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1	*European Sailplane Manufacturers*	SC-B22.01 - Applicability	1	The Applicability should not be as restrictive as written. Usage of the propulsion system to increase aerotow performance could be also useful and safe for a self-launching sailplane when towed (e.g. open class self-launcher with high MTOW) Furthermore, the term "controllable" creates questions. Even a simple on/off type of self-sustainer could be used for such an assisted aerotow, provided the sailplane can prevent unwanted start of the take-off roll with a slack towrope. Still "control" of such a powerplant is possible by shutoff of the engine. Last but not least the term "supported" could be replaced by "assisted" as "assisted aerotow" might be better understandable than "supported aerotow".	Proposed new wording: The Special Condition is applicable **to powered sailplanes for procedures to use the propulsion system to assist aero-tow**. delete the term "sustainer" and replace the term "supported" in the SC by "assisted" in paragraphs SC-B22.01 SC-B22.05 SC-B22.06 Interpretative Material (Remark. then perhaps the new speed definition could/should be renamed VTA instead of VTS) and change wording in the proposed AMC 22.1581 amendment (i.e. "assisted" instead of "sustained")			partially accepted	Change of the term 'supported' to 'assisted' is agreed. The wording of the SC has been modified accordingly and V_{TS} renamed in V_{TA}. A change of the applicability is not accepted. A control of the propulsion power by means of turning on/off is not considered a safe operation. Controlling a slack towrope by sole means of the wheel brake is not considered a safe operation either.
2	*European Sailplane Manufacturers*	SC-B22.05 - Operating Limitations	1	Clarification regarding the term "maximum take-off mass.	Proposed new wording: "…than the minimum recommended airspeed for aerotow at maximum take-off mass **of the towed sailplane**".			accepted	The wording of the SC has been modified accordingly.
3	*European Sailplane Manufacturers*	SC-B22.06 - Aircraft Flight Manual	2	Under c) a new point 22.1585 (p) is required, where the estimated impact to the performance of the towing combination has to be stablished. This is certainly useful information for the pilot, but difficult to impossible for the sailplane manufacturer as long as the performance of the tow plane is not known. At least it is clear that such an assisted aerotow is most useful for a rather weak towing combination, therefore such a combination should be used as basis.	Add an AMC: If no better data exists or if no further flight test data has been established use the following example calculation: Assume that the tow plane generated enough power to lift the towed sailplane at sailplane MTOW with 1.5 m/s at standard sea level conditions and at recommended towing speed. Then calculate the new rate of climb with identical conditions (same tow plane power, same speed, same air density) with the added drag for the not-running powerplant of the sailplane.			partially accepted	The intent of the proposed SC is not any different form the proposed AMC in this comment. An AMC has been added.
4	*Alexander Schleicher Segelflugzeugbau*	Information not provided	Information not provided	The method using the sustainer as support during towing is not new. At least the DG1000T (EASA.A.072) and the ASH25E (EASA.A.213) have this procedure officially certified in their approved AFMs.				noted	However, no Special Condition has been established by EASA, so far.
5	*Alexander Schleicher Segelflugzeugbau*	Information not provided	Information not provided	No occurrences are known from these sailplanes already certified for sustainer supported aerotow associated with towing in this configuration.				noted	

