

**International Maintenance Review Board Policy Board (IMRBPB)  
Issue Paper (IP)**

*Initial Date: 6/Mar/2014*

*IP Number: IP 152*

*Revision 1 / Date: 11/Aug/2015*

**Title:** Clarification of MSG-3 Applicability & Effectiveness Criteria

**Submitter:** Airbus

Applies To:	
Vol 1:	
Vol 2:	
Both:	X

**Issue:** The accuracy and adequacy of the Table 2-3-7.1 ‘Criteria for Task Selection’ has been challenged during MSG-3 training events. It has also been highlighted that clarification is desirable to address issues identified during Working Group discussions.

Airbus originally collated the various change proposals into a single CIP to allow discussion within MPIG to determine which ones may be appropriate for inclusion in a future revision. These were decided in the MPIG & IMRBPB meetings in April 2014. Revision 1 reflects result of that discussion.

Additionally, Rev 1 reflects the changes arising from MPIG / IMRBPB agreement of CIP EASA 2014-1 ‘Definition of Visual Check’.

**Problem:** The table does not clarify which Effectiveness criteria should be considered for each Failure Effect Category. Experience has shown that Operational considerations within FEC 9 are not always addressed. The extent of these considerations needs to be clarified to avoid inconsistent policy regarding impact on airport / airspace infrastructure in addition to impact on aircraft operation.

There have been misunderstandings that the consideration of cost effectiveness for an FEC9 OPC/VC should be made with reference to the cost of the consequences of the double failure whereas it is equally important to consider the costs, if any, directly resulting from the latent failure, e.g. engine seal degradation leading to higher fuel consumption.

The text in the table does not provide guidance on what is meant by ‘cost effective’.

The Applicability criterion for an OPC/VCK is valid only for a hidden failure. The existing text ‘Identification of failure must be possible’ must be read in the context of a hidden failure.

The Effectiveness criteria for a Discard task distinguishes between a ‘safe life limit’ (Safety effectiveness) and an ‘economic life limit’ (Economic Effectiveness) but has no equivalent term to address Operational effectiveness. The use of the term ‘life limit’ has also led to confusion with life limited components that are subject to airworthiness limitations.

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**Recommendation (including Implementation):**

See revision to Table 2-3-7.1 with additions shown in blue and deletions shown in red.

This table includes the introduction of separate rows for the Operational Check and the Visual Check as proposed in CIP EASA 2014-1 (later agreed as IP143). The original text proposed for the ‘Economic Effectiveness’ of a Visual Check has been split to consider both ‘Operational’ and ‘Economic’ aspects and is reworded to reflect the need to confirm the state of a component.

A change to MSG-3 Section 2-3-6 ‘Failure Effect Categories’ is proposed to allow simplification of the table. Text (in blue) is added in Sections 2-3-6-3 and 2-3-6-5 to clarify the scope of discussion regarding the determination of operational and economic (cost) effectiveness.

MSG-3 Section 2-3-7 is updated to reflect the revised applicability and effectiveness criteria and to introduce the separate consideration of Operational and Visual Checks.

The introduction of a definition of ‘multiple failure’ is proposed to be added to the Glossary.

Changes to Section 2-3-6

**3. Evident Economic Effects (Category 7)**

A task(s) is desirable if the cost of repeatedly performing the task on one aircraft is less than the cost of potentially recurring repair.

The determination of task effectiveness should be made for one typical aircraft over its full life considering repetitive task performance and potentially repetitive failure and repair.

Analysis of the failure causes through the logic requires the first question (Lubrication/Servicing) to be answered. Either a "YES" or "NO" answer to question "A" still requires movement to the next level; from this point on, a "YES" answer will complete the analysis and the resultant task(s) will satisfy the requirements. If all answers are "NO", no task has been generated. If economic penalties are severe, a redesign may be desirable

The following is the logic progression for functional failures that have Evident Economic Effects.

