

Document Comment Log (Table) - Internal Coordination Comments Disposition

Proposed Policy Statement, PS-ASW-27,29-10; Title: Policy Statement Concerning Non-Required Safety Enhancing Equipment (NORSEE) in Rotorcraft.

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EASA, D. Haddon	General	<p>The draft policy statement details an interesting concept, which we see as offering some merit. Encouraging operators to fit non-required equipment, if done correctly, may enhance safety and is generally welcomed by EASA and is fully in-line with the objectives of IHST/EHEST. However, the concept as drafted is a fundamental change to existing certification practice, will invalidate many of the 1309 principles, and will allow equipment to be installed that introduce additional hazards without the necessary system integrity. While safety management at product level offers safety benefits, all aspects must be taken into account, including operational rules, human factors and other flight aspects, and this draft policy statement does not cover some of those aspects as it focusses only on system and cost considerations. The current Safety assessment process takes into account multiple factors that are not considered in the draft policy statement and the expected intent to improve safety could not be met for that reason.</p>	<p>Therefore, before introducing such a policy, EASA would welcome an opportunity to further discuss this topic, and this may be best accomplished through an international forum.</p>	<p>Not adopted; the NORSEE policy intent is to allow an acceptable method to incorporate safety enhancing equipment into rotorcraft, with the clear understanding that the hazard level assessed is not reduced, but the design assurance level to meet that hazard is reduced by one level. This approach does address the fact that these NORSEE systems can realize this reduction, when those systems are not required. Hence, the operational rules are addressed (if the presented system is required, it is not eligible for the NORSEE approach). There is no relaxation in the human factors and other flight aspects, mentioned in your comment. The Safety Assessment is not altered in any way, from the current approach. The relaxation is strictly on the system design assurance level, and that is only allowed once the applicant has presented, and the FAA has accepted, that the proposed system provides an appreciable safety improvement to the rotorcraft fleet. This approach will not allow, in any way, an “uncontrolled systemic DAL reduction”. Rather, the intent is to tightly control those systems and installations, with the clear understanding that the safety benefit must outweigh any reasonable potential for a hazardous condition. We believe this approach has the potential to improve rotorcraft safety.</p>

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		<p>Furthermore, EASA is concerned by the lack of consistency brought about through this draft policy statement and we believe that it may promote adverse system design driven solely by cost considerations. For example, the uncontrolled systemic DAL reduction may lead to detrimental effects if adequate safety assessments are not performed.</p>		
EASA, C.2, PME	General	This policy is not really consistent.	<p>If an equipment is NORSEE, then it should be judged on its own merits and not by reference to a similar equipment in completely different operating conditions. As such the example is not well chosen and I can hardly imagine that the loss of function of a NORSEE could be catastrophic.</p> <p>The main issue being the misleading information, the “no hazard” part of the no hazard/no credit.</p> <p>The FHA (then SSA) should fit the equipment and its use (operating environment) and an automatic reduction of the DAL level associated with the FHA/SSA of similar equipment, but in a different operating context, does not make real sense to me. The mitigations are the key element to be considered in the FHA.</p>	Partially adopted; the NORSEE policy will be changed to clearly state that as NORSEE; the loss of any proposed system’s function MUST be no more hazardous than minor. However, there could be failure conditions that, once the system is installed, rise up to and include catastrophic hazards. With regard to being consistent, the Safety Assessments still must address these conditions, there is no reduction in the assessed hazard level, however if the applicant has presented a satisfactory case that the incorporation of this system provides a significant safety benefit to the rotorcraft fleet, the reduction in DAL is allowed, ONLY so long as the system remains “Non Required”. The mitigations referenced are the key elements and are what would be captured in the project issue paper.

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ACE-114, Ryan	General	<p>The Small Airplane Directorate agrees with the intent of the policy, but believes it may be confusing as written for the following reasons:</p> <ol style="list-style-type: none"> 1) The policy allows DAL reductions per the NORSEE discriminant, but it is not clear if this is limited (ie, not sure if allowing only B>C reduction per the example, or also allowing A>B, C>D, D>E) 2) It is not clear if the same reductions are allowed in both Part 27 and in Part 29 Transport Category Rotorcraft, or just Part 27. Since NORSEE can have a negative safety impact then it fails, there may be justification to have a DAL in Part 29 that may not be appropriate or cost effective for 27. The policy needs to distinguish better what is allowed on Transport Category Rotorcraft vs. part 27, particularly for VFR limited rotorcraft. 3) It is not clear why the DAL reduction is limited to non-required equipment. ACE has seen large safety benefits from a similar DAL reduction in required systems. <p>ACE believes the DAL relief</p>	<p>Consider extending the concepts in the proposed NORSEE policy, or begin additional policy efforts that compare actual in service safety statistics of Part 27 rotorcraft with the statistical design targets behind each DAL. Use this analysis to identify a level of DAL that could be a catalyst for a similar proliferation of new technology into Part 27 as we have seen in Part 23. Means of compliance to XX.1309 already allows this flexibility, should ASW-100 choose to embrace the concept.</p>	<p>Not adopted; it is unclear how the comments made correlate to the recommendation/suggested change. The proposed recommendation seems to be calling for a FAA generated generic Functional Hazard Assessment for different types of Part 27 rotorcraft, with a resultant generic DAL for each hazard. This approach assumes more comparability between various particular rotorcraft than experience would support. The NORSEE policy is not limited to Part 27, but includes Part 29. The differences in design, construction, propulsion, systems and stability between all different types of rotorcraft make “generic” assessments less than optimum or practical. Hence, the presented approach of continued use of the FHA through 27/29.1309 assessments is appropriate. Once the hazard levels have been established, the issue paper process is the appropriate vehicle to ascertain that the design being proposed is appropriate to the hazard assessed, with the DAL reduction, IF a safety case has been made and the function/system proposed is not required by the regulations. To discount the DAL in all cases (i.e., for required and non-required systems) would result in the systemic reduction in the reliability and quality of required systems, in machines (rotorcraft) that have a significant number of “required” or critical systems that directly affect safety of flight. Allowing the DAL reduction for required systems can jeopardize rotorcraft</p>