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6	*Alexander Schleicher Segelflugzeugbau*	Information not provided	Information not provided	Actually CS 22.151, CS 22.1518 or any other CS 22 requirement does not limit the configuration of the sailplane used for aerotowing. This means, the towed glider can be in "powered configuration" having a normal aerotow. Of course, in each configuration allowed for towing the sailplane must fulfil all requirements of CS-22 associated with towing (refer to 22.151(e)). The special condition clarifies this and summarizes the requirements, which is appreciated. But finally, it stays a normal aerotow. This point is especially important for operation, that a sustainer supported aerotow is not a new launching method. This hint should be added in the special condition				not accepted	It is not in the intent of CS-22 that the powerplant of the towed sailplane is in operation. Consequently, a sustainer assisted aerotow constitutes an unconventional use of the sailplane.
7	*Transport Canada – AARTC/D*	Requirements	1	Missing reference "22.581"	Suggest to add "22.581", if needed.	Suggestion		accepted	Reference has been added
8	*Transport Canada – AARTC/D*	New	2	Proposed new Special Condition as follows: **" SC-B22.XX - General requirements on systems and equipment function** Equipment and systems required to comply with the operation of the towed powered sailplane with its engine in operation or whose improper functioning would lead to a hazard to the towing combination or its occupants, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the towing combination is certified."	Suggest to add new SC-B22.XX, if needed, unless a safety assessment of the towing combination with the towed powered sailplane engine operating throughout the intended operating phases (take off and climb) is part of this proposed EASA SC. There is no specific pointer to such safety assessment.	Suggestion		noted	Any 1309 requirement does not exist in CS-22, i.e., a Functional Hazard Assessment (FHA) is not required for sailplanes. Nevertheless, CS-22 incorporates mitigation of safety hazards within its requirements. In this respect, a safety assessment has been performed for the proposed EASA SC and lead to the mitigations incorporated into the EASA SC: The identified safety thread is a loss of engine power during take-off and climb. Consequently, applicants are required to comply with: • SC-B22-02 (b): No credit towards performance • SC-B22-03: Flight test with engine running and stopped (failed) • SC-B22-06 (e)(q): AFM emergency procedure for loss of power

9	*Transport Canada – AARDD/NAC*	SC-B22.01 – Applicability		Need to be clear that the term “sustainer” excludes self-launching systems – introduce definition. With this definition, most current IC engine pylon mounted sustainer designs would not be acceptable; electric motor or turbojet pylon mounted sustainers would likely be acceptable. <u>Perspectives and Considerations</u> <u>Sustainers</u>: Front End Sustainers: • Electric motor; battery powered; controllable power • Fold out propeller – most current designs not suitable for self launch due to propeller clearance and limited thrust capability • Configuration not suitable for aerotow due to interference with tow rope regardless of release position: forward or CG. Pylon Mounted – Sustainer IC engine: • Typically retractable • Typically no electric starter - windmill start – decompression valve to allow spool-up • Power not controllable • Limited speed envelope (nominally 55 knots – less than typical aerotow speeds – automatic propeller overspeed cutout) • Configuration not suitable for aerotow due to windmill start design. Pylon Mounted – Sustainer Electric • Typically retractable • Electric motor; battery powered; controllable power Pylon Mounted – turbojet sustainer • Typically retractable • Controllable thrust <u>Self Launching</u>: Pylon mounted – IC engine Electric start Controllable power Pylon mounted – Electric Typically retractable Electric start Controllable power	See in the comment summary	Yes	No	Partially accepted	The SC has been amended to clarify that the applicability is not limited to non-self-launchable powered sailplanes. Powered sailplane with a nose mounted propeller will hardly comply with SC-B22.04.

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NR	Author	Section, table, figure	Page						
				Pylon Mounted – turbojet Typically retractable Controllable thrust					
10	*Transport Canada – AARDD/NAC*	SC-B22.02 – Performance		Demonstration of allowable degradation of performance on aerotow in the event of sustainer failure while continuing aerotow to support SC-B22.06 (CS22.1585(p))	See in the comment summary	Yes	No	partially accepted	please refer to comment 3
11	*Transport Canada – AARDD/NAC*	SC-B22.02 – Performance		CS 22.51 / CS 22.65 It is likely impossible to show, for any sailplane, that a deployed propulsion system (i.e. either operational (idling) or inoperative (failed or wind-milling but not stowed)) will not have condition where take-off and climb performance is negatively impacted. Consequently, Point a), as currently written, may be impossible to achieve.	SUGGEST REPLACING WITH: *"a) Performance loses associated with realistic operating or failure modes of the propulsion system of the towed powered sailplane, must be determined or factored for the take-off and climb phases of flight."*	Yes	No		SC-B22.02 addresses a situation in which the powerplant of the towed sailplanes is fully functional. The failure conditions are addressed in SC-B.22.03 b) and SC-B22.06 e) (q)
12	*Transport Canada – AARDD/NAC*	SC-B22.03 – Flight Test		Compliance to CS 22.151(a)(3); 22.151(c) – while SC-B22-01 specifies controllable power, use of power adjustment for regaining normal aerotow position from the initial displacement conditions may require exceptional pilot skills not representative of average pilots. It would seem that use of normal slack rope techniques (eg. use of rudder) rather than power management would be a more intuitive and successful technique considering normal aerotow training. Consideration of unstable atmospherics which increase difficulty in maintaining normal aerotow position. Perhaps operating limitation for low tow only since this can mitigate displacement and recovery in unstable atmospherics.	See in the comment summary	Yes	No	not accepted	The controllable power is of importance for the phase where the towing combination is not moving yet, i.e., the rope is attached but the tug plane is preparing for take-off. In this phase the powerplant of the towed sailplane is running but should be in idle. In the phase where the tug plane is rolling but not airborne yet, but the towed sailplane is airborne already, an adjustment of the power might be necessary. Applying air brakes or side slip at low altitude is not recommended. Please see IMC 1 e)