**5. Hidden Function Non-Safety Effects (Category 9)**

The Hidden Function Non-Safety Effect category indicates that a task(s) may be desirable to assure the availability necessary to avoid the operational or economic effects of multiple failures. Task selection will take into account both operational and economic (cost) effectiveness.

- The operational consideration shall be limited to the immediate consequences on the operation of the aircraft experiencing the double failure during certificated operations, e.g. cancellation of flight, aborted take-off, return-to-base, diversion. No consideration shall be given to:

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- the consequence on the infrastructure in which the aircraft operates, e.g. the impact of disruptions to the airport and airspace,
  - the subsequent disruption to the schedule, e.g. the impact of rescheduling or accommodating passengers overnight
  - a specific type of operation e.g. perishable goods as cargo,
  - the availability of repair capability or impact of sending parts and workforce to a remote airport (unless otherwise specified in the applicable Policy and Procedures Handbook or User's Guide).
- The economic consideration shall be limited to an assessment of whether the cost of repeatedly performing the task on one aircraft is less than the cost of the potentially recurring functional failure (i.e. loss of a function) or failure effect (e.g. increased fuel consumption) prevented on that aircraft. The assessment will qualitatively compare the cost to perform the task (limited to material and labour cost) with the cost of the failure effect and the cost of having to repair or replace a component whose failure could have been avoided by scheduled maintenance.

The determination of task effectiveness should be made for one typical aircraft over its full life considering repetitive task performance and potentially repetitive failure.

Movement of the failure causes through the logic requires the first question (Lubrication/Servicing) to be answered. Either a "YES" or "NO" answer still requires movement to the next level; from this point on, a "YES" answer will complete the analysis and the resultant task(s) will satisfy the requirements. If all answers are "NO", no task has been generated. If operational or economic penalties are severe, a redesign may be desirable.

The following is the logic progression for functional failures that have Hidden Function Non-Safety Effects.

### Changes to Section 2-2

In Figure 2-2.1 the question 8B and 9B are changed to read

**IS AN OPERATIONAL OR VISUAL CHECK TO DETECT HIDDEN FAILURE A  
~~CHECK TO VERIFY OPERATION~~ APPLICABLE AND EFFECTIVE?**

### Changes to Section 2-3-6

In Figures 2-3-6.4 and 2-3-6.5 the question 8B / 9B is changed to read

**IS AN OPERATIONAL OR VISUAL CHECK TO DETECT HIDDEN FAILURE A  
~~CHECK TO VERIFY OPERATION~~ APPLICABLE AND EFFECTIVE?**

### Changes to Section 2-3-7

#### **2-3-7. Task Development (Second Level)**

Task development is handled in a similar manner for each of the five Effect categories. For task determination, it is necessary to apply the failure causes for the functional failure to the second level of the logic diagram. There are **seven** possible task resultant questions in the Effect categories as follows

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## **1. Lubrication/Serviceing (All Categories)**

QUESTION 5A, 6A, 7A, 8A, 9A: IS A LUBRICATION OR SERVICING TASK APPLICABLE AND EFFECTIVE?

Any act of Lubrication or Serviceing for the purpose of maintaining inherent design capabilities.

### **1.1. Applicability Criteria**

The replenishment of the consumable must reduce the rate of functional deterioration.

### **1.2. Effectiveness Criteria - Safety**

The task must reduce the risk of failure to assure safe operation.

### **1.3. Effectiveness Criteria - Operational**

The task must reduce the risk of failure to an acceptable level.

### **1.4. Effectiveness Criteria - Economic**

The task must be cost-effective.

## **2. Operational Check (Hidden Functional Failure Categories Only)**

QUESTION 8B & 9B. IS **AN OPERATIONAL OR VISUAL CHECK TO DETECT HIDDEN FAILURE** ~~A CHECK TO VERIFY OPERATION~~ APPLICABLE AND EFFECTIVE?

