European Aviation Safety Agency	**Comment Response Document (CRD) to Special Condition for Turboshaft Engines "Approval of 30-minute Take-off Power Rating"** *(published on 09 February 2011)*	**Date:** 21.09.2011

EASA responses to Comments from:

Section 1 – EASA responses to Comments from Turboméca

For Turboméca comments, refer to the following :

Commentor	*Turboméca*	***Comment #***	*1*
Paragraph	Requirement Reference		
Comment :	C1: The definitions of the ratings are contained in CS-Definitions, not in CS-E. Therefore definition of the new rating has to be added in CS-Definitions which should also be considered in the list of the "requirement reference".		
Justification			
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Partially accepted.** This SC only amends CS-E paragraphs. At this time it has not been considered necessary to amend CS-Definitions, however CS-Definitions is added in Requirement Reference for completeness. Opportunity of amending CS-Definitions will be evaluated when this SC will be undertaken in rulemaking task E.015 Incorporation of Special Conditions in CS-E.		

Commentor	*Turboméca*	***Comment #***	*2*
Paragraph	Heading		
Comment	C2: it is proposed to clarify that this rating allows higher power than Maximum Continuous rating. The word "increased" is not sufficiently clear as it does not define in comparison with which power.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** "increased power" replaced by "higher power than Maximum Continuous Power".		

Commentor	*Turboméca*	***Comment #***	*3*
Paragraph	Requirement Reference; Statement of Issue		
Comment	C3: List of CS-E paragraphs is to be updated and CS-Definition to be added to be consistent with all this Special Condition (SC).		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** List of CS-E paragraphs is updated and CS-Definitions is added.		

Commentor	*Turboméca*	***Comment #***	*4*
Paragraph	Statement of Issue		
Comment	C4: the word "rating" seems redundant here.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** Word "rating" deleted.		

Commentor	*Turboméca*	***Comment #***	*5*
Paragraph	several		
Comment	C5: - Previous names are to be completed by adding the 30 minutes Take-off power (as another name is finally proposed by Turbomeca hereafter). - HIP-SARM: to our knowledge, it was used in the past more often for multi-engine rotorcraft than single-engine rotorcraft. - To remain consistent with the rating definitions principles of CS-Definitions, this rating should be called "30-minute power" as this rating may be used while all engines are operative and limited in use to continuous periods of not more than 30 minutes each. See also comment [C6]. In addition, this proposed name is more likely to be consistent with FAA name. The rating Name is to be modified accordingly throughout this SC.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** The rating has been renamed "30-minute Power" rating throughout the final SC.		

Commentor	*Turboméca*	***Comment #***	*6*
Paragraph	Discussion		
Comment	C6: With regard to power requirements, in these previous applications, the rating was equivalent to the Take-off rating. However, there is no reason for a generic requirement to impose this new rating to be equal to the Take-off power rating. The generic special condition should allow this rating to be above the Maximum Continuous rating up to equal to the Take-off rating. In addition it seems more appropriate to address this power level aspect before addressing the names subject, therefore the order of the subparagraphs is modified.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** The final SC now states that the "30-minute Power" rating may be set at any level between the Maximum Continuous up to and including the Take-off rating.		

Commentor	*Turboméca*	***Comment #***	*7*
Paragraph	Discussion		
Comment	C7: Only for clarification and to avoid confusion: note that E 20, E 25 and E 60 address specifically only the OEI ratings (only 30sec/2 min OEI for E25/E60) but not the "normal" ratings.		
Proposed Text (if applicable)	n/a		
EASA Response	Noted.		

Commentor	*Turboméca*	***Comment #***	*8*
Paragraph	Endurance Tests		
Comment	C8: - Time for maximum continuous rating should be added for completeness and to provide better understanding how E 740 test schedules have been established. For same reasons, case of engine having both 30 minute OEI and Continuous OEI ratings should be added. - It is to be noted that in Part33.87 (c), before Amendment 33.25 (2008), for engines with a 30 minutes OEI rating, there was no continuous 30 minutes periods required at Take-off rating (they were removed from Take-off and taken as part of the 12.5 hours required for the 30 minutes rating). JAR-E/CS-E statement in E 740(c)(2)(iii) formally accepts this 33.87 schedule. It is proposed to add this statement. See also [C19]. - The general principle followed in the establishment of the different E740 schedules has always been: time necessary for the validation of a rating is taken from time spent at lower power. See also [C20].		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Partially accepted.** - {Time for maximum continuous rating} and {case of engine having both 30 minute OEI and Continuous OEI ratings} have both been added in the table of time at ratings for Endurance Tests. - The differences between CS-E 740 (c)(2) and FAR 33.87 (c) have been eliminated at FAR 33 Amendment 33-25 therefore EASA does not see the former FAR 33.87 schedule as a relevant basis for comparison. It is to be noted that this reference is foreseen to be proposed for removal in a future CS-E update. - Additional testing is required to validate the "30-minute Power" rating. EASA has decided to leave the option to the Applicant to either include this additional testing within the overall test normally required by CS-E 740, or perform a complementary test, or a combination thereof. Time necessary for the validation of the "30-minute Power" rating may be proposed to be taken from time spent at lower		

	power.

Commentor	*Turboméca*	***Comment #***	*9*
Paragraph	Pilot Alert		
Comment	C9: to require instrument or means required at aircraft level is in contradiction with CS-E principles. Indeed, requirement of showing compliance with Aircraft requirement has been removed from JAR-E since change 10 (NPA-E-29). As a reminder, here is an extract from 'NPA-E-29 (Subparagraph Justification of changes)' : *<<After discussion, the ESG concluded …..and agreed the following principles: an Engine type certificate acknowledges compliance of a given hardware with some given requirements in some assumed conditions. It is the Engine manufacturer responsibility to take care of the feasibility of the installation of the Engine in an aircraft>>*. In particular, the E60 (a) requirement of JAR E change 9 requiring the provision for instruments required by the aircraft requirements has been removed from JAR-E by this NPA. Therefore, this requirement should be removed from this Special Condition.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** Requirement has been removed from the final SC.		

Commentor	*Turboméca*	***Comment #***	*10*
Paragraph	Engine Deterioration		
Comment	C10: this title does not seem appropriate. "Instructions for Continued Airworthiness" is considered more adequate and is consistent with CS-E 25.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Not accepted.** This section specifically intends to address engine deterioration.		

Commentor	*Turboméca*	***Comment #***	*11*
Paragraph	Engine Deterioration		
Comment	C11: *<<will not exceed its acceptable limits, which are either those assumed for declaring the engine… (TBO), or any other "on-condition" limits defined in the … (ICA)>>*: This wording does not seem adequate. ICA define preventative checks /inspections and associated acceptable limits which constitute criteria for maintenance action/removal and may also define hard time limits such as TBO. Engine deterioration may be greater and faster provided it is adequately covered by the instructions contained in the engine ICA (this can be made, if necessary,		

	through appropriate inspection/checks and/or appropriate maintenance action/removal and /or more severe inspection/checks intervals and /or more severe associated removal criteria). The target is to ensure that safety objectives remain acceptable with the proposed ICA or in other words the target is to ensure the continued airworthiness of the engine. Wording requiring that limits defined in the ICA must not be exceeded is difficult to interpret and confusing. In addition such a wording is not contained in current CS-E 25.
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.
EASA Response	**Accepted.** EASA agrees that the Applicant may propose appropriate instructions in the engine ICA to ensure that the engine deterioration in service will not be excessive. The final SC is modified accordingly.

