Annex C Certification Constraints Checklists

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Union Aviation Safety Agency (EASA). Neither the European Union nor EASA can be held responsible for them.

CONTRACT NUMBER:	EASA.2020.C02
CONTRACTOR / AUTHOR:	DART Aerospace
IPR OWNER:	European Union Aviation Safety Agency
DISTRIBUTION:	Public

APPROVED BY:	AUTHOR	REVIEWER	MANAGING DEPARTMENT
D. Shepherd	A. Flores	M.L. Scatola	DART Engineering

DATE: 26 February 2024

CONTENTS

1. Certification Constraints Checklists CS29

All sections of the CS29 Amendment 11 requirements have been considered in the preparation of this documentation. Those sections not appearing in this document have been deemed not to be applicable to the objective of this document. It should be noted that below Certification Checklist is just used for the purpose of this research. Certification projects should be assessed independently and the Certification Checklist agreed with Authority.

Req't	Section	Title / Description	Risks for Compliance
CS-29	**Subpart A – General**		
29.1	All	Applicability	No risks foreseen
CS-29	**Subpart B – Flight General**		
29.21	All	Proof of Compliance	No risks foreseen
29.25	(a)(1)	Weight Limits	No risks foreseen
29.27	(c)	Centre of Gravity Limits	No risks foreseen
29.29	All	Empty Weight and Corresponding C of G	No risks foreseen
CS-29	**Subpart B – Flight Performance**		
29.45	All	General	No risks foreseen
29.49	All	Performance at Minimum Operating Speed	No risks foreseen
29.51	(a)	Take-off	Some risks regarding position of the float pod and hover effects. Refer to Chapter 5 of main document.
29.65	(b)(2)(i) (b)(2)(iv)	Climb: All Engines Operating	Some risks regarding pod interactions with engine inlets during different flight regimes. Refer to Chapter 5 of main document.
29.71	All	Autorotation performance	No risks foreseen
29.75	(a)(1) (a)(2)	Landing	No risks foreseen
29.87	All	Height – Speed Envelope	No risks foreseen.
CS-29	**Subpart B – Flight Characteristics**		
29.141	(a)(2) (b)(2)	General	No risks foreseen
29.143	(a) (b) (d)	Controllability and manoeuvrability	Refer to Chapter 5 of main document.
29.151	All	Flight Controls	No risks foreseen
29.161	All	Trim Control	No risks foreseen
29.171	All	Stability: General	Refer to Chapter 5 of main document.
29.173	All	Static Longitudinal Stability	Refer to Chapter 5 of main document.

29.175	All	Demonstration of Static Longitudinal Stability	Refer to Chapter 5 of main document.
29.177	All	Static Directional Stability	Refer to Chapter 5 of main document.
CS-29	**Subpart B – Handling Characteristics**		
29.231	All	General	No risks foreseen
CS-29	**Subpart B – Flight Miscellaneous**		
29.251	All	Vibration	No risks foreseen
CS-29	**Subpart C – Strength General**		
29.301	All	Loads	No risk foreseen
29.303	All	Factor of Safety	No risks foreseen
29.305	All	Strength and Deformation	No risks foreseen
29.307	(a) (b)(5)	Proof of Structure	No risks foreseen
CS-29	**Subpart C – Strength Flight Loads**		
29.321	All	General	No risks foreseen
29.337	All	Limit Manoeuvring Load Factor	No risks foreseen
29.341	All	Gust loads	No risks foreseen
29.351	All	Yawing conditions	No risks foreseen
CS-29	**Subpart C – Water Loads**		
29.521	All	Float landing conditions	No risks foreseen
CS-29	**Subpart C – Strength Emergency Landing**		
29.561	(b)	General	No risks foreseen
29.563	(b)(1)	Structural Ditching Provisions	No risks foreseen. Dynamic loads during capsizing would need to be considered. No need to examine hydrodynamic loads since ditching would occur with the HEFS out of the water.
CS-29	**Subpart D – Design General**		
29.601	All	Design	No risks foreseen
29.603	All	Materials	No risks foreseen
29.605	(a)	Fabrication Methods	No risks foreseen
29.607	All	Fasteners	No risks foreseen
29.609	All	Protection of Structure	No risks foreseen
29.610	All	Lightning and static electricity protection	No risks foreseen
29.611	(a) (b)	Inspection Provisions	No risks foreseen
29.613	All	Material Strength Properties and Design Values	No risks foreseen. Some considerations may need to be taken on heat resistant materials and what will constitute the amount of time for heat exposure.
29.625	All	Fitting Factor	No risks foreseen
29.631	All	Bird Strike	No risks foreseen. Pod design would avoid rupture following bird strike keeping debris from impacting the main/tail rotors.
CS-29	**Subpart D – Control Systems**		