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		<p>should be extended to required equipment and relief given based on intended functional criticality in Part 27 and 29 appropriately.</p> <p>Both expected safety level and development cost must be considered as part of the FAA certification process. If reliability design targets are so high they make a product too expensive to produce for a particular market & make development infeasible, innovation stops.</p> <p>For 10 years, the FAA has shown it is possible to use risk analysis to appropriately and judiciously reduce DAL levels for required equipment in fixed wing aircraft, resulting in an actual increase in safety instead of the perceived reduction in safety some may believe a lower DAL represents.</p> <p>In reality, a lower DAL still can represent an <u>appropriate</u> certification standard for required systems (depending on their function and redundancy), and can lead to enhanced safety.</p>		<p>safety. Although, we do not dispute that ACE has seen safety benefits from their DAL reduction policy for required systems, we do note that the accident data drivers for the ACE Part 23 concept is different than the rotorcraft accident data that is the basis for our NORSEE policy. However, the Rotorcraft Directorate is in the process of issuing a federal register notice soliciting the public's interest and ideas on possibly undergoing a future rulemaking task to review all Part 27 and 29 regulations.</p>

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ACE-116W, Paul DeVore	General	<p>It is foreseen that some types of non-required equipment would be inappropriate for the alleviation proposed by this policy memo, yet the current wording may make it difficult for the FAA specialist to deny the alleviation request. For example, an applicant may argue that an autopilot should be certified to a lower design assurance level even though the autopilot could have hazardous or catastrophic failure conditions, such as runaways or oscillations, which would have a direct detrimental effect on the flight control system.</p> <p>With no restrictions in the policy memo on what types of systems or equipment is suitable for this alleviation, the applicant's case that almost any non-required equipment they want to install would provide an overall safety benefit may be difficult to refute.</p>	Suggest limiting the alleviation to equipment or systems that do not directly interface with required aircraft systems such as flight control, autothrottle, or other similar non-essential but yet critical aircraft systems.	Not adopted; this point was considered and discussed, prior to the release of the draft policy. While the concern is valid, the issue paper is the vehicle, wherein the applicant and the certifying office, will come to agreement that the safety benefit of the proposed system is sufficient to justify any relaxation in the design assurance level. Furthermore, as with any certification project, an appropriate evaluation of the installed system will still be required, with ground and flight test, where warranted, prior to approval. Loss of control of rotorcraft is a "high hitter" on the accident cause, so to exclude systems that could, potentially, provide improved control of flight, would not be in the best interest of reducing the total number of rotorcraft accidents.
ACE-119W, Philip Petty	General	Although the stated purpose is understood, the description of how safety analysis is performed seems inconsistent with the way it is actually performed. The proposed policy describes systems that are	1) Remove all contradictions of non-required equipment having a "loss of function" criticality higher than minor.	Partially Adopted; Adopted: 1) Corrected references to non-required systems having a loss of functions to clarify that anything higher than "minor" would not be a candidate for NORSEE.

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		<p>non-required and then gives an example on page 2 of a non-required system whose loss of function is “hazardous”. It is difficult to imagine any such situation. In fact, if loss of availability of the provided function from that system is major or more severe, wouldn’t that make it a required system? Although industry tries to argue that unimportant equipment is unnecessarily held to too high of a standard due to xx.1309, this is probably an exaggerated argument. Xx.1309 is function based, so if loss of the function is a mild consequence (i.e. minor, NSE), the xx.1309 obligations for that failure condition is extremely low, so it would not be necessary to lower it. It appears this part of the policy is providing alleviation to something that does not exist. The risk of the active malfunction case is the same whether the equipment is required or not. Therefore, it is not clear that any alleviation would be justified. However, if the desire is to simply alleviate the DAL requirements on active malfunctions because the safety benefit of encouraging system</p>	<p>2) Provide a better real life example or two that better illustrates the intended The risk of the active malfunction case is the same whether the equipment is required or not. Therefore, it is not clear that any alleviation would be justified. However, if the desire is to simply alleviate the DAL requirements on active malfunctions because the safety benefit of encouraging system installation outweighs the increased risk, okay, but that doesn’t come through clearly. It seems too tied to the “non required” statement. Further, this policy is sufficiently vague for its application to vary significantly if left to the ACOs to apply. Would suggest that all such cases be coordinated on a means of compliance issue paper to ensure application as intended situation to apply this policy.</p> <p>3) Provide more consistent language that reflects the function / failure condition based approach of safety analysis. In other words, the software associated with the loss of function may be different from software associated with active malfunctions and the DAL requirements could be different. What should be lowered and what should not?</p> <p>4) Redirect the guidance away from providing the alleviation of active malfunctions being justified by the</p>	<p>Adopted: 2) Emphasized the point that a project means of compliance issue paper will be the vehicle with which this policy is implemented. (note: the issue paper was mentioned under the Effect of Policy, but will be repeated in the Implementation section, to make clear of the requirement for an issue paper).</p> <p>Not Adopted: 3) This approach was considered and the determination made to speak about “system design assurance levels”, so as not to be too prescriptive or specific. With the issue paper being required, the determination as to what hardware and/or software DAL is allowed to be relaxed will be captured.</p> <p>Not adopted: 4) We made a conscience decision to avoid a list of safety benefits that would qualify for application of the NORSEE</p>

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		<p>installation outweighs the increased risk, okay, but that doesn't come through clearly. It seems too tied to the "non required" statement. Further, this policy is sufficiently vague for its application to vary significantly if left to the ACOs to apply. Would suggest that all such cases be coordinated on a means of compliance issue paper to ensure application as intended.</p>	<p>unrelated loss of function case being a low criticality, and instead clarify the type of safety benefit that would need to exist to earn the alleviation described.</p> <p>5) There might need to be more detailed terms and guidance based on the context of SAE ARP 4754A. Which DALs are being discussed – functional DAL, item DAL, etc.?</p>	<p>approach. The applicant and FAA will utilize the issue paper to address and justify the argument as to whether a proposed system will have an overall safety benefit to the rotorcraft fleet. The applicant needs to present the case on their proposed system, on its own merits.</p> <p>Adopted: 5) More clarification to the different kinds of DALs has been included.</p>
ACE-114, Sovia	General	<p>This policy has taken a different approach than Part 23. Would it be possible for ASW to create a subset of classes of aircraft within Part 27 and/or 29 to allow DAL reductions per those classes based on risk vs. safety reward and intended function? Maybe by VFR vs. IFR rating for the aircraft, or by gross weight, number of engines, etc. Doing so would create a safety continuum within rotorcraft, reflecting what has been done and well vetted in Part 23.</p> <p>A system that is truly NORSEE should have little or no safety impact if it fails. Therefore, the</p>	<p>This policy should clearly state how much DAL reduction is appropriate, and apply to both required and non-required systems, splitting out the requirements for different type of rotorcraft designs and how they are operated. What is defined as NORSEE in a recreational GA helicopter in VFR may not be the same as what is considered NORSEE in an EMS, or in passenger transport rotorcraft in IMC.</p>	<p>Not adopted; the rotorcraft approach was purposely different than the Part 23 approach, for the very reasons stated in the Recommendation/Suggest change section, with regard to NORSEE. The size and performance have little to do with the intended use of rotorcraft. A very small percentage of rotorcraft are "recreational", however those that fall into that use range from very small to transport category. Concurrently, the vast majority of rotorcraft are "working" aircraft and again, range from the very smallest, simplest to the largest and most complex. As a result, the approach that worked so well for Part 23 does not fit Part 27/29. The NORSEE policy states that a DAL reduction of one (not below DAL D) is the appropriate DAL reduction, IF a safety case has been made by the applicant and</p>