Commentor	*Turboméca*	***Comment #***	*12*
Paragraph	Engine Deterioration		
Comment	C12: *"For this, means must be provided, which may consist of a manual increment log,…"* : the CS cannot require as mandatory such means if they are not necessary/relevant for a given engine. Such means are to be provided only if required by the ICA. Proposed modified wording is consistent with CS-E 25 proposal here below.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Not accepted.** EASA considers that whatever instructions are required by the ICA, the time spent at the "30-minute Power" rating must be recorded and available. Therefore means (manual or automatic) must be provided to count the time spent at the "30-minute Power" rating.		

Commentor	*Turboméca*	***Comment #***	*13*
Paragraph	EASA Position- CS-E 20 & CS-E 25		
Comment	C13: - The special conditions related to CS-E 20 and CS-E 25 must be segregated as they cover separate subjects. In the proposal in attachment 2, CS-E 20 and CS-E 25 are separated. - In CS-E 20 only items related to operating limitations are kept. In addition the sentence related to pilot monitoring is considered to be an AMC or interpretative material as such details are not currently contained in CS-E 20. - In CS-E 25, only items related to Instructions for Continued Airworthiness are kept. Proposed wording is consistent with comment [C11] and consistent with wording contained in current CS-E 25. Usage limitations are extended and not limited to		

	"cumulated time" which is deemed too specific and not relevant to all engines. The Requirement to include limitations associated with the use of the 30-minutes power rating in the TCDS is removed as there is no reason to include such limitations in the TCDS. This is not required by CS-E even for the 30-second OEI rating for which mandatory actions are required. Limits associated with the use of the 30-minutes power rating (which could be for example cumulated time limitation or limit based on an appropriate counter…) are of a nature similar to the TBO which is never specified in the TCDS.
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.
EASA Response	**Partially accepted.** - CS-E 20 and CS-E 25 paragraphs are segregated in the final SC. - The sentence related to pilot monitoring is not considered to be AMC or interpretative material as it contains the word "must". - The requirement to include the limitations in the TCDS are removed in the final SC.

Commentor	*Turboméca*	***Comment #***	*14*
Paragraph	EASA Position- CS-E 40		
Comment	C14: Subparagraph (b) should be specified as this is an additional rating to the standard ratings of E 40(a). Note: this even could lead to create a new CS-E 40 (b)(4) "Turbine Engines for Rotorcraft" if preferred.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** (b) added in final SC. The new sentence is: In addition to the ratings already listed in CS-E 40 (b), a new "30-minute Power" rating is created and defined as follows…		

Commentor	*Turboméca*	***Comment #***	*15*
Paragraph	EASA Position- CS-E 40		
Comment	C15: - As explained under Comment [C1], the rating is added in CS-E 40 list, but the definition is to be created in CS-definitions. The definition proposed in the EASA proposal is not consistent with current rating definitions provided in CS-Definitions. The proposal made in attachment 2 is based on the wording used for the definition of the Rated 30-sec OEI power rating. -As explained under Comment [C6], the requirement imposing this rating to be equal to Take-off rating is removed.		
Proposed Text	->See changed text proposed in Attachment 2 – Turboméca		

(if applicable)	proposal.
EASA Response	**Partially accepted.** See EASA responses to Comments # 1 and 6.

Commentor	*Turboméca*	***Comment #***	*16*
Paragraph	EASA Position- CS-E 60		
Comment	C16: As explained under Comment [C9], the requirement related to CS-E 60 is to be removed. The second sentence is also to be removed as its associated paragraph should be CS-E 20. In addition this sentence is redundant as it is already contained in CS-E 20 of this SC.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** - See EASA response to Comment # 9. - Paragraph CS-E 60 has been removed from the final SC. - The second sentence is already contained in CS-E 20 paragraph.		

Commentor	*Turboméca*	***Comment #***	*17*
Paragraph	EASA Position- CS-E 515		
Comment	C17: Wording has been complemented to consider that the cycle counting system can also be an appropriate mean to take into account any 30-min rating usage impact. If the usage of the 30-min rating has an impact for a given Engine variant, it may be preferred to keep unchanged the Reference cycle used to declare the Cycle lives in order to keep the same declared lives for parts having same P/N on different variants and then to compensate the impact by an appropriate counting specific to this variant. Both methods enable to meet the Airworthiness objectives.		
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** Both methods may be acceptable provided usage of the "30-minute Power" rating is appropriately accounted for. The final SC is modified accordingly.		

Commentor	*Turboméca*	***Comment #***	*18*
Paragraph	EASA Position- CS-E 740		
Comment	C18: - The reasoning used here by the Agency is based on the assumption that originally the 12.5 hours requirement for the 30 minutes OEI rating was established on the basis it was not an AEO rating. Was it really the case when the type test was established in BCAR Section C? Does the agency have data to state that if it were not an OEI rating (i.e. an AEO rating), more than one run of 30 minutes in each of the 25 stages of the type test schedule would have		

	been requested? In a similar manner, were the 25 hours of the Continuous OEI rating established on the basis it was not an AEO rating? It is interesting to note that in E 740, the time required at the Continuous OEI rating is higher than the time required at the Maximum Continuous rating. Does the agency have data to state that if it were not an OEI rating (i.e. an AEO rating), more than one run of 1 Hour in each of the 25 stages of the type test schedule would have been requested? Turbomeca considers these are fundamental points to be clarified before freezing the 25 hours requirement for the 30 minutes rating in a generic Special Condition. This aspect being open, it is not covered in attachment 2 and 3 of this letter. - Without consideration of the consequence of the above question, it is proposed that clarification is added to highlight that this rating is limited in use to periods not exceeding 30 minutes each.
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.
EASA Response	**Partially accepted.** - EASA position is that although the "30-minute Power" rating might be considered equivalent in principle to the 30-minute OEI rating, in practice it may be used more frequently. Therefore the test requirements associated with this new rating have been developed using the approach previously adopted for the Continuous OEI rating. The test therefore consists of 25 hours of testing at the conditions described in the final SC. - For these 25 hours credit may be sought for time accrued during other parts of the test normally required by CS-E 740. This allowance excludes the time spent at "standard" Take-off power, but may include for instance time spent at OEI ratings. It must then be shown that these sequences were run with operating limitations equal to or higher than the "30-minute Power" rating operating limitations. - The justification for exclusion of the time spent at "standard" Take-off power in the endurance test is because in service the "30-minute Power" may be used at any time in the same flight in addition to the normal take-off sequence. - The final SC clarifies that the "30-minute Power" rating may be used for multiple periods of up to 30 minutes each.

