**FORM - 100**

**FLIGHT CLEARANCE CERTIFICATE FOR AIR SYSTEM**

In accordance with IMTAR – 21, Subpart P, 21.P.10

**Note : Form 100 is a generic format for FCC. Applicable information from Form 100A & Form 100B for Aircraft and Helicopters respectively may also be supplemented to Form 100. FCC form is meant to serve as guidelines and can be adapted to suit the nature of the air system, emphasizing on the necessary information, that affects safety of flying.**

**FLIGHT CLEARANCE CERTIFICATE FOR**

**DEVELOPMENT TRIALS**

**Air System type : Engine Type :**

This is to certify that is cleared for development flight trials within the conditions of release and limitations specified in the following pages of this document.

This certificate will be periodically amended depending on the changes to the standard of preparation of the Air System and flight test data obtained.

This certificate does not constitute any authority to fly unless accompanied by an individual or block Flight Program Clearance Memo (FPCM), as applicable, duly coordinated by CEMILAC & Airworthiness Group of Design Agency and a current certificate of safety for flight form 1090 coordinated by RDAQA ( ).

Head of Design ( )

Design agency CEMILAC

Date : Date :

**REF: CEMILAC/FCC/ ISSUE: NIL**

**DATED:**

**Date: August 2023**

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The incorporation of each amendment to this document is to be certified by entering below the amendment number, date and signature of the person responsible.

|  |  |  |  |
| --- | --- | --- | --- |
| **Amendment & Date** | **Document Number** | **Signature** | **Date** |
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1. **INTRODUCTION**

 The systems are described briefly in the following paragraphs.

* 1. **OBJECTIVE**

The objective of the flight trials are:

1. To assess the performance / behavior of the Air System and its systems, compare the same with analysis /

Tests carried out.

1. To validate the aero-data.
2. To calibrate aero-data, systems and flow direction sensors.
3. Others
4. **STANDARD OF PREPARATION (SOP) OF AIR SYSTEM**

The SOP of the Air System includes Equipment SOP and Drawing Applicability

* 1. **EQUIPMENT SOP**

The Equipment Standard of Preparation for flight trials is given in document titled

Issue: dated: , which is kept current by updating whenever any changes occurs

* 1. **DRAWING APPLICABILITY**

The drawing applicability for is given in Ref. No. , Issue: Nil, Amd: dated

 which is kept current by updating at regular intervals.

1. **BASIS FOR CLEARANCE**

The basis for clearance of includes LRU level and System Level clearances and certificate of designs.

* 1. **LRU LEVEL**

The clearances of all LRUs are available in the document Issue: Nil, Amd: Nil dated:

 which lists out flight clearances of all LRUs by various RCMAs.

* 1. **SYSTEM LEVEL**

Each system clearance includes technical specification, design reports, failure modes and effects analyses, test schedules and associated reports, Air System level test schedules and test reports.

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl.****No.** | **System** | **No. of Reports** | **Certificate of Design Documents Reference** |
| 1 | Aerodynamics Configuration |  |  |
| 2 | Structures & Analysis |  |  |
| 3 | Environmental Control System |  |  |
| 4 | Life Support System |  |  |
| 5 | Hydraulics |  |  |
| 6 | Landing Gear& Brake System |  |  |
| 7 | Escape System |  |  |
| 8 | Flight Control System |  |  |
| 9 | Power plant & Fuel System |  |  |

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|  |  |  |  |
| --- | --- | --- | --- |
| 10 | Electrical Power Generation System |  |  |
| 11 | Lighting System |  |  |
| 12 | Avionics system (Including , Navigation & Communication) |  |  |
| 13 | Engine |  |  |

1. **OPERATIONAL LIMITATIONS**
	1. **AIR FIELD OPERATIONS**
		1. **Taxying Limitations:**
			* Speed not more than xx knot if canopy is partially open.
		2. **Emergency arrester system**
			* Cleared for emergency entry into arrester barrier system at speeds up to

xx knot

Ground Speed

* 1. **TAXY, TAKE-OFF AND LANDING LIMITATIONS – TYRES, WHEEL BRAKES**
		1. **The tyres are cleared for rolling at the following ground speeds**

|  |
| --- |
| Tyre ground speed limits (Knot) |
| Main | Nose |
| xxx | xxx |

* + 1. **Brake application speed limit:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Air System****Configuration** | **Mass (kg)** | **Condition** | **Speed in TAS (knot)** |
| **Clean Configuration** | **xxx** | Normal (xx MJ per Air System) | xx |
| Emergency / RTO (xx MJ per Air System) | xx |

* 1. **TAXY, TAKE-OFF AND LANDING LIMITATIONS - AIR SYSTEM WEIGHT AND CENTRE OF GRAVITY LIMITS**
		1. **Take-off weight limitations :**
			+ Maximum take-off weight is xxx Kg.

