

# Specification/SOC

## 1.0 Introduction

ADE needs to fabricate following three aero grade test article (assemblies) in assembled condition.

- a. Airframe fore-body (nose cone with stiffener) (Quantity -2 Nos.)
- b. Air intake (Quantity -2 Nos.)
- c. Airframe aft-body (tail cone) (Quantity -2 Nos.)

To fabricate these assemblies, ADE will provide the 3D model and drawing of each component to development partner (after release of purchase order and signing of NDA). Following paragraphs will provide material, dimension and weight of each components for the above 3 assemblies.

### a. Airframe fore-body (nose cone with stiffener)

An Airframe nose cone is required as per following details

Sl. No	Parameters	Specification
Nose top skin		
1	Length X height X width (mm)	2577 x 743 x 3586
2	Material	CFRP
3	Weight	31 Kg
Nose bottom skin		
1	Length X Height X Width (mm)	2860 x 798x 3897
2	Material	CFRP
3	Weight	35 Kg
Bulkhead-1		
1	Length X Height X Width (mm)	530 x 173 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Cross bulkhead-1 PS		
1	Length X Height X Width (mm)	510 x 419 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Cross bulkhead-1 SB		
1	Length X Height X Width (mm)	510 x 424 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Bulkhead-1.1 PS		
1	Length X Height X Width (mm)	424 x 533 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Bulkhead-1.1 SB		
1	Length X Height X Width (mm)	424 x 533 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Bulkhead at 40 mm forward from EOTS		
1	Length X Height X Width (mm)	592 x 637 x 50
2	Material	AL Alloy 2014-T6
3	Weight	3 Kg

Bulkhead-1.2 PS		
1	Length X Height X Width (mm)	546 x 232 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Bulkhead-1.2 SB		
1	Length X Height X Width (mm)	546 x 232 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Bulkhead-2		
1	Length X Height X Width (mm)	1690 x 801 x 50
2	Material	AL Alloy 2014-T6
3	Weight	9 Kg
Nose le shearwall PS		
1	Length X Height X Width (mm)	2481 x 678 x 50
2	Material	AL Alloy 2014-T6
3	Weight	11 Kg
Nose le shearwall SB		
1	Length X Height X Width (mm)	2481 x 678 x 50
2	Material	AL Alloy 2014-T6
3	Weight	11 Kg
Nose shearwall PS		
1	Length X Height X Width (mm)	907 x 660 x 50
2	Material	AL Alloy 2014-T6
3	Weight	5 Kg
Nose shearwall SB		
1	Length X Height X Width (mm)	907 x 660 x 50
2	Material	AL Alloy 2014-T6
3	Weight	5 Kg
NLG shearwall PS		
1	Length X Height X Width (mm)	907 x 858 x 50
2	Material	AL Alloy 2014-T6
3	Weight	8 Kg
NLG shearwall SB		
1	Length X Height X Width (mm)	907 x 858 x 50
2	Material	AL Alloy 2014-T6
3	Weight	8 Kg
LB Antena MTG BKT PS		
1	Length X Height X Width (mm)	453 x 937 x 50
2	Material	CFRP
3	Weight	1.5 Kg
LB Antena MTG BKT SB		
1	Length X Height X Width (mm)	453 x 937 x 50
2	Material	CFRP
3	Weight	1.5 Kg
Nose mid rib		
1	Length X Height X Width (mm)	459 x 221 x 50
2	Material	CFRP
3	Weight	0.523 Kg
Bulkhead - 3		

1	Length X Height X Width (mm)	3926 x 1347 x 60
2	Material	AL Alloy 2014-T6
3	Weight	25 Kg
Nose rib – 4 PS		
1	Length X Height X Width (mm)	360 x 212 x 50
2	Material	CFRP
3	Weight	0.5 Kg
Nose rib – 4 SB		
1	Length X Height X Width (mm)	360 x 212 x 50
2	Material	CFRP
3	Weight	0.5 Kg