Commentor	*Turboméca*	***Comment #***	*19*
Paragraph	EASA Position- CS-E 740		
Comment	C19: EASA proposal is to require 25 hours in addition to time run at Take-off rating and therefore is understood as excluding the continuous 30 minutes periods which may be run at Take-off rating. Turbomeca does not agree with this position for the following reasons:		

	- As the 30-minutes rating is equal to or below the Take-off rating, any run carried out at Take-off rating during continuous 30 minutes periods covers all the parameters conditions required for the 30-minutes rating and therefore are technically valid. There is no technical reason to exclude them. They should not be excluded only on the basis of the rating name. - Consideration of the time run at Take-off rating during continuous 30 minutes periods is consistent with consideration of time accrued during other parts of the test as for time at OEI rating when they are equal to or above the 30-min rating. Exclusion of time spent during Take-off rating would be inconsistent with acceptance of credit for other parts of the test. - This is not consistent with the general type test philosophy which has always been: time run at a rating validates lower rating. This principle may be illustrated by: - 740(c)(2)(i)part3(B) with 30min OEI + Continuous OEI ratings which says: "A Continuous OEI rating and a 30-minute OEI rating at a higher power level can be cleared in the same test, if desired, by running 30 minutes at Maximum Continuous Power followed by 30 minutes at Continuous OEI Power and then 30 minutes at 30Minute OEI Power ". -, 740(c)(2)(ii) which says: " if only one additional rating is required, then the periods at the rating not required must be run at the power/thrust level appropriate to the next rating down the scale.", - refer also to table1 provided at the end of this attachment. It shows that these principles have been used to establish the different schedules for current E 740. - Table 1 also shows that if 30 minutes periods at Take-off rating are not considered, the total time accrued for 30 minutes periods would be 30 hours whatever the engine has a 30 min OEI rating (limited to 30 min. periods) or a Continuous OEI rating(periods of unrestricted duration) or not (assumption is made that the OEI and Take-off ratings are at least equal to the 30 minutes rating). This is not deemed technically logical. - Table 1 shows that if 30 minutes periods at Take-off rating are considered, the total time accrued for 30 minutes periods would be 30 hours if only the engine has a Continuous OEI rating (i.e. rating with periods of unrestricted duration) and 25 hours if only the engine has a 30min OEI rating (limited to 30 min. periods). Same assumption as above is made about rating scaling. This is deemed more technically logical. - Moreover, (see table 1) in case of test carried out in accordance with 33.87(c) with a 30min OEI rating, the total duration would be 25 hours i.e. inconsistent with the 30 hours according to EASA SC but consistent with the 25 hours according to Turbomeca proposal with such a rating.

	- FAR33.87 (c) pre 2008 (i.e. from 1964 up to amendment 24 included and therefore up to 2008 (Amendment 25) did not contain any 30min periods at Take-Off rating. All 30min periods at Take-Off rating have been taken for 30min OEI rating validation (whatever 30min OEI rating is lower or higher than TO rating). This FAR33.87(c) schedule is formally accepted by JAR E 740 from change 7 up to CS-E Amendment 3 included (ref. E 740 (c)(2)(iii)). Therefore, such engines, which are obviously as Airworthy as other engines, have a Take-off rating validated without running specific 30-minutes periods at Take-off rating. This principle should remain valid for the 30-minutes rating. - It is reminded that Take-off rating may be used for a continuous period of 10 minutes for aeroplane engines (in case of OEI condition) whereas for turboshafts it is always limited in use to a continuous period of 5 minutes. When allowed for 10 minutes period (aeroplane engine case only), there is no modification of the type test schedule i.e. no additional running, nor extension of the required periods. Therefore, even if we were unable to find the origin of the 30 minutes periods at Take-off rating, we can assume that one of the targets was to cover the 10 minute period at Take off rating which does not exist for turboshafts.
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.
EASA Response	**Not accepted.** See EASA responses to Comment # 8 and 18.

Commentor	*Turboméca*	***Comment #***	*20*
Paragraph	EASA Position- CS-E 740		
Comment	C20: - The general principle followed in the establishment of the different E740 schedules has always been: time necessary for the validation of a rating is taken from time spent at lower power. - This is, in particular, illustrated by: - 740(c)(2)(i)part3(B) with 30min OEI + Continuous OEI ratings which says: "A Continuous OEI rating and a 30-minute OEI rating at a higher power level can be cleared in the same test, if desired, by running 30 minutes at Maximum Continuous Power followed by 30 minutes at Continuous OEI Power and then 30 minutes at 30Minute OEI Power ". - 740(c)(2)(ii) which says: "if only one additional rating is required, then the periods at the rating not required must be run at the power/thrust level appropriate to the next rating down the scale.", - Table 1 (see 2nd column from the right) clearly shows that		

	this principle has always been used in E 740 for any rating in addition the two "standard" ratings (i.e. Take –off and Max Continuous). - This principle is consistent with the following sentence (from second bullet of E 740 SC): *"-If, for compliance with the above requirement, credit is sought for time accrued during other parts of the test (e.g. for time at OEI ratings), it must be shown that these sequences were run with operating limitations equal to or higher than the "30-minute" rating operating limitations."* - Turbomeca does not agree with a rule requiring that the 25 hours are in addition of the current 150 hours leading to a longer E 740 Endurance test. Turbomeca is opposed to a E740 Endurance test requirement leading to a test duration of 170 hours or more. (This could be the case for a single engine rotorcraft or for multi-engine rotorcraft with OEI rating lower than the 30 minutes rating). In addition, this would lead to inconsistency within the SC itself (see item just above). - The 25 hours, if not already covered by other ratings (equal to or higher), should be taken from lower power. It should be clearly stated that if, for compliance with the 25 hours requirement, specific running at this 30-minutes power rating is necessary, time run at this rating may be taken from lower power levels.
Justification	
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.
EASA Response	**Not accepted.** See EASA responses to Comment # 8 and 18.

Commentor	*Turboméca*	***Comment #***	*21*
Paragraph	EASA Position- CS-E 740		
Comment	C21: reference to E740(h)(1) is deemed more appropriate.		
Justification			
Proposed Text (if applicable)	->See changed text proposed in Attachment 2 – Turboméca proposal.		
EASA Response	**Accepted.** (1) is added. Sentence becomes: This will be justified by compliance with CS-E 740(h)(1).		

Attachment 1 – Turboméca comments embedded in the proposed SC

Turboshaft Engines
Approval of 30-minute Take-off *[C5]* Power Rating
Special Condition
Issue: 1: ***Turbomeca comments***
Date: ***08/03/2011***
Subject: Approval of Turboshaft 30-minute Take-off ***[C5]*** Power Rating
Requirement Reference: ***[C1]*** Following CS-E[1] requirements: CS-E 20, CS-E 25, CS-E 40, CS-E 60 ***[C3],*** CS-E 515 and CS-E 740
[1]: CS-E – Certification Specifications for Engines, Amendment 3, dated 23 December 2010
This Special Condition needs to be raised for the approval of an additional rating for turboshaft engines.
This rating allows helicopter hovering at ***[C2]*** increased power for a limited time and is not currently defined in CS-E 40.
Turbomeca comments:
C1: The definitions of the ratings are contained in CS-Definitions, not in CS-E. Therefore definition of the new rating has to be added in CS-Definitions which should also be considered in the list of the "requirement reference". *->See final text proposed in attachment 2.*
C2: it is proposed to clarify that this rating allows higher power than Maximum Continuous rating. The word "increased" is not sufficiently clear as it does not define in comparison with which power. *->See final text proposed in attachment 2.*
Statement of Issue:
This Special Condition defines the requirements for certification of a rating ***[C4]*** "30-minute Take-off ***[C5]*** Power" rating for a turboshaft engine, which covers prolonged helicopter hovering out of ground effect. This rating is intended to be used for periods of up to 30 minutes at any time between the take-off and landing phases in any flight without requiring additional post-flight maintenance. In accordance with Part 21A.16B, as there are no CS-E requirements covering such rating, a Special Condition is necessary. The following requirements are affected: CS-E 20, CS-E 25, CS-E 40, CS-E 60 ***[C3],*** and CS-E 740.
Turbomeca comments:
C3: List of CS-E paragraphs is to be updated and CS-Definition to be added to be consistent with all this Special Condition (SC). *->See final text proposed in attachment 2.*
C4: the word "rating" seems redundant here. *->See final text proposed in attachment 2.*
Discussion:
The first request to the Agency for the certification of such a rating was in 1997. Since then, there have been several more requests, and each has been the subject of a special Condition under a Certification Review Item (CRI) written specifically for the particular programme. The Agency anticipates further requests in the future and has therefore developed this Special Condition to ensure consistency in the requirements for certification of the rating.
[C6]
In the past this rating has been called: ***[C5]***
-AEO (All Engine Operative), generally in the case of multi-engine rotorcraft