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* + 1. **Landing weight Vs Sink rate :**

|  |  |  |
| --- | --- | --- |
| **Air System Configuration** | **Max Landing Mass (Kg)** | **Max Sink rate (m/sec)** |
| Clean Configuration | **xxx** | **xxx** |

* + 1. **Cross winds during landing and take-off :**

Air System is cleared to operate within the following crosswind limitations.

|  |  |
| --- | --- |
| **Runway condition** | **Cross wind Speed (Knots)** |
| Dry | Take off | xx |
| Landing | xx |
| Flooded | Not Cleared |

* + 1. **Centre of gravity limits before Take-off:**

Allowable centre of gravity range is **xx% to xx% MAC** for the following pilot weight configuration.

**Solo Pilot Configuration:**

* Front cockpit: **xxx** Kg to **xxx** Kg
* Rear cockpit: **Nil**

**Two pilot Configuration:**

* Front cockpit: **xxx** Kg to **xx** Kg
* Rear cockpit: xx Kg to **xx** Kg
	1. **ENGINE OPERATING LIMITATIONS:**

The xxxx engine is cleared for operation subjected to following Limitations:

* + 1. **Operating conditions:**

|  |  |
| --- | --- |
| Maximum absolute flying altitude, **ft** | xxx |
| Maximum air starting altitude, **ft** | xxx |
| Maximum indicated airspeed, **Mach** | xx |
| Maximum ambient temperature at sea level, **°C** | xx |
| Minimum Ambient temperature range for ground starting, **°C** | xxx |
| Minimum oil temperature range for air starting, **°C** | xx |

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* + 1. **Operating Limits on Engine Parameters and Actions:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Parameters** | **Normal range** | **Action if exceed the limit** |
| 1 | Torque |  |  |
| 2 | Rotor speed |  |  |
| 3 | **EGT**During Start |  |  |
| Other than Start |  |  |
| 4 | Fuel Flow |  |  |
| 5 | Oil Pressure |  |  |
| 6 | Oil Temperature |  |  |
| 7 | Starting Time |  |  |

* + 1. **Wind Milling Limit:**

|  |  |  |
| --- | --- | --- |
| **Wind Milling Rpm** | **Operating Limits** | **Action If Exceeded** |
| 28 to 100 % |  |  |
| 18 to 28 % |  |  |
| 10 to 18 % |  |  |
| 5 to 10 % |  |  |
| 0 to 5 % |  |  |

* + 1. **Warnings and cautions:**
		2. **Conditions of release:**

This clearance is contingent upon the following:

* + - * This clearance is valid for xxxx hours of flight (inclusive of Ground run, LSTT, HSTT)
			* All the maintenance / installation procedures are to be followed as stipulated in the respective

OEM manuals.

* + - * This clearance stands invalid if any changes are made from the present Configuration / SOP for the flight tests without the concurrence of CEMILAC ( ).

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* + 1. **Technical parameters:**

|  |  |
| --- | --- |
| Type |  |
| Compressor |  |
| Turbine |  |
| Direction of rotation |  |
| SHP |  |
| Max Torque |  |
| 100 % rpm of Ng |  |
| Specific Fuel Consumption, kg / (hr.kgf) |  |
| Prop rpm |  |
| Max allowable Exhaust Temp during starting |  |
| Bleed Extraction |  |
| **OIL SYSTEM** |
| Type |  |
| Oil specification |  |
| Oil tank capacity, quartz |  |
| Oil consumption rate, gallon / hour |  |
| Oil pressure in pressure line, psi |  |
| Inverted flying, sec |  |
| Fuel Specification |  |

**ENGINE FLIGHT ENVELOPE**

**Mach No. Vs Altitude & CAS**

* 1. **GENERAL FLIGHT LIMITATIONS**
		1. **Speed limitations:**

**Flight speed limitation (Level Flight) (CAS in knot)**

|  |  |  |
| --- | --- | --- |
| Minimum speed (knot) Corresponds toxxo AOA for xx Kg AUW | Clean configuration (Flap Level) | xx |
| Take-off & Landing configuration (30 deg Flap) | xx |
| Max speed / Mach with UC up | xxx |
| Max speed with UC down and locked | xx |

**Note: 1’g’ stall speeds at Sea level (CAS in knot) for various Air System configuration and**

**AUW are as follows:**

Clean configuration : xx Knots With UC and Takeoff flap : xx Knots

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**Take off speed limitations (CAS in knot):**

|  |  |
| --- | --- |
| Recommended take off rotation speed with deg Flap | xx |
| Unstick speed with max power | xx |
| Decision speed for RTO | xx |

**Approach speed limitations (CAS in knot):**

|  |  |
| --- | --- |
| Mass (kg) | Approach speed |
| xxx | xx |

* + 1. **Altitude limitations**

|  |  |
| --- | --- |
| Maximum pressure altitude with U/C up | xxx ft |
| Maximum pressure altitude with U/C down | xxxx ft |

* + 1. **AOA Limitations**

|  |  |  |
| --- | --- | --- |
| AOA range for Wings-level operations* As indicated on PFD
* xxO (Never Exceed)
 | Max | Min |
| xxo | xxo |
| AOA range for maneuvering operations* As indicated on PFD
 | xxo | xxo |