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		<p>development level and certification requirements should be minimal when considering its safety impact.</p> <p>However, even if a system is required, it should be developed according to the criticality of the loss of function in a particular type of aircraft and operational use.</p>		<p>accepted by the FAA. As rotorcraft move into the helicopter emergency medical services (HEMS) or IFR operational use, the requirements for equipment change, and those systems/equipment would NOT be accepted as NORSEE. This is the same rationale that states the NORSEE installation needs to be clearly identified as such, so in the future, a rotorcraft that is moving into an operational use that requires the system that was previously installed as “NORSEE”, would need to have a further showing of compliance and the reduced DAL would not be accepted until that showing was made.</p>

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ACE-111, Schinstock	General	<p>How will the FAA manage the use of previously approved data from these NORSEE installation approvals to keep them from becoming the basis for installations under field approval where they may be considered required equipment?</p> <p>By limiting the policy to NORSEE, the operational use of the system now dictates whether the installation data is acceptable for a particular installation. We have experienced similar challenges in Part 23, and have had to put clear limitations on the face of any STC or installation documents to avoid a system that is acceptable in one type of aircraft from being inappropriately installed in more critical installations.</p>	<p>The FAA may or may not have knowledge of how data will be used to support follow on installations in the field. Recommend the policy dictate that “limitations for acceptable installation and use of NORSEE equipment must be clearly stated in the documentation, such as installation instructions, ICA, the face of the STC, limitations section of the AFM, etc.</p>	<p>Adopted; the statement in the NORSEE policy draft addressed this, but not in the level of detail as the example given here. It is clearly the intent that these installations, and data from them, not be mistaken for similar systems where those systems are “required”. We also added to placard the NORSEE installation, where possible, so the casual observer will be aware that the system does not meet the standards for a required system.</p>
ACE-117A (ATL ACO), Michael Cann	General	<p>I have concern regarding field approvals and field incorporation of belly bands on rotorcraft because operators and ASIs think they are safety enhancements, when in fact they have a detrimental effect on the operation of the cargo hook. Operators and ASIs have mentioned that they</p>		<p>Agreed, Partially adopted; the NORSEE policy, as drafted, involves an issue paper, which is not applicable or appropriate for field approvals. With the incorporation of the issue paper for NORSEE approvals, the applicant will be required to show justification for the safety enhancement. This is exactly why the issue paper was specifically identified as the tool for the applicant presenting their case,</p>

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		<p>believe that the belly band is a safety enhancement for HEC (not to mention the potential illegal operation of HEC on some rotorcraft). My concern is that while this policy is meant to address equipment under 2x.1301, I am afraid that belly bands might be included “safety enhancement equipment” and approved in the field thinking this policy is applicable. Jim Grigg from RD is aware of belly band issue.</p> <p>Somehow address the potential misapplication of this policy to “believed to be safety enhancement” items, specifically Belly Bands. The ACO should first have to verify that it is indeed a safety enhancement and that decision should not be made in the field by operators or ASIs due to certification or operational requirements that might not be understood in the field.</p>		<p>and the FAA accepting the argument, before the NORSEE DAL reduction approach is seen as an acceptable solution.</p>
AIR-130, S. Paasch	General	This is a general comment - actually a question - about the policy as a whole: does this policy have ramifications for the TSO system, including issues with TSO deviation requests?	Look into it and see if there are issues that need addressing in this policy statement or issues that will ripple into the TSO system in general.	Noted; the NORSEE policy is addressing installation of equipment and systems in rotorcraft, not the manufacture of those systems. This policy does not affect the TSO system. Therefore, this policy is only applicable when a TSO’ed system is proposed

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				to be installed on Part 27 or 29 rotorcraft.
AIR-120, Strasburger	General	Somewhere in this guidance recommend addressing NORSEE software that is installed in equipment that is required (e.g. IMA) to include the need for partitioning.	Add the following: “If NORSEE software is installed in required equipment and the DAL of the required equipment is higher than the NORSEE DAL, the software partitioning guidance in RTCA DO-178B must be followed.”	Adopted; added statement “If NORSEE software is installed in required equipment (such as an IMA) and the DAL of the required equipment is higher than the NORSEE DAL, the software partitioning guidance in accordance with the latest FAA recognized version of RTCA DO-178 must be followed.”
EASA, C.2.5, AFL	Pg 1, Subject	Is the term “ NORSEE ” defined in a standard or a regulation?	If yes, a reference to this standard/regulation should be made in the document. If not, it is necessary to define it to avoid future inconsistencies. For instance, RTCA DO-313 is providing a table of examples (refer to Table 1-1 in section 1.3 of the guidance material) but some earlier presentations of the FAA (http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs200/branches/afs250/ems/media/verna_fdm_norsee.pdf) includes other kind of equipment (FDM system for instance).	Noted, adopted; NORSEE is not defined in any standard or regulation. The term is explained in the first paragraph of the draft; however a dedicated definition will be added. The term has been used, previously, in FAA slide presentations and is used in AC 20-167, but has not been “defined”.
ACE-111, Schinstock	Pg 1, Purpose	The Policy indicates the FAA is encouraging the proliferation of NORSEE. Rewording this sentence will avoid conflicting language.	Second Sentence: Change “FAA should encourage” to “FAA encourages.”	Adopted; changed sentence to read as suggested.

