EASA European Union Aviation Safety Agency	**Consultation paper** **Special Condition**	Doc. No. : SC-B22.151-01 Issue : 1 Date : 14 Sep 2021 Proposed ☐ Final ☒ Deadline for comments: 08 Apr 2021

SUBJECT	:	**Sustainer Assisted Aerotow**
REQUIREMENTS incl. Amdt.	:	**CS 22.51, 22.65, 22.151, 22.581, 22.901, 22.1518, 22.1563 22.1581, 22.1583, 22.1585, 22.1587 amdt. 2**
ASSOCIATED IM/MoC[1]	:	Yes☒ / No ☐
ADVISORY MATERIAL	:	**n/a**

INTRODUCTORY NOTE:

The following Special Condition (SC) has been classified as important and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

IDENTIFICATION OF ISSUE:

Sailplanes being towed by another aircraft is a usual take-off method, called aerotow. However, CS-22 covers only the case where any engine of the towed powered sailplane is not in operation and retracted, where applicable.

An applicant has applied to support an aerotow by having the engine of the towed sailplane in operation. This aims to increase the safety margin in terms of take-off distance and climb rate compared to the aerotow where the towed powered sailplane has its engine inoperative and retracted, if applicable. While no credit is taken for take-off and climb performance.

This scenario is called 'Sustainer Assisted Aerotow'. The requirements of CS-22 do not address the case of Sustainer Assisted Aerotow.

Considering all the above, the following Special Condition is proposed:

[1] In case of SC, the associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

Special Condition "SC-B22.151-01"

Sustainer Assisted Aerotow

Introduction

The requirements below apply in addition to the applicable requirements of the original certification basis. For instance, 22.143 and 22.151 including AMC apply and compliance needs to be demonstrated in Sustainer Assisted Aerotow, as well.

SC-B22.01 - Applicability:

The Special Condition is only applicable to powered sailplanes (self-launchable and self-sustaining) in sustainer assisted aerotow operations with an engine starter (functionality) and an adjustable power control of the propulsion (power lever).

SC-B22.02 - Performance

a) It has to be demonstrated that the use of the propulsion of the towed sailplane has no negative impact on both the take-off distance and the climb rate of the towing combination (tow plane and towed powered sailplane) compared to the aerotow where the towed powered sailplane has its engine inoperative and retracted, if applicable.
b) Credit shall not be taken for any performance increase by the use of the propulsion of the towed powered sailplane regarding both the take-off distance and the climb rate of the towing combination.

SC-B22.03 - Aerotowing (flight characteristics)

a) The towed powered sailplane with its engine in operation must comply with CS 22.151 up to V_{TA} as specified in SC-B022.05.
b) Flight testing referred to in a) has to cover engine failure of the towed powered sailplane during the different phases of the towing.
c) For the purposes of demonstrating compliance with CS 22.151(a), (b) and (c) for the proposed towing combination, all requirements must be successfully demonstrated for the towed sailplane with its propulsion system set to between its lowest selectable power setting any other setting(s) chosen by the applicant.
d) d) While demonstrating compliance with CS 22.151 at any proposed propulsion system power setting, it must be shown that all required tasks, to include abnormal situations (e.g., uncontrollable power, sudden propulsion system failures, etc.) can be completed without exceptional pilot skill, strength, alertness, or undue attention.

SC-B22.04 - Powerplant

a) The powerplant of the towed powered sailplane must be equipped with an engine starter (functionality) and adjustable power control (power lever).
b) The operation of the engine must be allowed up to V_{TA} as specified in SC-B22.05
c) There has to be a clearance between the propeller, if applicable, and the towing cable within the cone as specified in CS 22.581 (a).

SC-B22.05 - Operating Limitations

CS 22.1518 is amended by the following point:

(c) a maximum airspeed for sustainer assisted aerotow V_{TS} shall be established and shall be at least 20 km/h higher than the minimum recommended airspeed for aerotow at maximum take-off mass of the towed sailplane.

SC-B22.06 - Aircraft Flight Manual

a) CS 22.1557 is amended by the following point:

(i) A placard must be provided stating any power setting limitations during sustainer assisted aerotow operations.

b) CS 22.1563 (b) - the maximum airspeed for assisted aerotow V_{TA} is added to the paragraph.

c) CS 22.1583 (a) (2) - V_{TA} is added to the paragraph.

d) CS 22.1583 (g) is amended by the following point:

(4) For the towed powered sailplane, the maximum permissible power setting for aerotow operations must be established.

e) CS 22.1585 is complemented by the following points:

(o) The normal procedure for sustainer assisted aerotow has to be established.

(p) the estimated impact to the performance of the towing combination has to be established for the case of loss of power of the towed powered sailplane.

(q) Emergency procedures for engine failure of the towed powered sailplane in different phases of the towing shall be established.

f) CS 22.1587 is amended by the following point:

(d) Performance information shall state that there is no performance credit for sustainer assisted aerotow operations.

Associated Interpretative Material and Means of Compliance

The associated Interpretative Material and Means of Compliance is published for awareness only and is not subject to public consultation.

Interpretative Material

1. Procedures of the Aircraft Flight Manual should address in particular:
    a. Procedure and Checklist for engine starting on ground
    b. Minimum powerplant temperatures for take-off
    c. Minimum powerplant energy quantity (fuel, battery capacity) necessary for a sustainer-assisted aerotow
    d. The towing hook to be used for sustainer assisted aerotow
    e. Recommended engine power settings during the different phases of the towing, in particular to prevent a slack towing cable.

Means of Compliance

1. AMC 22.1581 is amended in point 2.2:

V_{TA}	Maximum airspeed for sustainer assisted aerotow	Do not exceed this airspeed during sustainer assisted aerotow

2. AMC to SC-B.22-06 e) (q):

It is sufficient to determine the climb rate of one towing combination (towing plane and towed powered sailplane) with the towed powered sailplane having the powerplant extracted, if applicable, and the with both the engine running and not running. The difference in climb rate should be presented in the AFM. These data should be determined at MTOM of the towed powered sailplane, sea level, and standard air density.