and/or
-HIP-SARM (Hovering at Increased Power for Search and Rescue Missions), generally in the case of single-engine rotorcraft
With regard to power requirements, the rating is equivalent to the Take-off rating. ***[C6]***
CS-E provides requirements for a number of engine ratings. "Take-off" and "Maximum Continuous" ratings (referred to as "Standard ratings") are listed in CS-E 40(a); "Other ratings" are listed in CS-E 40(b). In particular, CS-E 40(b)(3) lists One Engine Inoperative (OEI) ratings, applicable to Turbine Engines for Multi-Engine Rotorcraft. The requirements and associated usage limitations and conditions for these OEI ratings are clearly described in CS-Definitions and CS-E 20, CS-E 25, CS-E 40, CS-E 60 and CS-E 740. ***[C7]***
Turbomeca comments:
C5: - Previous names are to be completed by adding the 30 minutes Take-off power (as another name is finally proposed by Turbomeca hereafter).
- HIP-SARM: to our knowledge, it was used in the past more often for multi-engine rotorcraft than single-engine rotorcraft.
- To remain consistent with the rating definitions principles of CS-Definitions, this rating should be called "30-minute power" as this rating may be used while all engines are operative and limited in use to continuous periods of not more than 30 minutes each. See also comment [C6]. In addition, this proposed name is more likely to be consistent with FAA name. The rating Name is to be modified accordingly throughout this SC.
->See final text proposed in attachment 2.
C6: - With regard to power requirements, in these previous applications, the rating was equivalent to the Take-off rating. However, there is no reason for a generic requirement to impose this new rating to be equal to the Take-off power rating. The generic special condition should allow this rating to be above the Maximum Continuous rating up to equal to the Take-off rating. In addition it seems more appropriate to address this power level aspect before addressing the names subject, therefore the order of the subparagraphs is modified. *->See final text proposed in attachment 2.*
C7: - Only for clarification and to avoid confusion: note that E 20, E 25 and E 60 address specifically only the OEI ratings (only 30sec/2 min OEI for E25/E60) but not the "normal" ratings.
Endurance Tests ***[C8]***
As background information, the following table is a reminder of the test times required by CS-E 740 at the Take-off rating, as well as at the 30-minute OEI and Continuous-OEI ratings if those ratings are requested by the Applicant. It also shows the time required at continuous periods of minimum 30 minutes:

Table

Notes:
-30-Second and 2-Minute OEI ratings are not quoted in the table as they are usually at higher power levels and are associated with mandatory inspections and/or maintenance actions.
-With regard to the 2½-Minute OEI rating, CS-E 740 requires replacing 2 hours and 5 minutes at Take-off rating by 2 hours and 5 minutes at the 2½-Minute

OEI rating
In order to cover the Endurance Test safety objectives for the "30-minute Take-off ***[C5]*** Power" rating,
the Applicant shall propose and justify additional running time at or above this additional rating, including continuous 30 minute periods.
Turbomeca comments:
C8:
- Time for maximum continuous rating should be added for completeness and to provide better understanding how E 740 test schedules have been established. For same reasons, case of engine having both 30 minute OEI and Continuous OEI ratings should be added. . *->See final text proposed in attachment 2.*
- It is to be noted that in Part33.87 (c), before Amendment 33.25 (2008), for engines with a 30
minutes OEI rating, there was no continuous 30 minutes periods required at Take-off rating (they
were removed from Take-off and taken as part of the 12.5 hours required for the 30 minutes rating.). JAR-E/CS-E statement in E 740(c)(2)(iii) formally accepts this 33.87 schedule. It is proposed to add this statement. See also [C19]. *->See final text proposed in attachment 2.*
- The general principle followed in the establishment of the different E740 schedules has always been: time necessary for the validation of a rating is taken from time spent at lower power. See also [C20]. . *->See final text proposed in attachment 2.*
Pilot alert ***[C9]***
Provision for means must be available to alert the pilot when the 30 minutes continuous time spent at the "30-minute Take-off ***[C5]*** Power" rating has expired, would it be required at aircraft level.
Turbomeca comments:
C9: - to require instrument or means required at aircraft level is in contradiction with CS-E principles. Indeed, requirement of showing compliance with Aircraft requirement has been removed from JAR-E since change 10 (NPA-E-29). As a reminder, here is an extract from 'NPA-E-29 (Subparagraph Justification of changes)' **:** <<After discussion, the ESG concluded …..and agreed the following principles: an Engine type certificate acknowledges compliance of a given hardware with some given requirements in some assumed conditions. It is the Engine manufacturer responsibility to take care of the feasibility of the installation of the Engine in an aircraft>>.
In particular, the E60 (a) requirement of JAR E change 9 requiring the provision for instruments required by the aircraft requirements has been removed from JAR-E by this NPA. Therefore, this requirement should be removed from this Special Condition.
->See final text proposed in attachment 2.
Engine deterioration ***[C10]***
It must be ensured that the engine deterioration in service will not exceed its acceptable limits, which are either those assumed for declaring the engine Time Between Overhaul (TBO), or any other "on condition" limits defined in the engine Instructions for Continued Airworthiness (ICA) ***[C11]***. For this, means must ***[C12]*** be provided, which may consist of a manual increment log, or automatic counting through the Engine Control Unit (ECU) of the time spent at

the "30-minute Take-off ***[C5]*** Power" rating.

Turbomeca comments:

C10: - this title does not seem appropriate. "Instructions for Continued Airworthiness" is considered more adequate and is consistent with CS-E 25. *->See final text proposed in attachment 2.*

C11: - <<will not exceed its acceptable limits, which are either those assumed for declaring the engine… (TBO), or any other "on-condition" limits defined in the ….(ICA)>>**: *This wording does not seem adequate. ICA define preventative checks /inspections and associated acceptable limits which constitute criteria for maintenance action/removal and may also define hard time limits such as TBO. Engine deterioration may be greater and faster provided it is adequately covered by the instructions contained in the engine ICA (this can be made, if necessary, through appropriate inspection/checks and/or appropriate maintenance action/removal and /or more severe inspection/checks intervals and /or more severe associated removal criteria). The target is to ensure that safety objectives remain acceptable with the proposed ICA or in other words the target is to ensure the continued airworthiness of the engine. Wording requiring that limits defined in the ICA must not be exceeded is difficult to interpret and confusing. In addition such a wording is not contained in current CS-E 25.*** *->See final text proposed in attachment 2.*

C12: - "For this, means must be provided, which may consist of a manual increment log,…." **: *the CS cannot require as mandatory such means if they are not necessary/relevant for a given engine.***

Such means are to be provided only if required by the ICA. Proposed modified wording is consistent with CS-E 25 proposal here below. *->See final text proposed in attachment 2.*

EASA Position:

The Certification Basis for the [engine model] in addition to the applicable airworthiness code is amended by this Special Condition as follows:

CS-E 20 Engine Configuration and Interfaces & ***[C13]***

CS-E 25 Instructions for Continued Airworthiness

Operating limitations and cumulated time limitation (if any) associated with use of the "30-minute Takeoff ***[C5]*** Power" rating must be specified in the Instructions for Continued Airworthiness (ICA) and will be included in the Type Certificate Data Sheet (TCDS).

