RESTRICTED
TYPE CERTIFICATE
DATA SHEET

No. EASA.IM.R.504

for

DHRUV (ALH)

Type Certificate Holder

Rotary Wing Research & Design Centre (RWR&DC),
Hindustan Aeronautics Limited

15/1, Cubbon Road
Bangalore – 560 001
India

For Models: DHRUV-C
DHRUV-CFW
DHRUV-CS

TABLE OF CONTENTS

SECTION 1: DHRUV (ALH)

I. General

1.	Type/ Model	
	1.1 Type	DHRUV (ALH), see Note 1.
	1.2 Models	- DHRUV-C - DHRUV-CFW - DHRUV-CS
2.	Airworthiness Category	Large Rotorcraft, Cat-B (Restricted Type Certificate)
3.	Manufacturer	*reserved* (see Note 2.)
4.	Type Certification Application Date to:	DGCA-I: 8 July 2000 for DHRUV-C and DHRUV-CFW DGCA-I: 12 January 2004 for DHRUV-CS EASA: 23 July 2005
5.	State of Design Authority	DGCA India
6.	Type Certificate Date by DGCA-I	31 October 2003 for DHRUV-C 20 April 2005 for DHRUV-CFW 30 July 2004 for DHRUV-CS
7.	Type Certificate n° by DGCA-I	5-8/96-RD-TC-1
8.	Type Certificate Data Sheet n° by DGCA-I	5-8/96-RD
9.	EASA Restricted Type Certification Date	29 June 2023

II. Certification Basis

1.	Reference Date for determining the applicable requirements	not applicable (see Note 3.)

2. Airworthiness Requirements

CS-29 – initial issue, dated 14 November 2003,
except non-compliant 29.562(c)(5); 29.783(d); 29.785(a),(d),(e); 29.803(d),(e); 29.805(c); 29.807(d)(2),(d)(3); 29.851(a)(3); 29.853(a),(b); 29.855(a),(c),(d); 29.952(a); 29.965(d); 29.1309 which are substituted by airworthiness and/or operating limitations acceptable to EASA to provide for a level of safety adequate with regard to the intended use of the rotorcraft (see II.6.).

3. Special Conditions

Protection from the effects of High Intensity Radiated Fields – HIRF,
in accordance with JAA interim policy and guidance material document No.INT/POL/27&29/1 Issue 3, dated 1 October 2003, unless any non-compliance with these EASA Special Conditions is substituted by operating limitations acceptable to the Agency to provide a level of safety adequate with regard to the intended use of the rotorcraft (see F-01 and II.6 here below).

4. Deviations

Online chip detection and warning system on IGB &TGB,
applicable to 29.1337(e) and 29.1305(a)(23), ref. F-13.

5. Equivalent Safety Findings

- Vertical acceleration sensor installation for FDR/CVR, applicable to 29.1459(a)(2), ref. F-02
- Absence of Master Caution light, applicable to 29.1322(a)&(b), ref. F-03

6. Restricted Type Certificate Limitations (see Note 4.)

R-TC Limitation	Mitigation for non-compliant CS-29 requirement
Maximum authorised fuel quantity reduced to 50% of the maximum fuel tank capacity	29.952(a), Basic Regulation, Annex II, points 1.1.1 and 2.3(b)

R-TC Limitation	Mitigation for non-compliant CS-29 requirement
No passenger transport	29.952(a), Basic Regulation, Annex II, points 1.1.1 and 2.3(b)
	29.562(c)(5); 29.783(d); 29.785(a),(d),(e); 29.803(d),(e); 29.805(c); 29.807(d)(2),(d)(3); 29.851(a)(3) and 29.853(a),(b). Basic Regulation, Annex II, point 2.3(b)
	29.1309 (vs. DO-160D), Basic Regulation, Annex II, points 1.3.2 and 2.3
	JAA doc. No.INT/POL/27&29/1, Issue 3, Basic Regulation, Annex II, point 2.3(a)
Minimum flight crew: 2 pilots	29.1309 (vs. DO-160D), Basic Regulation, Annex II, points 1.3.2 and 2.3
Operations in VFR day only	JAA doc. No.INT/POL/27&29/1 issue 3, Basic Regulation, Annex II, point 2.3(a)
Operations in Category B only	
Do Not Use Cargo (for cargo compartment, see Note 5.)	29.855 (a),(c),(d) Basic Regulation, Annex II, point 2.3(b)
Pre & Post-flight checks for absence of fuel leakage	29.965(d), Basic Regulation, Annex II, point 2.3
300FH Service Life Limit for fuel tank bladders	