29.685	(a) (b) (c) (d)	Control System Details	No risks foreseen
CS-29	**Subpart D – Floats and Hulls**		
29.751	All	Main float buoyancy	No risks foreseen
29.753	(a)	Main float design	No risks foreseen
CS-29	**Subpart D – Design Personnel and Cargo Accommodations**		
29.771	All	Pilot Compartment	No risks foreseen
29.777	All	Cockpit controls	No risks foreseen
29.801	(b) (c) (d) (e)	Ditching	No risks foreseen. Additional guidance may be required for stability in the capsized configuration (i.e. what buoyancy will be provided by the primary EFS)
29.803	(c)(3)	Emergency evacuation	No risks foreseen
29.805	(c)	Flight crew emergency exits	No risks foreseen
29.807	(d)	Passenger emergency exits	No risks foreseen
CS-29	**Subpart F – Equipment General**		
29.1301	All	Function and Installation	No risk foreseen.
29.1309	(a) (b) (c)	Equipment, Systems, and Installations	Refer to Chapter 3 of main document.
29.1323	All	Airspeed Indicating System	No risks foreseen
29.1325	(a)	Static Pressure Systems	No risks foreseen
CS-29	**Subpart G – Operation Limitations and Information**		
29.1501	All	General	No risks foreseen
29.1503	All	Airspeed Limitations: General	No risks foreseen
29.1505	(a)(2) (c)	Never-Exceed Speed	No risks foreseen
29.1525	All	Kinds of Operation	No risks foreseen
29.1529	All	Instructions for Continued Airworthiness	No risks foreseen
CS-29	**Subpart G – Operation Markings and Placards**		
29.1541	All	General	No risks foreseen
29.1555	(d)(2)	Control markings	No risks foreseen
CS-29	**Subpart G – Operation Rotorcraft Flight Manual**		
29.1581	(a) (d)	General	No risks foreseen
29.1583	(a) (c) (g)	Operating limitations	No risks foreseen
29.1585	All	Operating Procedures	No risks foreseen
29.1587	(a)(1)	Performance information	No risks foreseen
29.1589	All	Loading Information	No risks foreseen

Table 1 Certification contraints checklist CS29

2. Certification Constraints Checklist CS27 Cat A

All sections of the CS27 Amendment 10 requirements have been considered in the preparation of this documentation. Those sections not appearing in this document have been deemed not to be applicable to the objective of this document. It should be noted that below Certification Checklist is just used for the purpose of this research. Certification projects should be assessed independently and the Certification Checklist agreed with Authority.

Req't	Section	Title / Description	Risks for Compliance
CS-27	**Subpart A – General**		
27.1	All	Applicability	No risks foreseen
CS-27	**Subpart B – Flight General**		
27.21	All	Proof of Compliance	No risks foreseen
27.25	(a)(1)	Weight Limits	No risks foreseen
27.27	(c)	Centre of Gravity Limits	No risks foreseen
27.29	All	Empty Weight and Corresponding C of G	No risks foreseen
CS-27	**Subpart B – Flight Performance**		
27.45	All	General	No risks foreseen
27.49	All	Performance at Minimum Operating Speed	No risks foreseen
27.51	(a)	take-off	Some risks regarding position of the float pod and hover effects. Refer to Chapter 5 of main document.
27.65	(b)(2)(i) (b)(2)(iv)	Climb: All Engines Operating	Some risks regarding pod interactions with engine inlets during different flight regimes. Refer to Chapter 5 of main document.
27.71	All	Glide Performance	No risks foreseen
27.75	(a)(1) (a)(2)	Landing	No risks foreseen
27.79	All	Limiting Height – Speed Envelope	No risks foreseen.
CS-27	**Subpart B – Flight Characteristics**		
27.141	(a)(2) (b)(2)	General	No risks foreseen
27.143	(a) (b) (d)	Controllability and Manoeuvrability	Refer to Chapter 5 of main document.
27.151	All	Flight Controls	No risks foreseen
27.161	All	Trim Control	No risks foreseen