It must be demonstrated that the use of the "30-minute Take-off***[C5]*** Power" rating in service will not result in engine deterioration in excess of that assumed for the engine TBO (if one is declared) or in exceeding any other "on-condition" limit defined in the engine ICA.

If monitoring is to be performed by the pilot this must be specified in the instructions for installing and operating the engine.

Turbomeca comments:

C13: - The special conditions related to CS-E 20 and CS-E 25 must be segregated as they cover separate subjects. In the proposal in attachment 2, CS-E 20 and CS-E 25 are separated.

- In CS-E 20 are only kept items related to operating limitations. In addition the sentence related to pilot monitoring is considered to be an AMC or interpretative material as such details are not currently contained in CS-E 20.

- In CS-E 25, are only kept items related to Instructions for Continued

Airworthiness.
Proposed wording is consistent with comment [C11] and consistent with wording contained in current CS-E 25.
Usage limitations are extended and not limited to "cumulated time" which is deemed too specific and not relevant to all engines.
The Requirement to include limitations associated with the use of the 30-minutes power rating in the TCDS is removed as there is no reason to include such limitations in the TCDS. This is not required by CS-E even for the 30-second OEI rating for which mandatory actions are required. Limits associated with the use of the 30-minutes power rating (which could be for example cumulated time limitation or limit based on an appropriate counter…) are of a nature similar to the TBO which is never specified in the TCDS.
->See final text proposed in attachment 2.

CS-E 40 Ratings

In addition to the ratings already listed in CS-E 40 ***[C14]*** , a new "30-minute Take-off ***[C5]*** Power" rating is created and defined as follows: ***[C15]***

"Rated 30-minute Take-off ***[C5]*** power" means the brake horsepower, developed in standard atmosphere at sea level or specified altitude, limited in use for periods of no more than 30 minutes each at rotor shaft rotation speed and gas temperature established for this rating.

The 30-minute Take-off ***[C5]*** rating is equivalent in power to the Take-off rating. It is intended for usage for periods of up to 30 minutes at any time between the take-off and landing phases in any flight.

Turbomeca comments:
C14: - Subparagraph (b) should be specified as this is an additional rating to the standard ratings of E 40(a). Note: this even could lead to create a new CS-E 40 (b)(4) "Turbine Engines for Rotorcraft" if preferred. *->See final text proposed in attachment 2.*
C15: -As explained under Comment [C1], the rating is added in CS-E 40 list, but the definition is to be created in CS-definitions. The definition proposed in the EASA proposal is not consistent with current rating definitions provided in CS-Definitions. The proposal made in attachment 2 is based on the wording used for the definition of the Rated 30-sec OEI power rating.
-As explained under Comment [C6], the requirement imposing this rating to be equal to Take-off rating is removed. *->See final text proposed in attachment 2.*

CS-E 60 Provision for Instruments ***[C16]***

The engine must have provision for means to alert the pilot when the 30 minutes allowable continuous time spent at the "30-minute Take-off ***[C5]*** Power" rating has expired, would it be required at aircraft level.

If monitoring is to be performed by the pilot this must be specified in the instructions for installing and operating the engine.

Turbomeca comments:
C16: As explained under Comment [C9], the requirement related to CS-E 60 is to be removed.
The second sentence is also to be removed as its associated paragraph should be CS-E 20. In addition this sentence is redundant as it is already contained in CS-E 20 of this SC. *->See final text proposed in attachment 2.*

CS-E 515 Engine Critical Parts

A representative usage of the "30-minute Take-off ***[C5]*** Power" rating must be included in the Engine Flight Cycle used for the establishment of the Approved Life of the Engine Critical Parts. ***[C17]***

Turbomeca comments:

C17: - Wording has been complemented to consider that the cycle counting system can also be an appropriate mean to take into account any 30-min rating usage impact. If the usage of the 30-min rating has an impact for a given Engine variant, it may be preferred to keep unchanged the Reference cycle used to declare the Cycle lives in order to keep the same declared lives for parts having same P/N on different variants and then to compensate the impact by an appropriate counting specific to this variant. Both methods enable to meet the Airworthiness objectives. -

>See final text proposed in attachment 2.

CS-E 740 Endurance Tests

The following modifications of the test schedules required by CS-E 740(c) have been established as an acceptable means to demonstrate the capability of the engine in regard to this additional rating. The requirements are based on those associated with the Continuous OEI rating. Although the "30-minute Take-off ***[C5]*** Power" rating might be considered equivalent in principle to the 30-minute OEI rating, the Agency believes that in practice the "30-minute Take-off***[C5]*** Power" rating may be used more

frequently, and therefore that the test time associated with the Continuous OEI rating is a more appropriate precedent. ***[C18]***

-***[C19]*** In addition to the time at Take-off power required by CS-E 740, a further 25 hours consisting of continuous periods greater than or equal to 30 minutes must be run at the power level and associated operating limitations of the "30-minute Take-off ***[C5]*** Power" rating. The modified/additional test periods must be uniformly distributed throughout the endurance testing. In any case the modification of the CS-E 740 test sequences (order and schedules) must be proposed by the Applicant and accepted by the Agency.

-If, for compliance with the above requirement, credit is sought for time accrued during other parts of the test (e.g. for time at OEI ratings), it must be shown that these sequences were run with operating limitations equal to or higher than the "30-minute Take-off ***[C5]*** Power" rating operating limitations.

- ***[C20]***

-It may be possible that the intended engine usage and performance characteristics are such that its power will be limited by mechanical limitations for a certain portion of its missions. In that case it may be acceptable to run a representative percentage of the runs to these mechanical limits, but not to exceed 50% of the required further 25 hours, i.e. 12.5 hours. The remaining percentage must be run to the higher thermal limits. The proposal must be substantiated and proposed to the Agency for acceptance.

No specific maintenance action is expected following the use of the "30-minute Take-off ***[C5]*** Power" rating. This will be justified by compliance with CS-E 740(h). ***[C21]***

Any other method proposed by the Applicant shall be justified and will be subject to the acceptance of the Agency.

Turbomeca comments:

C18: -The reasoning used here by the Agency is based on the assumption that originally the 12.5 hours requirement for the 30 minutes OEI rating was established on the basis it was not an AEO

rating. Was it really the case when the type test was established in BCAR Section C? Does the agency have data to state that if it were not an OEI rating (i.e. an AEO rating), more than one run of 30 minutes in each of the 25 stages of the type test schedule would have been requested? In a similar manner, were the 25 hours of the Continuous OEI rating established on the basis it was not an AEO rating? It is interesting to note that in E 740, the time required at the Continuous OEI rating is higher than the time required at the Maximum Continuous rating. Does the agency have data to state that if it were not an OEI rating (i.e. an AEO rating), more than one run of 1 Hour in each of the 25 stages of the type test schedule would have been requested? Turbomeca considers these are fundamental points to be clarified before freezing the 25 hours requirement for the 30 minutes rating in a generic Special Condition. This aspect being open, it is not covered in attachment 2 and 3 of this letter.