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EASA, R.4.1, DHA	Pg 1, Purpose	<p>Comment related to the sentence: ”The FAA should encourage the use of optional, non-required equipment that can improve safety <u>for most rotorcraft in most operational conditions</u>”.</p> <p>Why limit this to mainstream rotorcraft.</p>	I think FAA should still encourage the fitment of NORSEE even if of limited applicability to the fleet or to specific types of operation.	Adopted; Changed wording to read “...for an increased number of rotorcraft under most operational conditions.”
EASA, C.2.4, HKI	Pg 1, Purpose	<p>Comment related to the sentence: “The FAA should encourage the use of optional, non-required equipment that can improve safety.”</p> <p>The idea is good but the proposal to achieve this goal is bias and dangerous. We have to understand the human behaviour in case compelling information may be provided by “none required equipment.” To compensate less reliable equipment behaviour (due to lower DAL levels) by a limitation that need to be memorized by the pilot seems not a way enhancing the safety.</p>	We have carefully to review this attempt to have finally a fake enhancement of safety.	Noted with comment; as explained in the draft policy memorandum, the onus is upon the applicant to present the safety case and for acceptance of that analysis, by the FAA, before any reduction in the system DAL is considered. This process is captured via the issue paper process and is subject to review and scrutiny prior to authorization. Certainly, there are systems that are not appropriate for consideration under the NORSEE approach. Just as clearly, there are systems that offer predictable safety enhancements, that accepting a slight reduction in the DAL, can be made available to a higher percentage of rotorcraft, with more safety enhancement, than risk of anomalous behavior being introduced with the reduced DAL.

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EASA, C.2.5, AFL	Pg 1, Purpose	<p>Comment related to the sentence: “The FAA should encourage the use of optional, non-required equipment that can improve safety”.</p> <p>I see a risk in encouraging the industry to install for instance “integrated display system” in addition to the standard instrumentation. Indeed although it is often said that in case of misleading information, the pilot can come back to the standard instrumentation, the human factors aspects should be taken into account.</p>	In my opinion, there is a risk that the pilot relies “only” on those additional installed equipment/systems, which make them becoming indirectly critical.	Noted with comment; to be considered for the NORSEE approach, the ground rule is the introduced system is not required. So, in the case of the integrated display system mentioned, the information provided is supplemental to windscreen of the aircraft, since, under the ground rule for the example provided in the policy, no attitude indicator could be “required”. The case could be made (the applicant would need to substantiate the claim) that in the event of inadvertent IMC, the availability of easily interpreted flight parameters, could lessen the likelihood of loss of control, due to disorientation. The argument would have to balance that against the probability of the reduced DAL display system presenting hazardously misleading information under VMC. IMC would not be considered a normal flight condition under NORSEE.
AIR-130, S. Paasch	Pg 1, Purpose, 2nd sentence.	The policy statement does not provide any guidance for determining what constitutes "most" rotorcraft and "most" operational conditions. This offers a wide latitude for interpretation of what the range of the policy is, which in turn offers a large opportunity for non-standardization in the application of the policy.	Provide some criteria as to what constitutes "most" rotorcraft and "most" operational conditions. (For instance, would "most operational conditions" mean within a certain set of flight envelope parameters?)	Not adopted; the policy is purposely written so as not to be “prescriptive”, but allow (and require) the applicant to present the case for justifying the safety benefit vs. the DAL reduction afforded by the NORSEE policy. This is precisely why the policy requires the use of issue paper process, which is applicable only to a TC (or STC) project.
EASA,	Pg 1,	Comment related to the sentence:		Noted with comments; the criteria necessary

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C.2.5, AFL	Purpose	<p>“A possible increased safety risk from failed or malfunctioning non-required equipment to an individual rotorcraft operating in unusual conditions should not overshadow the significant safety benefits to the rest of the fleet in most operational conditions.”</p> <p>This sentence could be misinterpreted by the industry and could lead to CS-27/29.1309 requirements being overruled.</p> <p>Any design modification to a certified rotorcraft shall follow the Part 21 Subpart D or E (whichever is applicable) Change Product Rule principles.</p> <p>In particular compliance with requirement CS-27/29.1309 needs to be demonstrated by the applicant.</p> <p>This implies that:</p> <ul style="list-style-type: none"> • Failure Conditions introduced by the NORSEE equipment (if any) need to be identified and assessed in terms of severity. • Already existing Failure Conditions to which NORSEE equipment failure (if any) are contributing need to be identified. 		<p>to be met, to be considered for NORSEE, would preclude ANY “requirement” from being overruled. In other words, if there is a requirement, the proposal is ineligible for the NORSEE approach.</p> <p>It is agreed that the applicant must consider all applicable regulations, apply the appropriate hazard analysis, failure conditions and ramifications, as with any project. If the safety case has been made (via the issue paper) a system DAL reduction of one level (not to go below DAL D) is allowed, and for software, that DAL would need to be in accordance with the FAA agreed upon guidance.</p>

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		<ul style="list-style-type: none"> DAL assignment needs to follow ARP4754A guidelines (recognized by FAA through AC 20-174 dated September 2011). 		
EASA, R.4.1, DHA	Pg 1, Purpose	<p>Comment related to the sentence: “A possible increased safety risk from failed or malfunctioning non-required equipment to an individual rotorcraft operating in unusual conditions should not overshadow the significant safety benefits to the rest of the fleet in most operational conditions.”</p> <p>Maybe in part, but it is not really about operations in unusual conditions. It is about ensuring that when used normally, the increased safety bought about by its operational use outweighs any increased risk from system failures, thereby providing an overall safety benefit.</p>		Noted with comment.; point is well taken, and is correct; however the operational conditions can have a significant effect on the risk exposure. The intent of the quoted sentence is to say that the benefit some safety enhancing equipment provided under the conditions expected for “normal operations,” might be satisfactory under those conditions. However, if the rotorcraft is being operated under some very unusual (rarely if ever seen) conditions that could raise the severity of any misleading information, that exposure time (or lack thereof) may be accepted as a mitigating factor for NORSEE equipment approvals. Not “guaranteed”, but considered.
EASA, C.2.4, ASM	Pg 1, Purpose	<p>“Failures and malfunctions” are not enough. Has this been assessed by OPS? How will these affect the normal / standardised pilot decision making? Avionics disagrees with generic statements like this.</p>		Noted with comment; each system and proposal will require unique analysis and evaluation. First, to determine if it is eligible for NORSEE, and once this determination is made, that all project specific issues are addressed.