27.171	All	Stability: General	Refer to Chapter 5 of main document.
27.173	All	Static Longitudinal Stability	Refer to Chapter 5 of main document.
27.175	All	Demonstration of Static Longitudinal Stability	Refer to Chapter 5 of main document.
27.177	All	Static Directional Stability	Refer to Chapter 5 of main document.
CS-27	**Subpart B – Handling Characteristics**		
27.231	All	General	No risks foreseen
CS-27	**Subpart B – Flight Miscellaneous**		
27.251	All	Vibration	No risks foreseen
CS-27	**Subpart C – Strength General**		
27.301	All	Loads	No risk foreseen
27.303	All	Factor of Safety	No risks foreseen
27.305	All	Strength and Deformation	No risks foreseen
27.307	(a) (b)(5)	Proof of Structure	No risks foreseen
CS-27	**Subpart C – Flight Loads**		
27.321	All	General	No risks foreseen
27.337	All	Limit Manoeuvring Load Factor	No risks foreseen
27.341	All	Gust loads	No risks foreseen
27.351	All	Yawing conditions	No risks foreseen
CS-27	**Subpart C – Water Loads**		
27.521	All	Float landing conditions	No risks foreseen
CS-27	**Subpart C – Strength Emergency Landing**		
27.561	(b)	General	No risks foreseen
27.563	(b)(1)	Structural Ditching and Emergency Flotation Provisions	No risks foreseen. Dynamic loads during capsizing would need to be considered. No need to examine hydrodynamic loads since ditching would occur with the HEFS out of the water.
CS-27	**Subpart D – Design General**		
27.601	All	Design	No risks foreseen
27.603	All	Materials	No risks foreseen
27.605	(a)	Fabrication Methods	No risks foreseen
27.607	All	Fasteners	No risks foreseen
27.609	All	Protection of Structure	No risks foreseen
27.610	All	Lightning and static electricity protection	No risks foreseen
27.611	(a) (b)	Inspection Provisions	No risks foreseen

27.613	All	Material Strength Properties and Design Values	No risks foreseen. Some considerations may need to be taken on heat resistant materials and what will constitute the amount of time for heat exposure.
27.625	All	Fitting Factor	No risks foreseen
27.631	All	Bird Strike	No risks foreseen
CS-27	**Subpart D – Control System**		
27.685	(a) (b) (c) (d)	Control System Details	No risks foreseen
CS-27	**Subpart D – Floats and Hulls**		
27.751	All	Main float buoyancy	No risks foreseen
27.753	(a)	Main float design	No risks foreseen
CS-27	**Subpart D – Personnel and Cargo Accommodations**		
27.771	All	Pilot Compartment	No risks foreseen
27.777	All	Cockpit controls	No risks foreseen
27.801	(b) (c) (d) (e)	Ditching	No risks foreseen. Additional guidance may be required for stability in the capsized configuration (i.e. what buoyancy will be provided by the primary EFS)
27.805	(c)	Flight crew emergency exits	No risks foreseen
27.807	(d)	Passenger emergency exits	No risks foreseen
CS-27	**Subpart F – Equipment Instruments: Installation**		
27.1301	All	Function and Installation	Inflation system shall be self-contained to prevent damage during ditching or capsizing affecting the function of the system.
27.1309	(a) (b) (c)	Equipment, Systems, and Installations	Refer to Chapter 3 of main document.
27.1323	All	Airspeed Indicating System	No risks foreseen
27.1325	(a)	Static Pressure Systems	No risks foreseen
CS-27	**Subpart G – Operation Limitations and Information**		
27.1501	All	General	No risks foreseen
27.1503	All	Airspeed Limitations: General	No risks foreseen
27.1505	(a)(2) (c)	Never-Exceed Speed	No risks foreseen
27.1525	All	Kinds of Operation	No risks foreseen
27.1529	All	Instructions for Continued Airworthiness	No risks foreseen

CS-27	Subpart G – Markings and Placards		
27.1541	All	General	No risks foreseen
27.1555	(d)(2)	Control markings	No risks foreseen
CS-27	**Subpart G – Rotorcraft Flight Manual and Approved Manual Material**		
27.1581	(a) (d)	General	No risks foreseen
27.1583	(a) (c) (g)	Operating limitations	No risks foreseen
27.1585	All	Operating procedures	No risks foreseen
27.1587	(a)(1)	Performance information	No risks foreseen
27.1589	All	Loading information	No risks foreseen

Table 2 Certification contraints checklist CS27

European Union Aviation Safety Agency

Konrad-Adenauer-Ufer 3
50668 Cologne
Germany

Mail EASA.research@easa.europa.eu
Web www.easa.europa.eu

An Agency of the European Union