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13	*Transport Canada – AARDD/NAC*	SC-B22.03 – Flight Test		While not listed here, CS-22.143(a) for pilot skill and alertness may also be impacted by the need to simultaneously maintain tow position and manage the powerplant while on aerotow. As this is a new and novel aerotow technique, the workload required should be assessed, including in conditions of strong wings and lift/sink which could reasonably be encountered in service; a. Pilot workload could be impacted by the type of powerplant controls the glider utilizes. The workload required to manage the engine with binary controls (ie. either ON/MAX or IDLE/OFF) may be less than a powerplant that allows fine adjustment of power or propeller blade angle (ie. for a non-fixed pitch propeller). • For takeoff, there is a risk that early power application (ie. before the tow aircraft) or rapid application of power could result in the glider catching up to the tow plane, creating slack in the rope, or resulting in the glider overrunning the tow rope with its skid plate. b. If the glider utilizes a power lever that allows fine adjustment of power or propeller blade angle, a pitch change associated with power adjustments could affect the workload and alertness required to maintain or correct aerotow positioning, thereby affecting 22.151(c)(2) and (3). Should this section explicitly include 22.151(a)(3) and (c)(2) for regaining normal tow position when displaced vertically? The use of sailplane power on takeoff or tow could affect the ability to descend from an inadvertent high tow position.	Suggesting to add CS 22.143 Suggesting to add explicitly 22.151(a)(3) and (c)(2)	Yes	No	noted	EASA is not disagreeing with the comment; however, EASA believes that the intend is covered. As matter of principle the compliance demonstration is not limited to the items addressed by the SC. The applicant has to produce a certification programme for which all requirements of CS-22 amended by this SC apply, i.e., C2 22.143 and 22.151 are applicable. An introduction has been introduced to remind about this fact.

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14	*Transport Canada – AARDD/NAC*	SC-B22.03 – Flight Test		CS 22.151 It would be best to re-label SC-B22.03 as "AEROTOWING FLIGHT CHARACTERISTICS" vice "FLIGHT TEST". The minimum and maximum power setting(s) chosen by the applicant for aerotow, including any resultant failure condition, must be safely demonstrated and declared.	SUGGEST ADDING: *"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."* SUGGEST ADDING: "*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."*	Yes	No	accepted	The text of the SC has been adjusted accordingly.
15	*Transport Canada – AARDD/NAC*	SC-B22.04 – Powerplant		Since SC-B22-01 - Applicability refers to "…with a controllable power of the propulsion", it would seem appropriate to include this as a requirement in this powerplant SC. Include requirement for starter for sustainer powerplant. Note that these powerplant special conditions for sustainer supported aerotow are in addition to the requirements of Subpart E - Powerplant	See in the comment summary	Yes	no	accepted	The text of the SC has been adjusted accordingly.