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EASA, C.2.4, ASM	Pg 1, Purpose	<p>The phrasing does not pass the right message. For example, there should be NO POSSIBLE SAFETY RISK for “toys” (i.e., equipment nice-to-have). The text implies that there should be a trade-off between risk and benefits to an undefined depth. As the phrasing stands this is a generic policy evolution which we would encourage to be accompanied by a proper rulemaking process based on actual data, research, accidents etc.</p> <p>Within EASA we call these “No-Hazard-no-credit” installations, assuming they have undergone a thorough evaluation from the operational perspective. No reduction in DALs has been granted.</p>		<p>Noted with comment; a “toy” would have a difficult time being presented as “safety enhancing equipment”. Many pilots/operators carry on “portable equipment” that is perceived as providing improved situational awareness. That same equipment, since it’s introduction into the cockpit has received zero oversight, is a complete “unknown” with regard to performing intended function, environmental qualifications, or hazard presented by it’s presence in/on the aircraft. A compromise needs to be made with the approach to introducing non required equipment, which can be justified as providing an overall safety benefit, so more aircraft will likely be equipped with safety enhancing equipment. A reduction in the system DAL, while retaining oversight of installation and evaluation, seems to be a reasonable approach, so long as the safety benefit case has been successfully presented and accepted.</p>

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AIR-130, S. Paasch	Pg 1, Purpose, last sentence.	Similar to the comment on offering guidance for what constitutes "most", the policy statement does not provide any guidance for determining what constitutes an "unusual" condition. This offers wide latitude for interpretation of what the range of the policy is, which in turn offers a large opportunity for non-standardization in the application of the policy.	Provide some criteria as to what constitutes an "unusual" condition.	Not adopted; the policy is purposely written so as not to be "prescriptive", but allow (and require) the applicant to present the case for justifying the safety benefit vs. the DAL reduction afforded by the NORSEE policy. The applicant will need to present the safety benefit case, and the intent is to not have the policy pre-determine what conditions qualify or not. The possible conditions of exposure for a VFR rotorcraft are extremely varied, and each case for relief of DAL, under the NORSEE policy, must stand on its own merit.
AIR-130, S. Paasch	Pg 1, Purpose, last sentence	The policy statement does not provide any specific guidance for making a safety risks vs. safety benefits assessment, nor on the measure of the results of such an assessment that would allow a designation of NORSEE for a system or piece of equipment. This offers wide latitude for interpretation, which in turn offers a large opportunity for non-standardization in the application of the policy. Also, it feels, intuitively, that for part 29 Category A rotorcraft, the acceptable measure of risk vs. benefit would have a different threshold from, say, part 27 rotorcraft.	<ol style="list-style-type: none"> 1. Provide some criteria for assessing safety risk vs safety benefit and the measure of the results of such an assessment. 2. Address whether criteria for part 29 Category A rotorcraft should be different from criteria for other rotorcraft types. 	<ol style="list-style-type: none"> 1. Not adopted; the criteria is left up to the applicant to present for agreement and acceptance by the FAA. This will be accomplished via the issue paper, with (at least initially) Rotorcraft Directorate involvement, to have a standardizing effect on the process. What will ultimately result will be some kind of list of items that can "generally" be accepted as NORSEE, based on the cases presented, and accepted as meeting that criteria. 2. Not adopted: This is not a necessary topic, as it will become apparent that a Part 29 Category A rotorcraft, WILL have requirements that MUST be met, and those systems would clearly have to meet different criteria than other types of rotorcraft. Each system, on each model rotorcraft being applied for, will have to show the justification, on an individual basis. Keep in

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				mind that there will be Limitations in the RFM, as well as other markings, to identify those systems that are installed as NORSEE. If the system becomes required, for any airworthiness regulation, a further showing will be necessary (and a DAL reduction would be a non-starter) for that system to meet the standards for a required system.
ACE-111, Schinstock	Pg 1, Purpose	Potentially confusing use of the word “should.” In sentence stating, “operating in unusual conditions should not overshadow the significant...” The intent of the policy is more clearly stated if “may not,” or “should not necessarily” is placed in this sentence instead of “should”.	Reword to say, “operating in unusual conditions should not necessarily overshadow the significant safety....”	Adopted; change made.
ANE-150	Pg 1, Current Regulatory and Advisory Material	There are additional operating rules that rotorcraft are approved, such as part 137.	Rotorcraft certified under parts 27 or 29 may be requested for a design approval for agricultural operations, part 137. As the other operating regulations are cited, part 137 should be included.	Adopted; text changed to incorporate recommendation.

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EASA, C.2.4, ASM	Pg 1, Current Regulatory and Advisory Material	Comment related to the sentence: “For rotorcraft certified under parts 27 or 29, §§ 27.1301 and 29.1301 (Equipment: Function and Installation) and §§ 27.1309 and 29.1309 (Equipment, Systems and Installations) establish the design assurance level (DAL) and certification requirements for level of qualification of systems and equipment installations.”	<p>Before arguing about the DAL there are much more important items in the aircraft that need to be clarified:</p> <ol style="list-style-type: none"> 1. No/minimum hazard (from the installation) 2. No confusion or compelling information (from the ops perspective) 3. Thorough evaluation from the crew for obvious operational benefits. 	Noted with comment; agreed, the items mentioned are precisely what would need to be addressed in the means of compliance issue paper, and in the approval process of the STC (or TC, if applicable). The “arguing about the DAL” mentioned is not a factor. IF the agreement is made that the product provides a safety benefit, is not required, and the FHA supports the NORSEE parameters, the DAL can be reduced one level, but not lower than DAL D, for the project. The project then goes through the review, evaluation, and approval process, like any other approval, including the need to show compliance with all applicable regulations.