7. Environmental Protection Requirements

7.1 Noise Requirements	See R-TCDSN No. EASA.IM.R.504
7.2 Emission Requirements	ICAO Annex 16, Volume II, Part II, Amdt. 5, Chapters 1 and 2 (as implemented in CS-34, initial issue, dated 17 October 2003)

8. Operational Suitability Data (OSD) (See SECTION 2 below)

8.1 Master Minimum Equipment List	*reserved*
8.2 Flight Crew Data (FCD)	*reserved*
8.3 Simulation Data	*reserved*

III. Technical Characteristics and Operational Limitations

1. Type Design Definition — RC/ALH-EASA/QCC/SOP/001, Issue I, Rev A, dated 9 Sep 2021, with Addendum dated 11 Jan 2023.

2. Description — Medium twin-engine helicopter of conventional configuration. Main gear box, upper controls and rotor head as a single integrated unit (IDS). The civil models are identified as '-C' with retractable landing gear, '-CFW' with fixed landing gear, and '-CS' with skids.

Main rotor:	4 blades, flexible hingeless composite, elastomeric bearings
Tail rotor:	4 blades, flex beam concept
Fuselage:	2/3 composite, 1/3 metal structure
Control system:	Mechanical with hydraulic actuation
Powerplant:	2 independent free turbine engines, FADEC

3. Equipment — Basic equipment must be installed and operational prior to registration of the helicopter as per the Type Design

Definition documents.

4. Dimensions

4.1 Fuselage	Length:	13.43 m (fuselage only)
	Width:	3.19 m (span of horizontal stabilizer)
	Track gauge:	2.80 m (main LG) 2.60 m (skid LG)
	Height:	4.91 m (top of TR circle, wheeled LG) 4.98 m (top of TR circle, skid LG)
4.2 Main Rotor	Diameter:	13.20 m
4.3 Tail Rotor	Diameter:	2.55 m

5. Engine

5.1 Model: Safran Helicopter Engines (formerly: Turboméca)
2 x Model TM 333-2B2

5.2 Type Certificate: EASA TC/TCDS No.: EASA.E.030

5.3 Limitations

5.3.1 Installed Engine Limitations and Transmission Torque Limits

	Engine TQ [Nm]	MR [rpm]	N1 [% (rpm)]	TOT [°C]
TOP 30 min, AEO 30-min HIP SARM	1 230	314.5	100.20 (45 088)	904
AEO-MCP	1 088		98.58 (44 361)	853
OEI (30 sec)	1 519	314.5	101.92 (45 864)	985
OEI (2 min)			100.51(45 229)	925
OEI (30 min)	1 360		99.88 (44 946)	897

T45 on start-up	- 810 °C for unlimited duration - 880 °C for max. 12 sec
Minimum N1	- 74.6 % (33 570 rpm) in steady state
Maximum N1 (5 sec)	- 101.0 % (45 450 rpm) maximum overspeed <5 sec
Reference N1	- 100 % <–> 45 000 rpm

Limit values for N2, in:		N2 [% (rpm)]
- Flight	Max. authorised stabilised speed	105 (39 440)
	Min. authorised stabilised speed (PWR ON)	90 (33 805)
	Min. authorised stabilised speed (idle mode):	86 (32 303)
- Transient conditions	Maximum	107 (40 191)
	Minimum (PWR ON):	90 (33 805)

Reference N2	- 100 % <–> 37 562 rpm

5.3.2 Other Engine and Transmission Torque Limits

	PWR rating [kW]	MGB TQ [Nm]	Shaft TQ [Nm]
MCP	2 x 568	902	1 088
TOP/ AEO (30-min)	2 x 640	1 014	1 230
max. transient over-TQ	---	---	1 360 (20 sec)
OEI (30 sec)	1 x 800	1 270	1 519

OEI (2 min)	---	---	
OEI (2 min 30 sec)	1 x 700	1 114	---
OEI (30 min)	---	---	1 360

6. Fluids

6.1 Fuel

Type of fuel	NATO	Specification		
		France	USA	UK
Kerosene-50 (AVTUR) JET A1	F35	DCS EA 134/B	ASTM-D-1655 -07	DEFSTAN 91-91
Notes:	- Refer to approved RFM - Maximum fuel temperature: 55 °C - Minimum temperature for engine starting: -30 °C			