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16	*Transport Canada – AARDD/NAC*	SC-B22.04 – Powerplant		CS 22.1149(a)(1) states "If there are propeller speed or pitch controls, their operation must not require undue attention or exceptional skill". This paragraph may be affected, as the skill to required to maintain tow position, with the additional task of managing propeller speed or pitch controls may be high, especially in the case where the glider encounters lift and may "catch up" to the tow plane, resulting in slack cable and a simultaneous need to correct both position and power (versus pitch alone, as is currently the case on aerotow without use of glider propulsion). "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)." What is the allowable clearance? Does this rule out gliders with nose mounted propellers due to the fact that the tow rope is generally attached in the vicinity of the nose, and nose mounted propeller would likely cut the tow rope?	See in the comment summary	Yes	No	noted	see commend 13. Yes, powered sailplane with a nose mounted propeller will hardly comply with SC-B22.04.
17	*Transport Canada – AARDD/NAC*	SC-B22.05 - Operating Limitations		Possibly establish limitations with regard to demonstrated capability for sustainer supported aerotow.	See in the comment summary	Yes	No	noted	22.1501 applies, see comment 13
18	*Transport Canada – AARDD/NAC*	SC-B22.05 – Operating Limitations		CS 22.1557, Miscellaneous Marking and Placards	SUGGEST ADDING: *"CS 22.1557 is amended by the following point: A placard must be provided stating any power setting limitations during sustainer supported aerotow operations."*	Yes	No	accepted	The text of the SC has been adjusted accordingly.
19	*Transport Canada – AARDD/NAC*	SC-B22.05 – Operating Limitations		The intended function of Sustainer systems is to be used similar to an emergency system when needed help the glider reach a landing area. After use for supported aerotow the powerplant energy quantity (fuel, battery capacity) necessary to support the original intended function may be insufficient.	SC-B22.05 - Operating Limitations should clearly address the remaining energy required to fulfil the original intended role.	Yes	No	noted	A field landing (outlanding) of a sailplane is a normal operation that usually occurs when the pilot is unable to detect or utilise any updraft. The sustainer system is a 'nice-to-have' system that helps to avoid the effort of retrieval by trailer. The retrieval by trailer and car can easily take several hours. This means a sustainer system is by no means an emergency system a pilot would be required to rely on. It is never approved as such. The use during aerotow is not any different from any use e.g., after a winch launch to search for an updraft. However, SAO.OP.145 applies.

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20	*Transport Canada – AARDD/NAC*	SC-B22.06 – Airplane Flight Manual / Subpart G – Operating Limitations and Information:		CS 22.1513: Should the powerplant retraction speed be greater than VT to ensure that the powerplant can be safely stowed on aerotow, if need be? CS 22.1581(a)(2) "Other information necessary for safe operation" may be affected, if special procedures or additional information are required to safely carry out sustainer supported aerotow.	See in the comment summary	Yes	No	noted	An retraction during aerotow will be impossible in most of the cases due to the windmilling propeller at V_T. CS 22.1581 (a)(2) applies, see comment 13.
21	*Transport Canada – AARDD/NAC*	SC-B22.06 – Airplane Flight Manual		CS 22.1581 thru 22.1587, Aircraft Flight Manual	SUGGEST ADDING: *"CS 22.1583(g) – For the towed sailplane, the maximum permissible power setting for aerotow operations must be established."* SUGGEST ADDING: *"CS 22.1587 is amended by the following point: For sustainer assisted towing operations, all take-off and climb performance penalties resulting from the deployment, use, idling or realistic failure modes of the propulsion system of the towed powered sailplane, must be determined or factored for the take-off and climb phases of flight."*	Yes	No	partially accepted	point 1 has been accepted and the text of the SC has been amended accordingly. point 2: is addressed in SC-B22.06 e) (p)
22	*Transport Canada – AARTA*	General		The Canadian Aviation Regulations (CAR) are silent on this issue. The exception would be if the operating manual of the glider being used addressed/prohibited such operation.	Not applicable	No	No	noted	EASA believes that the launch method addressed in this SC constitutes an unconventional use of the sailplane and is usually not covered by the approved launch method 'aerotow'. The AFM explicitly needs to allow this operation.

* Please complete this column using the word "yes" or "no"
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