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ACE-114, Sova	Pg 1, Current Regulatory and Advisory Material, 3rd sentence	<p>The sentence refers to 14 CFR sections (27.1301, 27.1309, 29.1301, 29.1309) that "...establish the <i>design assurance level (DAL) and certification requirements for level of qualification of systems and equipment installations...</i>"</p> <p>None of the 4 rules referenced directly establish or even mention DALs.</p> <p>FAA best practice uses these rules to indirectly address the certification requirements for level of qualification. However, the DAL topic is covered in the ACs that are mentioned in the next section titled "Relevant Past Practice."</p>	Delete the words: " <i>design assurance level (DAL) and</i> " in the sentence noted, since it is covered in the referenced AC materials.	Adopted intent; added references to the advisory circulars and industry standards guidance used to establish the DAL. The establishment of the DAL is requisite to the incorporation of this NORSEE policy. See comment/recommendation and disposition immediately following this entry for updated sentence.

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AIR-130, S. Paasch	Pg 1, Current Regulatory and Advisory Material, 3rd sentence	The sentence merges and muddies terms and acronyms. The acronym "DAL" has two meanings and is set in three areas by the results of FHAs, PSSAs, and architectural mitigation considerations. There is a <i>development</i> assurance level for the system (ARP-4754), there is a <i>development</i> assurance level for the system's software (DO-178B), and there is a <i>design</i> assurance level for the system's electronic hardware (DO-254). (The definitions of <i>development assurance</i> and <i>design assurance</i> are similar but not identical - there is a slight nuance to each). The phrase "certification requirements for level of qualification of systems and equipment installations" is also unclear.	Clarify DAL/DAL. If the rest of the policy statement does not deal with the bit about cert requirements for level of qualification, then delete that latter part of the sentence (however, please see a later comment regarding requirements besides DALs). Rewrite the sentence to read as follows: "For rotorcraft certified under parts 27 or 29, §§ 27.1301 and 29.1301 (Equipment: Function and Installation) and §§ 27.1309 and 29.1309 (Equipment, Systems and Installations) establish the development assurance levels (DAL) for systems and software, and the design assurance level (DAL) for electronic hardware".	Adopted intent; changed the text to incorporate the recommendation.
AIR-120, Strasburger	Pg 1, Current Regulatory and Advisory Material	Under "Current Regulatory and Advisory Material" it introduces the term Design Assurance Level. Recommending using Development Assurance Level to be consistent with SAE ARP 4754A. Software does not use the term Design Assurance level	Change "Design Assurance Level" to "Development Assurance Level."	Adopted; see comment/suggested change and disposition immediately above this entry.

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ACE-111, Schinstock	Pg 1, Current Regulatory and Advisory Material, last sentence	It is impossible to remove all potential hazards, and some level of acceptable risk is normal for any aviation operation.	Add the word “unacceptable” in the sentence “...function and does not present hazards to the rotorcraft.” Change sentence to say, “.....function and does not present <i>unacceptable</i> hazards to the rotorcraft because of malfunction or failure”	Adopted; change made.
AFS-350, KM	Pg 1. Current Regulatory and Advisory Material and Pg 2,. Policy	This Policy Statement contains similar information as the Portable Safety Device (PSD) InFO (currently in the publication process). The PSD InFO was initiated by AFS-300, AFS-800, AIR-100 and ASW-100.	Please mention or add a reference to the PSD InFO. This would unify the NORSEE and the PSD concept.	Not Adopted; assumption is the PSD InFO being referenced is InFO 12015, since no details were provided. InFO 12015 discusses non-installed equipment that specifically states that a supplemental type certificate is not required. This NORSEE policy does not align with that approach. The NORSEE policy will be only applicable to STC or TC products and projects.
AFS-820, Carl Johnson (202-385-9593)	Pg 1, Current Regulatory and Advisory Material, para. 2	Part 137 operators also use helicopters.	Add part 137 to operating part examples.	Adopted; this comment and suggestion is a duplicate to one from ANE-150 seen on page 18 of 32 in these comments.

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EASA, C.2.5, AFL	Pgs 1 & 2, Relevant Past Practice, para 1	<p>Comment related to the sentence: “The Advisory Circulars (ACs) 27-1B and 29-2C, sections 27.1309 and 29.1309, respectively, provide guidance for establishing DALs for installation of systems and equipment.”</p> <p>ARP4754A published in December 2010 and recognized by FAA through AC 20-174 dated September 2011 provides more detailed guidance related to the DAL assignment. available guidance for this topic.</p>	It is thus recommended to reference latest.	Adopted;changed the text to incorporate the recommendation.
EASA, C.2.5, AFL	Pgs 1 & 2, Relevant Past Practice, para 1	<p>Comment related to the sentence: “These ACs recognize the Safety Assessment process reflected in .../... SAE ARP 4754 (Certification Considerations for Highly Integrated or Complex Aircraft Systems) documents.”</p>	<p>The reference to SAE ARP 4754 is incorrect since:</p> <ul style="list-style-type: none"> • AC 29-2C and AC 27-1B both recognize the latest revision of ARP4754 (refer to MG 13 section 3). • ARP4754A “Guidelines for development of civil aircraft and systems” was issued in December 2010. 	Partially adopted; the version of the base documents was purposely deleted. The expectation is for the applicant to utilize the latest version of any referenced document. The phrase “latest version” was added in the Policy section, first sentence.
AIR-130, S. Paasch	Pgs 1 & 2, Relevant Past Practice, para 1, last sentence.	Another primary tool of the SA process is Common Cause Analysis (CCA). Also, the sentence could be cleaned up a bit.	Rewrite the sentence to read as follows: "The Safety Assessment process consists of Functional Hazard Assessments (FHA), Preliminary System Safety Assessments (PSSA), System Safety Assessments (SSA), and Common Cause Analyses (CCA)."	Adopted; sentence changed to address this recommendation.

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AIR-120, Strasburger	Pg 2, Relevant Past Practices, para 2.	Under paragraph 2 in Relevant Past Practices, the term complex electronic hardware is used. Recommend using airborne electronic hardware. Alternatively you could use complex and simple electronic hardware. Simple devices also have DALs and must comply with DO-254 and Order 8110.105.	Change “complex electronic hardware” to “airborne electronic hardware.”	Adopted; change made.
EASA, C.2.5, AFL	Pgs 1 & 2, Relevant Past Practice, para 2	<p>Comment related to the sentence: “There has been no previous relaxation in DALs from these requirements that consider hazards introduced by the installation of systems and equipment. This is true even when the introduction of the system and equipment had no regulatory requirement and incorporated features shown to improve rotorcraft safety. We are now proposing a change to this practice for these systems and equipment.”</p> <p>In my opinion, this statement is incorrect. Section 5.2 of ARP4754A proposes a systematic method to relax DALs when a function is implemented through independent systems/equipment</p>	It is considered that section 5.2 of ARP4754A, which is recognized by the FAA through AC 20-174, is already answering the need.	Not adopted; the referenced section of ARP 4754A is discussing a combination of possible development errors between two or more independently developed systems. The proposed NORSEE policy is addressing single string systems, for non required applications. The process in the ARP is appropriate for required systems, which is beyond the scope of the NORSEE policy.