* + 1. **Fuselage scrape attitude:**
			- With Oleo collapsed and Tyres flat = xxx deg.
		2. **Side slip limitations:**

|  |  |
| --- | --- |
| Maximum side slip with U/C up | xx deg |
| Maximum side slip with U/C down | xx deg |

* + 1. **Maneuver limitations:**

Maneuver limits are permitted within the following:

|  |  |
| --- | --- |
| Inverted flying | xx sec max |
| 360 deg roll (Recommended) | Left and Right |

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* + 1. **Normal Acceleration limitation:**

|  |  |
| --- | --- |
| Normal Acceleration limitation for various Air System AUW weight. | xxx Kg |
| UC up | Minimum permitted | xx g |
| Max permitted | xx g |
| UC down | Minimum permitted | xx g |
| Max permitted | xx g |

* + 1. **Roll rate limitation:**

|  |  |
| --- | --- |
| Maximum Roll rate with U/C up | xxx deg/sec |
| Maximum Roll rate with U/C down | xxx deg/sec |

* + 1. **Roll acceleration limit:**

|  |  |
| --- | --- |
| Maximum Roll acceleration with U/C up | xx rad/sec2 |
| Maximum Roll acceleration with U/C down | xx rad/sec2 |

* + 1. **Yaw rate limitation:**

|  |  |
| --- | --- |
| Maximum Yaw rate permitted with U/C up | xx rad/sec2 |
| Maximum Yaw rate permitted with U/C down | xx rad/sec2 |

* + 1. **Yaw acceleration limits:**

|  |  |
| --- | --- |
| Maximum Yaw acceleration permitted with U/C up | xx rad/ sec 2 |
| Maximum Yaw acceleration permitted with U/C down | xx rad/ sec 2 |

* + 1. **Pitch acceleration limits**

|  |  |
| --- | --- |
| Maximum Pitch acceleration permitted with U/C up | xx deg/sec 2 |
| Maximum Pitch acceleration permitted with U/C down | xx deg/sec 2 |

* + 1. **Stalling and spinning:**
			- Air System is not cleared for intentional stalling and spinning.
		2. **Weather related limitations:**
			- The Air System is cleared to fly in fair weather and day light conditions only. The minimum visibility shall be xx km for demonstration flights
	1. **OTHER SYSTEM LIMITATIONS**
		1. **AERODYNAMICS**
			+ Angle of Attack limitation for the first block of flights are and Angle of side

slip limitations are.

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* + 1. **STRUCTURE AND ANALYSIS**
		2. **ENVIRONMENTAL CONTROL SYSTEM (ECS)**
		3. **LIFE SUPPORT SYSTEM (LSS)**
		4. **HYDRAULIC**
		5. **LANDING GEAR AND BRAKE SYSTEM**
		6. **ESCAPE SYSTEM**
		7. **FCS**
		8. **FUEL**
		9. **ELECTRICAL AND POWER GENERATION**
		10. **LIGHTING**
		11. **AVIONICS**
1. **FLIGHT ENVELOPES**
2. The flight envelopes for the development flights are :

|  |  |  |
| --- | --- | --- |
| 1. | Load Factor – Mach No. Envelope | Ref: Fig. 1 |
| 2. | Altitude – Mach No. Envelope | Ref: Fig. 2 |

1. Operating Envelopes of Air System AUW xxx Kg, , Issue: Nil, Amendment: Nil, dated:
2. Aerodynamic operating limitations for Air System AUW xx Kg, vide Technical Memo dated .
3. Computation of Mass and CG data for Air System for xxx kg take-off weight (Computed based on weighing carried on ) on this weighing vide report No.

 / , Issue: Nil Amendment: Nil dated

**Fig 1: V-n diagram (wt =xxxx) kg**

**Fig 2: Flight Envelope for xxxx kg**

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1. **CONDITIONS OF RELEASE**
* xxxx is cleared for operations in airfields. It is also cleared for outstation trials and demonstration flights (Air Shows) at other airfields, with prior concurrence of CEMILAC.
* The Air System is cleared to fly in fair weather and day light conditions. The minimum visibility shall be xx km for demonstration flights during Air shows.
* The Air System will not carry any Stores.
* Arrester barrier system shall be made available for all flights.

**IMAP-2023 Part II, Chapter 5 & IMTAR 21 Subpart P Persons authorised for undertaking flight tests:**

Only test pilots / test engineers, who have successfully undergone a course in experimental flight testing are authorized to undertake flight testing of experimental, prototype or technology demonstrator Air System under development as a flight crew member. Similarly, persons who have successfully undergone the production test pilots course are authorized to flight-test production Air System of , BRDs / NAY or any other main contractor. Non qualified persons are not authorized to be crew members in any developmental flight testing or even as passengers in multi crew Air System during such developmental flight testing. In exceptional cases, however, the CTP / Head of flight testing can authorize in writing specific individuals (non flight test crew) on specific flights.

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