#### a. Air intake

A serpentine intake with bulkhead is required as per following details

Sl. No	Parameters	Specification
Annular ring at Air intake (forward)		
1	Length X Height X Width (mm)	1945 x 499 x 5
2	Material	AL Alloy 2014-T6
3	Weight	7 Kg
Air Intake Portion-1		
1	Length X Height X Width (mm)	631 x 822 x 1947
2	Material	CFRP
3	Weight	44 Kg
Air Intake Portion-2		
1	Length X Height X Width (mm)	1111 x 799 x 1714
2	Material	CFRP
3	Weight	48 Kg
Air Intake Portion-3		
1	Length X Height X Width (mm)	978 x 929 x 1207
2	Material	CFRP
3	Weight	21 Kg
Air Intake Portion-4		
1	Length X Height X Width (mm)	978 x 929 x 1207
2	Material	CFRP
3	Weight	22 Kg
Annular ring at rear portion		
1	OD, ID & thickness	824, 788 & 2
2	Material	AL Alloy 2014-T6
3	Weight	7 Kg
K Sealing		
1	OD, ID & thickness	824, 745 & 30
2	Material	Nitrile rubber
3	Weight	6.5 Kg
Total 7 bulkheads are required along with intake , following is the details of each bulkhead		
Bulkhead- 4.1		
1	Length X height X width(mm)	1898 x 1504 x 60
2	Material	AL Alloy 2014-T6
3	Weight	18 Kg
Bulkhead- 5 (Truncated)		
1	Length X Height X Width (mm)	1387 x 1686 x 60

2	Material	AL Alloy 2014-T6
3	Weight	37 Kg
Bulkhead- 6		
1	Length X Height X Width (mm)	1356 x 1727 x 60
2	Material	AL Alloy 2014-T6
3	Weight	16 Kg
Bulkhead- 7.1(top)		
1	Length X Height X Width (mm)	1356 x 1691 x 60
2	Material	AL Alloy 2014-T6
3	Weight	11 Kg
Bulkhead- 7.1 (Bottom)		
1	Length X height X width(mm)	1048 x 742 x 60
2	Material	AL Alloy 2014-T6
3	Weight	5.4 Kg
Air intake support fwd. Bulkhead		
1	Length X Height X Width (mm)	1850 x 722 x 50
2	Material	AL Alloy 2014-T6
3	Weight	11 Kg
Air intake support Bulkhead NLG END SB		
1	Length X Height X Width (mm)	102 x 428 x 50
2	Material	AL Alloy 2014-T6
3	Weight	0.5 Kg
Air intake support Bulkhead NLG END PS		
1	Length X Height X Width (mm)	102 x 428 x 50
2	Material	AL Alloy 2014-T6
3	Weight	0.5 Kg
Air intake support Bulkhead NLG END (C)		
1	Length X Height X Width (mm)	1610 x 543 x 50
2	Material	AL Alloy 2014-T6
3	Weight	5 Kg
Air intake support Bulkhead NLG END SB		
1	Length X Height X Width (mm)	102 x 286 x 50
2	Material	AL Alloy 2014-T6
3	Weight	0.33 Kg
Air intake support Bulkhead NLG END PS		
1	Length X Height X Width (mm)	102 x 286 x 50
2	Material	AL Alloy 2014-T6
3	Weight	0.33 Kg

**b. Airframe aft-body (tail cone).**

An Airframe tail cone is required as per following details

Tail top skin (Truncated)		
1	Length X height X width(mm)	1368 x 474 x 1944
2	Material	SS 321
3	Weight	39 Kg
Tail bottom skin (Truncated)		
1	Length X Height X Width (mm)	1963 x 652 x 1944
2	Material	SS 321
3	Weight	59 Kg
Bulkhead- 10 (top)		