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EASA, C.2.4, ASM	Pgs 1 & 2, Relevant Past Practice, para 2	<p>being independent.</p> <p>Comment related to the sentence: “There has been no previous relaxation in DALs from these requirements that consider hazards introduced by the installation of systems and equipment. This is true even when the introduction of the system and equipment had no regulatory requirement and incorporated features shown to improve rotorcraft safety. We are now proposing a change to this practice for these systems and equipment.”</p> <p>EASA Avionic systems disagrees. ARP4754 section 5 (5.4.1, or later in table 5.2 explained) allows for reduction in the DALs from a lot of requirements provided certain independency, dissimilarity etc...requirements are being met. And this not only for “nice-to-have” systems but also for properly certified installations.</p>		Not adopted; see comment preceding.

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ACE-111, Schinstock	Pg 2, Relevant Past Experience	The last sentence of item 2 says the FAA is proposing a change.... The Policy is actually implementing the change the paragraph says the FAA is proposing.	Change “proposing” to “implementing” in this sentence as an indication of the action the policy is taking.	Adopted; change made.
EASA, C.2.5, AFL	Pg 2, Policy		As stated earlier, it is my opinion that section 5.2 of ARP4754A answer the initial request to have the possibility to “relax” some DAL assignment. It is as well my opinion that the proposed policy is not in line with ARP4754A principles since: <ul style="list-style-type: none"> • there is no mention to the potential Failure Conditions being introduced by the NORSEE equipment, • there is no mention of the need to prove the independence of the NORSEE equipment with the already other installed equipment. 	Not adopted; the potential failure condition of the NORSEE equipment would be a requisite part of the applicant’s FHA and the issue paper would capture the justification of the proposed system meeting the NORSEE criteria. The NORSEE would be held to a non interference basis on previously installed equipment. If the NORSEE equipment is being interfaced with existing systems, the combined system would require assessment with regard to whether, or not, there was any need for independence. In essence, if the system is not required, there would be no need for reliability beyond minor, for availability.
EASA, C.4.1, DHA	Pg 2, Policy	Will the “no hazard/no credit” option still be available to applicants? The fact that the NORSEE is still certificated may have a bearing on costs and hence its wider adoption.		Noted; essentially, the NORSEE policy is a formalization of the no hazard//no credit option, with the potential to allow for a reduction in the system DAL, if a safety case is successfully presented and accepted.
EASA, C.2.5, JLD	Pg 2, Policy, para 1.		The installation of additional equipment to improve the overall safety should be driven by other factors than cost; it was the way the regulations worked during decades.	Noted; conversely, if safety can be improved in a more cost effective manner, more rotorcraft will likely be equipped with that equipment. The balance needs to be carefully examined before relaxation is allowed. This

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				is precisely the intent and purpose of this NORSEE policy.
AIR-120, Strasburger	Pg 2, Policy, para 1.a.	Under Policy paragraph 1.a. it states, "If a system has both a loss of function and display of misleading information assessed as Hazardous in the FHA, that system would typically require satisfying DAL B." If loss of function is a functional failure condition, then it should not be considered NORSEE. NORSEE should only be assessed for misleading information. Also, if you include loss of function as an assessment criterion it could potentially increase the cost of the equipment due to the redundant hardware.	Change to the following: "If a system has display of misleading information, assessed as Hazardous in the FHA, that system could require a DAL B. For NORSEE, loss of function does not need to be assessed."	Partially adopted; the referenced statement, as presented in the draft, was in error. The statement in 1.a. was changed to read: "If a system has a loss of function assessed as minor but with the display of misleading information assessed as hazardous in the FHA, the described system would typically require satisfying DAL B." The portion of the comment not adopted, ("For NORSEE, loss of function does not need to be assessed") is accepted as practically true, however, to ensure that systems being installed under this NORSEE policy are documented as such, and these NORSEE systems will need to be assessed. For these systems to qualify as NORSEE, the loss of function cannot be any higher than "minor" under that assessment.
AIR-130, S. Paasch	Pg 2, Policy, para 1., last full sentence	The sentence says "...a one level reduction in DAL may be authorized". Per a previous comment, there are three areas of DAL: system DAL, software DAL, and electronic hardware DAL. Depending on architectural considerations, the DALs of these may not necessarily end up at equivalent levels. For systems with independent components such as with an independent monitor,	Rewrite to clarify which DALs can be reduced. (ARP 4754A may provide some help in figuring out how to reword this item in the policy statement.)	Adopted; will incorporate reference to ARP 4754A and expound on the different DALs being considered for reduction, if the system is NORSEE.

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		the plant component may have a different DAL from the monitor component. The policy statement does not distinguish which DAL(s) can be lowered, or whether the whole can all be dropped a level.		
AIR-120, Strasburger	Pg 2, Policy, para 1.a.	Under Policy paragraph 1.a. it states, "This would result in a redundant hardware design with Level B software." Recommend deleting redundant for the reason described in comment 3.	Change to the following: This would result in Level B software and/or AEH.	Adopted; sentence changed to address the recommendation.
AIR-130, S. Paasch	Pg 2, Policy, para 1., 1.a, and 1.b.	DAL is not always necessarily the largest cost driver for a system - or at least there isn't a reference in the policy statement to a study that shows such. High reliability/low failure rates, sometimes resulting in redundancy or features such as monitoring, also drive cost. Qualification for extreme environments is also a cost driver. Frankly, even misunderstandings of regulations and guidance are cost drivers. The policy statement, however, only looks at one cost driver: DAL. It seems we should be looking at all factors that make it difficult to get NORSEE certified.	Look at cost drivers as a whole for NORSEE, determine if there are other large cost drivers besides DAL, and balance the policy to take these into account as well. This may not be practical in the short run for getting this policy statement out, but it should be accounted for eventually.	Not adopted, at this time; discussion has taken place on this subject, with the environmental being the more likely candidate for some relaxation. More discussions will be undertaken, as the assurance of a benign failure, with regard to the rotorcraft safety, is under question, if the equipment has not been tested to the rotorcraft environment.
ANM-130S, W. M. Cameron	Pg 2, Policy, para 1.b.	Allows a one level reduction in DAL, e.g., level B to level C, if the	Suggest that it also state somewhere in the policy that if a system has been	Noted; this subject is addressed in the draft policy, under Policy, item 2, the second