- Without consideration of the consequence of the above question, it is proposed that clarification is added to highlight that this rating is limited in use to periods not exceeding 30 minutes each. . *->See final text proposed in attachment 2.*

C19: EASA proposal is to require 25 hours in addition to time run at Take-off rating and therefore is understood as excluding the continuous 30 minutes periods which may be run at Take-off rating. Turbomeca does not agree with this position for the following reasons:

- As the 30-minutes rating is equal to or below the Take-off rating, any run carried out at Take-off rating during continuous 30 minutes periods covers all the parameters conditions required for the 30-minutes rating and therefore are technically valid. There is no technical reason to exclude them. They should not be excluded only on the basis of the rating name.

- Consideration of the time run at Take-off rating during continuous 30 minutes periods is consistent with consideration of time accrued during other parts of the test as for time at OEI rating when they are equal to or above the 30-min rating. Exclusion of time spent during Take-off rating would be inconsistent with acceptance of credit for other parts of the test.

- This is not consistent with the general type test philosophy which has always been: time run at a rating validates lower rating. This principle may be illustrated by:

- 740(c)(2)(i)part3(B) with 30min OEI + Continuous OEI ratings which says: "A Continuous OEI rating and a 30-minute OEI rating at a higher power level can be cleared in the same test, if desired, by running 30 minutes at Maximum Continuous Power followed by 30 minutes at Continuous OEI Power and then 30 minutes at 30Minute OEI Power ".

-, 740(c)(2)(ii) which says: " if only one additional rating is required, then the periods at the rating not required must be run at the power/thrust level appropriate to the next rating down the scale***.",***

- refer also to table1 provided at the end of this attachment. It shows that these principles have been used to establish the different schedules for current E 740.

- Table 1 also shows that if 30 minutes periods at Take-off rating are not considered, the total time accrued for 30 minutes periods would be 30 hours whatever the engine has a 30 min OEI rating (limited to 30

min. periods) or a Continuous OEI rating (periods of unrestricted duration) or not. (assumption is made that the OEI and Take-off ratings are at
least equal to the 30 minutes rating). This is not deemed technically logical.
- Table 1 shows that if 30 minutes periods at Take-off rating are considered, the total time accrued for 30 minutes periods would be 30 hours if only the engine has a Continuous OEI rating (i.e. rating with periods of unrestricted duration) and 25 hours if only the engine has a 30min OEI rating (limited to 30 min. periods). Same assumption as above is made about rating scaling. This is deemed more technically logical.
- Moreover, (see table 1) in case of test carried out in accordance with 33.87(c)with a 30min OEI rating, the total duration would be 25 hours i.e. inconsistent with the 30hours according to EASA SC but consistent with the 25 hours according to Turbomeca proposal with such a rating.
- FAR33.87 (c) pre 2008(i.e. from 1964 up to amendment 24 included and therefore up to 2008 (Amendment 25) did not contain any 30min periods at Take-Off rating.
All 30min periods at Take-Off rating have been taken for 30min OEI rating validation (whatever 30min OEI rating is lower or higher than TO rating).
This FAR33.87(c) schedule is formally accepted by JAR E 740 from change 7 up to CS-E Amendment 3 included (ref. E 740 (c)(2)(iii)). Therefore, such engines, which are obviously as Airworthy as other engines, have a Take-off rating validated without running specific 30-minutes periods at Take-off rating.
This principle should remain valid for the 30-minutes rating.
- It is reminded that Take-off rating may be used for a continuous period of 10 minutes for aeroplane engines (in case of OEI condition) whereas for turboshafts it is always limited in use to a continuous period of 5 minutes. When allowed for 10 minutes period (aeroplane engine case only), there is no modification of the type test schedule i.e. no additional running, nor extension of the required periods. Therefore, even if we were unable to find the origin of the 30 minutes periods at Take-off rating, we can assume that one of the targets was to cover the 10 minute period at Take off rating which does not exist for turboshafts.
->See final text proposed in attachment 2.
C20: -The general principle followed in the establishment of the different E740 schedules has
always been: time necessary for the validation of a rating is taken from time spent at lower power.
-This is ,in particular, illustrated by:
- 740(c)(2)(i)part3(B) with 30min OEI + Continuous OEI ratings which says: "A Continuous OEI rating and a 30-minute OEI rating at a higher power level can be cleared in the same test, if desired, by running 30 minutes at Maximum Continuous Power followed by 30 minutes at Continuous OEI Power and then 30 minutes at 30Minute OEI Power ".
-, 740(c)(2)(ii) which says: " if only one additional rating is required, then the periods at the rating not required must be run at the power/thrust level appropriate to the next rating down the scale***.",***

- Table 1 (see 2nd column from the right) clearly shows that this principle has always been used in E 740 for any rating in addition the two "standard" ratings (i.e. Take –off and Max. Continuous).
- This principle is consistent with the following sentence (from second bullet of E 740 SC)
"-If, for compliance with the above requirement, credit is sought for time accrued during other parts of the test (e.g. for time at OEI ratings), it must be shown that these sequences were run with operating limitations equal to or higher than the "30-minute " rating operating limitations."
-Turbomeca does not agree with a rule requiring that the 25 hours are in addition of the current 150 hours leading to a longer E 740 Endurance test. Turbomeca is opposed to a E740 Endurance test requirement leading to a test duration of 170 hours or more. (This could be the case for a single engine rotorcraft or for multi-engine rotorcraft with OEI rating lower than the 30 minutes rating). In addition, this would lead to inconsistency within the SC itself (see item just above).
- The 25 hours, if not already covered by other ratings (equal to or higher), should be taken from lower power. It should be clearly stated that if, for compliance with the 25 hours requirement, specific running at this 30-minutes power rating is necessary, time run at this rating may be taken from lower power levels.
. *->See final text proposed in attachment 2.*
C21: reference to E740(h)(1) is deemed more appropriate. . *->See final text proposed in attachment 2.*

Table 1 referred in Turboméca comments # 19 and 20

Table 1

Rating structure	Take off	Take-off dont durée à période 30 min continue	30 min OEI	30 min. OEI dont durée à période 30 min continue	Continuous OEI	Continuous. OEI dont durée à période 30 min continue	30 min rating EASA/TM	30 min rating dont durée à période 30 min continue EASA/TM	durée totale à période 30min continue, hors PMC et hors 30min rating	durée totale à période 30min continue, hors PMC with 30 min rating EASA/TM	PMC (no 30 min. rating considered)	Current CS-E : durée OEI prise sur	durée 30min prise sur (selon EASA SC)	Current CS-E : Hiérarchie régimes	Principle used for current ratings in JAR-E/CS-E	Principle to be used for 30 min. rating. (when TO and OEI > or = 30 min rating)
standard rating (i,e, TO+PMC)	18.75	5					25/20	25/20	5	30/25	45		Lower rating or means TD=175Hours?			should include 5H at TO(30min periods) , remaining 20 Hours taken on lower rating
with 30 min OEI only	18.75	5	12.5	12.5			12.5/7.5	12.5/7.5	17.5	30/25	32.5	sur PMC	12.5 H covered by 30min OEI if > or = 30min, and lower rating or TD=162.5 Hours?	30min OEI peut être < ou > à TO mais tj > PMC	pris sur 1er regime obligatoirement inferieur	should include 5H at TO, and 12.5 at 30 min OEI, remaining 7.5 Hours taken on lower rating
with Cont OEI only	18.75	5			25	25	0/0	0/0	30	30/30	20	sur PMC	25 H covered by Continuous OEI, if > or = 30 min	Cont OEI peut être < ou > à TO mais tj > PMC	pris sur 1er régime obligatoirement inferieur	25 H covered by TO(30min periods) + Continuous OEI
with 30min OEI+Cont OEI (30min > Cont OEI)	18.75	5	12.5	12.5	12.5	12.5	0/0	0/0	30	30/30	20	- 30 min OEI sur Cont OEI - Cont OEI sur PMC	25 H covered by Continuous OEI and 30min OEI, if both> or = 30 min	30 min OEI > Cont OEI	pris sur 1er regime obligatoirement inferieur	25 H covered by TO(30min periods) + Continuous OEI and 30min OEI,
+ with 30 min OEI only, 33.87 dated 2007	13.75	0	12.5	12.5			12.5/12.5	12.5/12.5	12.5	25/25	50	sur TO+ increments	12.5 H covered by 30min OEI if > or = 30min, and lower rating or TD=162.5 Hours?	30min OEI peut être < ou > à TO mais tj > PMC		should include 12.5 at 30 min OEI, remaining 12.5hours taken on lower rating