6.2 Oil Refer to approved RFM

6.3 Additives See Note 7.

6.3.1 Engine lubricants

Type of oil	NATO code	Specification			Class	Approved oil brands
		France	USA	UK		
Recommended use 5 cSt at 98.9°C	O-156	---	MIL-PRF-23699F (MIL-L-23699)	DEF STAN 91-101 (DERD 2499)	HTS	EXXON (ESSO) Turbo Oil 2197 (ETO 2197) MOBIL Jet Oil 291 MOBIL Jet Oil 254
Normal use 5 cSt at 98.9°C					CI	Castrol Aerojet 5
					STD	Aero Shell Turbine Oil - 500 (ASTO 500) - 560 (ASTO 560) CASTROL 5000 ELF TURBO JET II EXXON (ESSO) Turbo Oil 2380 (ETO 2380) MOBIL Jet Oil II TOTAL Aeroturbine 535 TURBO NYCOIL 600 (TN 600)
Other oils	3 cSt at 98.9°C	O-148	---	MIL-PRF-7808 (MIL-L-78-08)	---	---	CASTROL 3C CASTROL 325 EXXON (ESSO) Turbo Oil 2389 (ETO2389) MOBIL OIL AVREX 256 TURBO NYCOIL 160 (TN 160)
		O-150	AIR 3514	---	---	---	ELF JET synthetic oil 15 TURBO NYCOIL 13B (TN 13B)
	4 cST at 98.9° C	---	---	---	DEF STAN 91-94	---	Aero Shell Turbine Oil 390 (ASTO 390)
Note: For temperature ranges refer to approved RFM						

6.3.2 Gear Box lubricants (MGB, AGB, IGB, TGB)

NATO	Specifications			Class	Approved oil brands
	France	USA	UK		
O-156	---	MIL-PRF-23699F	---	---	Mobil Jet-II Aeroshell-555 TN-600
---	---	DEF STAN-91-98/2 DERD 2487 JSD OX38	---	---	Turbonycoil-35M
Note: For temperature ranges refer to approved RFM					

6.3.3 Hydraulic fluid

NATO	Specifications			Class	Approved oil brands
	France	USA	UK		
---	---	MIL-H-5606	DEF-STAN 9148	---	Air 3520 A GRADE
Note: For temperature ranges refer to approved RFM					

7. Fluid capacities

7.1 Fuel

For wheeled landing gear models:
Fuel tank capacity: 710 litres
Unusable fuel: 20.0 litres

For skid landing gear model:
Fuel tank capacity: 676 litres
Unusable fuel: 10.0 litres

7.2 Oil

Refer to approved RFM

7.3 Hydraulic system

Refer to approved RFM

7.4 Coolant System

n/a

8. Air Speed Limitations

AEO:
$V_{NE\ PWR\ ON}$: 150 KIAS at MSL
OEI:
$V_{NE\ PWR\ ON}$: 120 KIAS at MSL, or,
$V_{NE\ PWR\ ON}$ AEO – 15 KIAS, whichever is less
$V_{NE\ PWR\ OFF}$: 100 KIAS at MSL, or,
$V_{NE\ PWR\ ON}$ AEO – 25 KIAS, whichever is less

Refer to approved RFM for reduction in V_{NE} with altitude and other speed limitations.

9. Rotor Speed Limitations

Reference: 100 % <–> 314.5 rpm

Power ON	Continuous	Transient
Maximum	102 %	107 %
Minimum	90 %	90 %
Power OFF	Continuous	Transient
Maximum	110 %	115 %
Minimum	85 %	80 %

10. Maximum Operating Altitude and Temperature

10.1 Altitude

20 000 ft PA

10.2 Temperature

-30°C to ISA+35°C, limited to +50°C.

For variation of temperature limitations with altitude, refer to approved RFM

11. Operating Limitations

- VFR day
- No flight into known or anticipated icing and/or snow conditions
- No transport of passengers
- No transport of cargo (see Note 5.)