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		system is identified and agreed to as NORSEE.	developed to that lower DAL, it cannot be used in a rotorcraft as a required system, unless the software is brought up to the required DAL (i.e., from level C back to level B).	sentence: “This is necessary to convey that this particular NORSEE system and equipment is not eligible for installations where the system or function is “required” by any regulation, including operational regulations, without further showing.”
EASA, C.4.1, DHA	Pg 2, Policy, para 1.b.	<p>The fact that a Hazardous failure will be allowed to occur more often invalidates the 1309 principles. By definition, all required equipment also offer a safety benefit, but we are not contemplating a reduction in standards for these items (which could also be another way of installing more equipment for your buck and enhancing overall safety).</p> <p>Presumably some form of cost/benefit analysis and analysis of historical accident/incident data is used to determine that there is a net benefit in safety in installing NORSEE?</p>		Concur, noted; the analysis method is not defined in this policy, other than it will be documented in an issue paper. Further, the applicant will need to justify the addition of their equipment as providing a safety benefit. Cost is not, necessarily, a part of that analysis, however it is reasonable to expect that a non required system which measurably increases safety, in a cost effective way, will be more likely to find its way onto rotorcraft.
AIR-120, Strasburger	Pg 2, Policy, para 2.	Under Policy paragraph 2, recommend adding a sentence that clarifies that you can not approve an TSOA article (e.g, VFR attitude display) when the DAL is reduced below what is specified in the TSO since it is now considering safety	Add the following: “If the NORSEE equipment does not meet a TSO’s DAL, a TSO approval can not be granted”	Adopted; change made.

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ANE-150	Pg 2, Policy, para 2	enhancing. If the equipment is a non-required safety enhancing equipment (NORSEE), but the one level reduction in the DAL is not used for relief, is the equipment still required to be identified as NORSEE since it would be certified for full compliance?	As the installation of any equipment would need to be compliant based on the approved envelope of the rotorcraft, there does not appear to be any reason to identify the equipment as NORSEE if the applicant does not take the DAL relief option. Any placards, RFM operating limits, STC limitations, such as the described "day VFR" would already be required of any approval if the rotorcraft was approved for night operations or IFR under 2x.1525 and not properly assessed for compliance. So it should be made clear that the identification of NORSEE under this policy is only for those using the DAL level reduction. Those equipment that may be a NORSEE based on the acronym, but not using the DAL reduction, would not need to follow this policy memo and so the NORSEE identification is not used.	Adopted; added statement in Policy section to explain that a fully compliant installation (i.e. one that does not take advantage of the DAL reduction) would not be required to show the NORSEE limitations in the STC, RFM or placard.
EASA, C.2.4, HKI	Pg 2, Policy, para 2.	Comment related to the sentence: “In cases allowing this DAL relief, there must be a way to readily identify this system and equipment as NORSEE, including requiring limitations on the installation approval (e.g., placards, RFM, STC Limitations)” :		Noted; the concerns expressed in this comment would be the subject of the issue paper, which is requisite the NORSEE approach to approval. Human Factors would have an input into the decision process, as would systems and Flight Test.

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		<p>I believe that this “policy” need some careful consideration by Human Factors. To compensate less reliable equipment (which may be a result of lowering the DAL level) by a limitation in a “manual” is considered a dangerous path to follow. Even if you have “Non Required Systems Enhancing Safety” the information presented to pilots may be very compelling and thus he may trust the information delivered by a more unreliable system. I can’t see that we enhance safety by accepting less reliable equipment, and rely on the memory of a pilot to follow a limitation due to the lowering of a DAL Level. We should not follow such a path. Furthermore, applicability of this policy on certain equipment may lead to endless discussions with applicant whether or not the policy can be followed.</p>		
EASA, C.2.4, ASM	Pg 2, Policy, para 2.	<p>It is understood what is attempted here. However, at what point will the equipment (in this example the horizon) be properly certified? If the aircraft gets a variety of STCs authorities will lose track of which serial number has what installed in</p>		<p>Noted; the issue paper process is where the safety benefit claim is made and either accepted, or not accepted. The STC limitation, as well as placards would provide the visibility into what level of certitude was shown. If, at a later date, a system becomes “required” in a particular rotorcraft, there</p>

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		it and with what integrity. The potential confusion and wrong installations in that case have they been considered against the “safety benefits” claimed?		would need to be a further showing of compliance to the regulations that address that requirement.
EASA, C.2.5, JLD	Pg 2, Policy, para 2.	The example is misleading as usual Display SW and AEH are assigned DAL A.		Noted; sentence was re-written to better explain the intent.
EASA, C.2.5, JLD	Pg 2, Policy, para 2.	As soon as the display is installed, regardless if it is required or not by any regulation, it will be used in the same way by the pilot, particularly if it brings substantial improvement in term of useful information.	The normal safety process including the human factor assessment should therefore be followed.	Noted; this is why the issue paper process will be necessary for each NORSEE approval. Human Factors, Flight Test as well as Systems would have input into the acceptance of the system benefit and any DAL reductions allowed.
EASA, C.2.4, ASM	Pg 3, Effect of Policy, para 1.	It is not possible to agree with this statement. Practice shows that industry always goes for the cheapest option as long as it is legal. The rest is the authority’s responsibilities.		Noted; statement was re-written to expound on the need for an issue paper, which would first of all accept the safety enhancing benefit and secondly, establish and define the DAL reduction allowed on a system. This policy is for non-required systems, only. As soon as a system becomes “required,” this approach is off the table.
EASA, C.2.5, JLD	Pg 3, Effect of Policy, para 1.	This subsection requests justification whereas no criteria have been defined to substantiate that justification except the “overall level of safety.”		Noted; statement was re-written to emphasize the issue paper, which is the documentation that will show any justification for the overall level of safety improvement, and authority acceptance or rejection of that approach.