PMC=Puissance maximum continue= Maximum Continuous rating
TO= Take-off rating
TD= Total Endurance test duration

Attachment 2 – Turboméca proposal

Change information

Turboshaft Engines
Approval of 30-minute ~~Take-off~~ Power Rating
Special Condition(as proposed by Turbomeca)

Issue: 1 as proposed by Turbomeca
Page 1/3
Date:
~~09.02.2011~~08/03/2011

Subject: Approval of Turboshaft 30-minute ~~Take-off Power~~ Rating

Requirement Reference: CS Definitions and ~~Following~~ following CS-E[1] requirements: CS-E 20, CS-E 25, CS-E 40, ~~CS-E 60,~~ CS-E 515 and CS-E 740
[1] : CS- Definitions, Amendment 2, dated 23 December 2010
CS-E – Certification Specifications for Engines, Amendment 3, dated 23 December 2010

This Special Condition needs to be raised for the approval of an additional rating for turboshaft engines.
This rating allows helicopter hovering at ~~increased~~ higher power than Maximum Continuous power for a limited time and is not currently defined in CS-E 40.

Statement of Issue:
This Special Condition defines the requirements for certification of a ~~rating~~ "30-minute ~~Take-off~~ Power" rating for a turboshaft engine, which covers prolonged helicopter hovering out of ground effect. This rating is intended to be used for periods of up to 30 minutes at any time between the take-off and landing phases in any flight without requiring additional post-flight maintenance.
In accordance with Part 21A.16B, as there are no CS-E requirements covering such rating, a Special Condition is necessary. The following requirements are affected: CS- Definitions and CS-E 20, CS-E 25, CS-E 40, CS-E ~~60~~ 515 and CS-E 740.

Discussion:
The first request to the Agency for the certification of such a rating was in 1997. Since then, there have been several more requests, and each has been the subject of a special Condition under a Certification Review Item (CRI) written specifically for the particular programme. The Agency anticipates further requests in the future and has therefore developed this Special Condition to ensure consistency in the requirements for certification of the rating.
With regard to power requirements, in these previous applications, the rating was equivalent to the Takeoff rating. However, it is considered the 30 min rating may be above the maximum Continuous rating up to equal to the Take-off rating.

In the past this rating has been called:
-AEO (All Engine Operative) 30 minutes, generally in the case of multi-engine rotorcraft and/or
-HIP-SARM (Hovering at Increased Power for Search and Rescue Missions), either~~generally~~ in the case of single-engine rotorcraft or multi-engine rotorcraft or
-30 minutes Take–off
To remain consistent with the rating definitions principles of CS-Definitions, this rating will be called "30-minute power" as this rating may be used while all engines are operative and limited in use to continuous periods of not more than 30 minutes each. ~~With regard to power requirements, the rating is equivalent to the Take-off rating.~~
CS-E provides requirements for a number of engine ratings. "Take-off" and "Maximum Continuous" ratings (referred to as "Standard ratings") are listed in CS-E 40(a); "Other ratings" are listed in CS-E 40(b). In particular, CS-E 40(b)(3) lists One Engine Inoperative (OEI) ratings, applicable to Turbine Engines for Multi-Engine Rotorcraft. The requirements and associated usage limitations and conditions for these OEI ratings are clearly described in CS-Definitions and CS-E 20, CS-E 25, CS-E 40, CS-E 60 and CS-E 740.

Endurance Tests
As background information, the following table is a reminder of the test times required by CS-E 740 at the Take-off rating, Maximum Continuous rating as well as at the 30-minute OEI and Continuous-OEI ratings if those ratings are requested by the Applicant. It also shows the time required at continuous periods of minimum 30 minutes:

Time at ratings for Endurance Test (hours) Ref: CS-E 740 (c)(1)&(2)	Take-off	of which time for continuous 30 min periods	30-min OEI	30-min OEI of which time for continuous 30 min periods	Continuous OEI	of which time for continuous 30 min periods	Maximum Continuous
"Standard ratings" only	18,75	5					45
-with 30-min OEI only	18,75	5	12.5	12.5			32.5
-with Cont-OEI only	18,75	5			25	25	20
-with 30-min OEI and Cont-OEI	18.75	5	12.5	12.5	12.5	12.5	20

Notes:
-30-Second and 2-Minute OEI ratings are not quoted in the table as they are usually at higher power levels and are associated with mandatory inspections and/or maintenance actions.
-With regard to the 2½-Minute OEI rating, CS-E 740 requires replacing 2 hours and 5 minutes at Take-off rating by 2 hours and 5 minutes at the 2½-Minute OEI rating

- It is to be noted that in Part 33.87 (c), before Amendt 33.25 (2008), for engines with a 30 minutes OEI rating, there was no continuous 30 minutes periods required at Take-off rating (they were removed from Take-off and taken as part of the 12.5 hours required for the 30 minutes rating). JAR-E/CS-E statement in E 740(c)(2)(iii), formally accepts this 33.87 schedule.
- The general principle followed in the establishment of the different E740 schedules has always been: time necessary for the validation of an additional

rating is taken from time spent at lower power.
In order to cover the Endurance Test safety objectives for the "30-minute ~~Take-off~~ Power" rating, the Applicant shall propose and justify ~~additional~~ running time at or above this additional rating, consisting of~~including~~ continuous 30 minute periods.

Pilot alert
~~Provision for means must be available to alert the pilot when the 30-minutes continuous time spent at the~~
~~"30-minute Take-off Power" rating has expired, would it be required at aircraft level.~~

~~Engine deterioration~~Instructions for Continued Airworthiness (ICA):
It must be ensured that the engine deterioration in service will not be excessive and adequately covered by the ICA.~~exceed its acceptable limits, which are either those assumed for declaring the engine Time Between Overhaul (TBO), or any other "on-condition" limits defined in the engine Instructions for Continued Airworthiness (ICA). For this~~If necessary, , means ~~must~~ may be provided, which may consist of a manual increment log, or automatic counting through the Engine Control Unit (ECU) of the time spent at the "30-minute ~~Take-off~~ Power" rating.

EASA Position:
The Certification Basis for the [engine model] in addition to the applicable airworthiness code is amended by this Special Condition as follows:

CS-E 20 Engine Configuration and Interfaces ~~& ~~:
E 20(d): The Operating limitations associated with use of the 30-minute Power rating are to be specified in the Instructions for installing and Operating manual(s).
AMC E 20 (or interpretative material): If monitoring is to be performed by the pilot this must be specified in the instructions for installing and operating the engine.