1	Length X Height X Width (mm)	1380 x 932 x 60
2	Material	AL Alloy 2014-T6
3	Weight	4.5 Kg
Bulkhead- 10 (bottom)		
1	Length X Height X Width (mm)	1150 x 592 x 60
2	Material	AL Alloy 2014-T6
3	Weight	3 Kg
Bulkhead- 11 (top) (Truncated)		
1	Length X Height X Width (mm)	1634 x 640 x 50
2	Material	AL Alloy 2014-T6
3	Weight	3 Kg
Bulkhead- 11 (bottom)		
1	Length X Height X Width (mm)	1430 x 541 x 50
2	Material	AL Alloy 2014-T6
3	Weight	3.3 Kg
Tail shear wall -1 SB		
1	Length X Height X Width (mm)	591 x 751 x 50
2	Material	AL Alloy 2014-T6
3	Weight	3 Kg
Tail shear wall -1 PS		
1	Length X Height X Width (mm)	591 x 751 x 50
2	Material	AL Alloy 2014-T6
3	Weight	3 Kg
Tail rib -1 SB		
1	Length X Height X Width (mm)	708 x 462 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1.4 Kg
Tail rib -1 PS		
1	Length X Height X Width (mm)	708 x 462 x 50
2	Material	AL Alloy 2014-T6
3	Weight	1.4 Kg
Nozzle aft deck flange bulkhead		
1	Length X Height X Width (mm)	1900 x 379 x 50
2	Material	AL Alloy 2014-T6
3	Weight	4.3 Kg
Tail nozzle bulkhead		
1	Length X Height X Width (mm)	696 x 161 x 50
2	Material	AL Alloy 2014-T6
3	Weight	0.8 Kg
Tail nozzle longeron 2 SB		
1	Length X Height X Width (mm)	594 x 302 x 60
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Tail nozzle longeron 2 PS		
1	Length X Height X Width (mm)	594 x 302 x 60
2	Material	AL Alloy 2014-T6
3	Weight	1 Kg
Tail nozzle longeron 1 SB		
1	Length X Height X Width (mm)	359 x 213 x 60
2	Material	AL Alloy 2014-T6

3	Weight	0.48 Kg
Tail nozzle longeron 1 PS		
1	Length X Height X Width (mm)	359 x 213 x 60
2	Material	AL Alloy 2014-T6
3	Weight	0.48 Kg
Nozzle aft deck		
1	Length X Height X Width (mm)	855 x 183 x 1581
2	Material	Inconal (GTM-SU-718)
3	Weight	36 Kg
Nozzle and aft-deck support with airframe (spherical joint with linkage)		

## 2.0 Scope of work for the vendor

### Following is the scope of work for the vendor

1. Prior to submitting the quotation, vendor has to visit ADE to understand the requirement in detail.
2. As per ADE requirement Vendor has to fabricate 2 set of all the three components as per approved drawing. ADE will provide the 3D model/ drawing of the component after release of purchase order.
3. Vendor has to procure raw material for fabrication
4. Vendor has to produce following
  - a. Process plan for the fabrication of each test article
  - b. QAP and inspection plan as per aerospace standard
  - c. Inspection report
  - d. Raw material test certificate as per NABL standards and QAP plan
5. Vendor has to produce inspection report of component level prior to start the assembly. Once the components are cleared then only assembly may be started
6. Only some part of the airframe is being fabricated and hence vendor has to do following to ensure structure integrity of the all the component without any additional cost.
  - a) Structure analysis of tail cone section along with nozzle and aft-deck to check the structure integrity of tail cone section. ADE will provide the CAD model and load cases for the analysis. Five load cases should be studied. Necessary modification (if required) in the tail cone section will be implemented by vendor to meet the structure integrity of the tail-cone.
  - b) Vendor has to design fabricate and assemble a flexible joint between CFRP and metal portion of the intake to assemble in test bed for testing. This joint should take care of 5 mm axial expansion.
  - c) If required vendor has to fabricate the components as per revised drawing if drawings are modified due change in the design. 10% of the total cost for the modification should be bare by vendor.

## 3.0 Acceptance criteria

1. All the components have to fabricate as per process, QAP plan and approved drawing. Any deviation from process plan and approved drawing will not be accepted.
2. Vendor has to produce final inspection reports as per drawings and approved QAP plan. All the components and assemblies will be inspected at vendor place by ADE team.

3. Post-delivery inspection will be carried out in ADE in presence of development partner.

## **4.0 Deliverable**

Following will be deliverables

- d. Airframe nose cone assembly (Quantity -2 Nos).
- e. Serpentine air intake assembly with bulkhead (Quantity -2 Nos).
- f. Airframe tail cone assembly (Quantity -2 Nos).

The vendor has to execute the work as per various milestones. The deliverables for each milestone is given in Appendix-A

## **5.0 Review mechanism**

ADE will constitute a committee to review the work progress. The reviews will be conducted in various milestones of project as mentioned in the Annexure-A

## **6.0 Payment terms**

Payment will be made in two parts against the supply of each set of items as mentioned in the Appendix-A

## **7.0 Scope of work of ADE**

1. Providing all part, sub-assembly, assembly models load cases and drawings to vendor.
2. Approval of process plan, QAP and inspection report
3. Component level inspection at vendor place
4. Pre and post-delivery inspection
5. Review of work as mentioned in Appendix-A