12. Maximum Mass

5 500 kg

13. Centre of Gravity Range

Refer to approved RFM

14. Datum

Longitudinal: Reference datum is STA #0 located 5 000 mm forward of the TPTO (Tail Power Take Off) point (see RFM, 6.1)

15. Levelling Means

Refer to accepted MM

16. Minimum Flight Crew — two (2) pilots

17. Maximum Number of Occupants — Only personnel essential for the mission are allowed on board.

18. Emergency Exit — 4 jettisonable exits (2 pilot doors, 2 exits in cabin doors)

19. Maximum Baggage/ Cargo Loads — none, see Note 5.

20. Rotor Blade Control Movement — For rigging information refer to Maintenance Manual

21. Auxiliary Power Unit (APU) — n/a

22. Life-limited Parts — Refer to approved ALS, Doc. No. DHRUV-EASA-ALS-002

23. Wheels and Tyres

	Wheels	tyres
nose	Forged half hubs P/N 155 100000, or, P/N 153 600000	13.5”x4.25”-6”, 6PR, tubeless P/N DR 4123T
main	Forged half hubs P/N 153 400000	18”x5.5”-8”, 10PR, tubeless P/N DR 9841T / 033-631-0 (DR 9840T)

IV. Operating and Service Instructions

1. Flight Manual
   - Flight Manual, Civil (Fixed Wheel) Version, DHRUV (ALH), DHRUV-EASA-C-FM 001, Issue 1, November 2022
   - Flight Manual, Civil (Wheel) Version, DHRUV (ALH), DHRUV-EASA-CFW-FM 001, Issue 1, November 2022
   - Flight Manual, DHRUV (ALH), Civil (Skid) Version, DHRUV-EASA-CS-FM001, Issue 1, November 2022

   For all FM: EASA-approved, dated 29 June 2023, or later EASA-approved revisions.

2. Maintenance Manual
   - Airworthiness Limitations, DHRUV (Advanced Light Helicopter), Doc. No. DHRUV-EASA-ALS-002., Issue 1, Rev. 0, dated July 2022, EASA-approved, dated 29 June 2023, or later EASA-approved revisions.
   - Maintenance Manual, Civil (Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-MTM-001. Rev 3.18.
   - Maintenance Manual, Civil (Fixed Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CFW-MTM-001. Rev 1.21.
   - Maintenance Manual, Civil (Skid) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-MTM-001. Rev 1.21.

   For all MTM: EASA-accepted, dated 29 June 2023, or later EASA-accepted revisions.

3. Structural Repair Manual
   - Repair Manual, Civil-Wheel Version, Advanced Light Helicopter (DHRUV), Volume I, Doc. No. DHRUV-C-RRM-001, Rev 1.8, or later revisions, (Note: applicable to both ‘C’ and CFW’ version)
   - Repair Manual, Civil-Skid Version, Advanced Light Helicopter (DHRUV), Volume I, Doc. No. DHRUV-CS-RRM-001, Rev 1.8, or later revisions

   For all RRM: or later revisions.

4. Weight and Balance Manual — No W&B manual. See Section 6 of RFM, EASA-approved

5.	Illustrated Parts Catalogue	- Illustrated Parts Catalogue, Civil Wheel Version, Advanced Light Helicopter (DHRUV), Vol I, Doc. No. DHRUV-C-IPC-001, Rev 1.9. - Illustrated Parts Catalogue, Civil Fixed Wheel Version, Advanced Light Helicopter (DHRUV), Vol I, Doc. No. DHRUV-CFW-IPC-001, Rev 1.9. - Illustrated Parts Catalogue, Civil Skid Version, Advanced Light Helicopter (DHRUV), Vol I, Doc. No. DHRUV-CS-IPC-001, Rev 1.10. For all IPC: or later revisions.
6.	Miscellaneous Manuals	- Engine documents as per Engine TCDS EASA.E.030 - Master Servicing Recommendations: -- Civil (Wheel) Version Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-MSR-001, Rev. 2.33. -- Civil (Fixed Wheel) Version Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CFW-MSR-001, Rev. 1.35. -- Civil (Skid) Version Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-MSR-001, Rev. 2.34. - Fault Tracing Manual: -- Civil Wheel Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-FTM-001, Rev 1.12., (Note: applicable to both 'C' and CFW' version) -- Civil (Skid) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-FTM-001, Rev 1.11. - Wiring Diagram Manual: -- Civil-Wheel Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-WDM-001, Rev 1.6. -- Civil (Fixed Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CFW-WDM-001, Rev 1.6. -- Civil (Skid) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-WDM-001, Rev 1.6. - Storage and Preservation Manual: -- Civil (Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-STM-001, Rev 2.7. -- Civil (Fixed Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CFW-STM-001, Rev 3.8. -- Civil-Skid Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-STM-001, Rev 3.7. - Description and Operation Manual: -- Civil (Wheel) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-C-DOM-001, Rev 1.10., (Note: applicable to both 'C' and CFW' version) -- Civil (Skid) Version, Advanced Light Helicopter (DHRUV), Doc. No. DHRUV-CS-DOM-001, Rev 1.11. For all Miscellaneous Manuals: or later revisions.
7.	Service Letters and Service Bulletins	Safety Information Notice, Information Notice, Alert Service Bulletin, Service Bulletin Repair Design Approval Sheets as published by Hindustan Aeronautics Ltd.
8.	Required Equipment	Refer to EASA-approved Rotorcraft Flight Manual and related supplements for other approved mandatory and optional equipment and Master Minimum Equipment