CS-E 25 Instructions for Continued Airworthiness
The usage of the 30-minute Power rating is to be considered in the establishment of the Instructions for
Continued Airworthiness.
~~Operating limitations and c~~Usage limitations (if any) such as cumulated time limitation ~~(if any)~~ associated with use of the "30-minute ~~Takeoff~~ Power" rating must be specified in the Instructions for Continued Airworthiness (ICA)~~)and will be included in the Type Certificate Data Sheet (TCDS).~~ .
~~It must be demonstrated that the use of the "30-minute Take-off Power" rating in service will not result in engine deterioration in excess of that assumed for the engine TBO (if one is declared) or in exceeding any other "on-condition" limit defined in the engine ICA.~~
~~If monitoring is to be performed by the pilot this must be specified in the instructions for installing and operating the engine.~~

CS-E 40 Ratings
In addition to the ratings already listed in CS-E 40(b), a new "30-minute ~~Take-off~~ Power" rating is

addedcreated and defined as follows:.

CS-Definitions
In CS-Definitions, a new "30-minute Power" rating is created and defined as follows:
"Rated 30-minute Take-off power" means , with respect to rotorcraft turbine engines, the approved brake horsepower, developed under static conditionsin standard atmosphere at sea level or at specified altitudes and temperatures within the operating limitations established for the engine, limited in use for periods of no more than 30 minutes. each at rotor shaft rotation speed and gas temperature established for this rating.
This e 30-minute Take-off rating is equivalent in power to the Take-off rating. It is intended for usage for periods of up to 30 minutes at any time between the take-off and landing phases in any flight.

CS-E 60 Provision for Instruments
The engine must have provision for means to alert the pilot when the 30 minutes allowable continuous
time spent at the "30-minute Take-off Power" rating has expired, would it be required at aircraft level.
If monitoring is to be performed by the pilot this must be specified in the instructions for installing and operating the engine.

CS-E 515 Engine Critical Parts
A representative usage of the "30-minute Take-off Power" rating must be included in the Engine Flight Cycle used for the establishment of the Approved Life of the Engine Critical Parts, or/and taken into account in the method for accounting for the number of cycles used in operation.

CS-E 740 Endurance Tests
The following modifications of the test schedules required by CS-E 740(c) have been established as an acceptable means to demonstrate the capability of the engine in regard to this additional rating. The requirements are based on those associated with the Continuous OEI rating. Although the "30-minute Take-off Power" rating might be considered equivalent in principle to the 30-minute OEI rating, the Agency believes that in practice the "30-minute Take-off Power" rating may be used more frequently,
and therefore that the test time associated with the Continuous OEI rating is a more appropriate
precedent, recognizing in another hand that the 30-minute power rating is limited in use to periods not exceeding 30 minutes each.
-In addition to the time at Take-off power required by CS-E 740, a furtherDuring the test required by CS-E 740, 25 hours consisting of continuous periods greater than or equal to 30 minutes must be run at the power level and associated operating limitations of the "30-minute Take-off Power" rating. The modified/additional test periods must be uniformly distributed throughout the endurance testing. In any case the modification of the CS-E 740 test sequences (order and schedules) must be proposed by the Applicant and accepted by the Agency.
-If, for compliance with the above requirement, credit is sought for time accrued during other parts of the test (e.g. for time at OEI ratings), it must be shown that these sequences were run with operating limitations equal to or

higher than the "30-minute ~~Take-off~~ Power" rating operating limitations.
-If, for compliance with the 25 hours requirement, specific running at this 30-minutes power rating is necessary, time run at this rating may be taken from lower power levels.
-It may be possible that the intended engine usage and performance characteristics are such that its power will be limited by mechanical limitations for a certain portion of its missions. In that case it may be acceptable to run a representative percentage of the runs to these mechanical limits, but not to exceed 50% of the required further 25 hours, i.e. 12.5 hours. The remaining percentage must be run to the higher thermal limits. The proposal must be substantiated and proposed to the Agency for acceptance.
No specific maintenance action is expected following the use of the "30-minute ~~Take-off~~ Power" rating.
This will be justified by compliance with CS-E 740(h)(1).
Any other method proposed by the Applicant shall be subject to the acceptance of the Agency.

Section 2 – EASA responses to Comments from Rolls-Royce Turbomeca Ltd (RRTM)

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*22*
Paragraph	not referred		
Comment	The rating definition should be created in CS-Definitions. It should be called "30-minute power" rating to be consistent with other definitions from CS-Definitions.		
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).		
EASA Response	**Partially accepted:** see EASA responses to Comment # 1 and 5 in Section 1 of this CRD.		

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*23*
Paragraph	not referred		
Comment	Special conditions for CS-E 20 and CS-E 25 should be segregated.		
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).		
EASA Response	**Accepted:** see EASA response to Comment # 13 in Section 1 of this CRD.		

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*24*
Paragraph	not referred		
Comment	Special conditions for CS-E 25 should be more consistent with current CS-E 25.		
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).		
EASA Response	**Partially accepted:** see EASA responses to Comments # 11, 12 and 13 in Section 1 of this CRD.		

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*25*
Paragraph	not referred		
Comment	The 30 min rating should not be defined as equal to the take-off rating.		
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).		
EASA Response	**Accepted:** see EASA response to Comment # 6 in Section 1 of this CRD.		

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*26*
Paragraph	not referred		

Comment	Credit should be allowed for time accrued at any rating equal or higher than the 30-min rating.
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).
EASA Response	**Partially accepted:** see EASA responses to Comments # 8 and 18 in Section 1 of this CRD.

Commentor	*Rolls-Royce Turbomeca Ltd (RRTM)*	***Comment #***	*27*
Paragraph	not referred		
Comment	The total duration of the type test should remain within the current 150 Hours duration.		
Proposed Text (if applicable)	Text proposed by RRTM is the same as changed text proposed by Turboméca (see Attachment 2 – Turboméca proposal in Section 1 of this CRD).		
EASA Response	**Partially accepted:** see EASA responses to Comments # 8 and 18 in Section 1 of this CRD.		

Section 3 – EASA responses to Comments from UK CAA

Commentor	*UK CAA*	***Comment #***	*28*
Paragraph	Statement of Issue		
Comment	It is not clear here, and later in the paper, whether the rating is intended for multiple periods of up to 30 minutes in one flight (between take-off and landing) or cumulative periods to a maximum total time of 30 in one flight. This point should be made clear.		
Justification	Clarification of intent		
Proposed Text (if applicable)	n/a		
EASA Response	**Accepted**. The sentence has been modified as follows: "This rating is intended to be used for **multiple** periods of up to 30 minutes **each**, at any time between the take-off and landing phases in any flight,…"		

Commentor	*UK CAA*	***Comment #***	*29*
Paragraph	Pilot Alert		
Comment	The text is rather unclear and a revised version is offered below.		
Justification	Clarity		
Proposed Text (if applicable)	Provision for means ~~must be available~~ to alert the pilot when the 30 minutes continuous time spent at the "30-minute Take-off Power" rating has expired ***must be made available***, ~~would it be required at aircraft level~~.		
EASA Response	**Not Applicable**. The paragraph has been deleted and the associated paragraph CS-E 60 has been removed. See EASA responses to Comments # 9 and 16.		