the previously certified floats with or without a damaged compartment.

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 5.1
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729	REPORT NO. AI332-3
CHECKED BY		20730	
DATE			

5.0 Buoyancy Verification

5.1 Comparison of Floats

Verification that the Apical replacement floats are of the same buoyancy as the existing floats will be accomplished by a direct comparison of the floats dimensions. The floats for the AS332 are made up of multiple cylinders and therefore only the length and diameters need to be compared to determine if the buoyancies are equal. Weights, mounting dimensions and inlet valve locations will also be measured to also insure complete interchangeability of the Apical and Eurocopter AS332 approved floats. FAA authorized DMIR Mr. Manny Gonzalez will perform and compare the measurements of the floats and the drawing package during the conformity inspection called for in Apical document PSCP332-1.

Apical Replacement Float

Aerazur AS332 FAA Approved Float

Fwd

Fwd

Length 92.90

Length 92.25

Dia 31.50

Dia 30.50

Length 33.50

Length 33.50

Dia 18.48

Dia 17.50

Aft

Aft

Length 112.30

Length 114.00

Dia 43.30

Dia 43.13

PREPARED BY ML	APICAL INDUSTRIES, INC. OCEANSIDE, CA		PAGE NO. 5.2
DATE 10/31/00	SUBJECT FLOAT BUOYANCY SUBSTANTIATION REPORT	REF. DWG. NO. 20729 20730	REPORT NO. AI332-3
CHECKED BY DATE			

Weight

Fwd/Mid 27.56

Fwd/Mid 27.58

Aft 27.60

Aft 27.50

5.2 Conclusions

a. _____