V. Notes

0. s/n eligible for registration: none

   At time of initial issuance of the EASA Restricted Type Certificate neither POA (see Note V.2.) nor OSD (see SECTION 2) approval had been issued for this type.

1. There is a high degree of technical commonality among the three models DHRUV-C, DHRUV-CFW and DHRUV-CS. For the sake of clarity, it was therefore decided to list all three models in one SECTION. Items, where the individual type design differs, are clearly referenced (e.g. by quoting the kind of landing gear).

2. At time of initial issuance of the EASA Restricted Type Certificate a Production Organisation Approval (optionally an EASA POA nor in accordance with Article 9.2 of Regulation (EU) No 748/2012) had not been issued.

3. No agreed reference date necessary for Restricted Type Certification (under 21.B.80(a)(3)(ii) of Part 21).

4. The table in Section 1, II.6. defines the set of RTC limitations applicable to DHRUV (ALH), which in combination with the restricted Certification Basis prescribed in Section 1, II., provide as specific mitigations for non-compliant requirements a level of safety adequate with regard to the intended restricted use of the helicopter.

5. At time of initial issuance of the EASA Restricted Type Certificate, the use of the cargo compartment is prohibited due to non-compliance with 29.855(a),(c)&(d). In addition, compliance with 29.855(e) for the carriage of cargo in the cabin area had not been demonstrated. Therefore, no transport of cargo is permitted.

6. At time of initial issuance of the EASA Restricted Type Certificate, compliance with Certification Specifications for Airborne Communications Navigation and Surveillance, CS-ACNS, had not been demonstrated.

7. Use anti-icing additives for fuel temperatures less than or equal to +5°C. For details refer to Turboméca TM 333-2B2 Maintenance Manual.

* * *

SECTION 2: OPERATIONAL SUITABILITY DATA (OSD)

At time of initial issuance of the EASA Restricted Type Certificate compliance with OSD requirements had not been demonstrated.

II.1 MMEL

reserved

II.2 Flight Crew Data

reserved

II.3 SIM Data

reserved

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

AEO	All Engines Operative	OSD	Operational Suitability Data
ALS	Airworthiness Limitations Section	PA	Pressure Altitude
APU	Auxiliary Power Unit	PWR	Power
ESF	Equivalent Safety Finding	ref.	Reference
FADEC	Full Authority Digital Engine Control	RFM	Rotorcraft Flight Manual
FCD	Flight Crew Data	RTC	Restricted Type Certificate
HIRF	High Intensity Radiated Field	R-TCDS	Restricted TCDS
IDS	Integrated Dynamic System	s/n	Serial Number
IFR	Instrument Flight Rules	sec	Seconds
KIAS	Knots Indicated Air Speed	TGB	Tail Gearbox
LG	Landing Gear	TC	Type Certificate
Max	Maximum	TCDS	Type Certificate Data Sheet
MCP	Maximum Continuous Power	TCDSN	Type Certificate Data Sheet for Noise
MGB	Main Gearbox	TOP	Take-Off Power
min	Minute	TOT	Turbine Outlet Temperature
MMEL	Master Minimum Equipment List	VFR	Visual Flight Rules
No.	Number	V_{NE}	Never Exceed Speed
OEI	One Engine Inoperative		

II. Type Certificate Holder Record

II.1 Type Certificate Holder	**Period**
Rotary Wing Research & Design Centre (RWR&DC), Hindustan Aeronautics Limited, 15/1, Cubbon Road Bangalore – 560 001, India	From 29 June 2023

III. Change Record

Issue	**Date**	**Changes**	**TC issue**
Issue 1	29 June 2023	Initial issue of EASA TCDS	Initial Issue, 29 June 2023

- end of file -