An Operational Check is a task to determine that an item is fulfilling its intended purpose. The check does not require quantitative tolerances. This is a failure finding task.

### **2.1 Applicability Criteria**

Confirmation that an item is fulfilling its intended purpose must be possible

### **2.2. Effectiveness Criteria - Safety**

The task must ensure adequate availability of the hidden function to reduce the risk of **a** multiple failures.

### **2.3. Effectiveness Criteria - Operational**

The task must ensure adequate availability of the hidden function in order to avoid operational effects of multiple failures.

### **2.4. Effectiveness Criteria – Economic**

The task must ensure adequate availability of the hidden function in order to avoid economic effects of multiple failures and must be cost effective

## **3. Visual Check (Hidden Functional Failure Categories Only)**

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QUESTION 8B & 9B. IS AN OPERATIONAL OR VISUAL CHECK TO DETECT HIDDEN FAILURE A CHECK TO VERIFY OPERATION APPLICABLE AND EFFECTIVE?

A Visual Check is an observation to determine that an item is in fulfilling its intended state purpose. The check does not require quantitative tolerances. This is a failure finding task with obvious pass / fail criteria.

NOTE: A Visual Check identified through application of Systems/Powerplant logic may not subsequently be considered as covered by a zonal inspection as described in paragraph 2-5-1(j) if it is derived from a Category 8 analysis. At the level of the originating document, such a task must be retained as a standalone Visual Check task within the MSI from which it was identified.

### **3.1 Applicability Criteria**

Visual identification of pass / fail state must be possible

### **3.2. Effectiveness Criteria - Safety**

The task must confirm the state of a component which indicates that a function required for safe operation is available and reduces the risk of multiple failures

### **3.3. Effectiveness Criteria – Operational**

The task must confirm a state of a component which indicates availability of the hidden function in order to avoid operational effects of multiple failures

### **3.4. Effectiveness Criteria – Economic**

The task must confirm a state of a component which indicates availability of the hidden function in order to avoid economic effects of multiple failures and must be cost effective

## **4. Inspection/Functional Check (All Categories)**

QUESTION 5B, 6B, 7B, 8C & 9C. IS AN INSPECTION OR FUNCTIONAL CHECK TO DETECT DEGRADATION OF FUNCTION APPLICABLE AND EFFECTIVE?

An Inspection is:

### **A. GENERAL VISUAL INSPECTION (GVI)**

A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance, unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or drop-light and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked. Basic cleaning may be required to ensure appropriate visibility.

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**B. DETAILED INSPECTION (DET)**

An intensive examination of a specific item, installation or assembly to detect damage, failure or irregularity. This could include tactile assessment in which a component or assembly can be checked for tightness/security. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids such as mirrors and magnifying lenses may be necessary. Surface cleaning and elaborate access procedures may be required.

OR

**C. SPECIAL DETAILED INSPECTION (SDI)**

An examination of a specific item, installation, or assembly making use of specialized inspection techniques such as Non Destructive Testing (NDT) and/or equipment (e.g. boroscope, videoscope, tap test) to detect damage, failure or irregularity. Intricate cleaning and substantial access or disassembly procedure may be required. Classification of a task as an SDI does not define the required qualifications for the person performing the task.

NOTE: A GVI identified through application of Systems/Powerplant logic may not subsequently be considered as covered by a zonal inspection as described in paragraph 2-5-1(h) if it is derived from either a Category 5 or 8 analysis. At the level of the originating document, such a task must be retained as a standalone GVI task within the MSI from which it was identified.

A Functional Check is:

A Functional Check is a quantitative check to determine if one or more functions of an item performs within specified limits.

**4.1. Applicability Criteria**

Reduced resistance to failure must be detectable, and there exists a reasonably consistent interval between a deterioration condition and functional failure.

NOTE: If the deterioration identified is of a structural nature (e.g. corrosion) the Structures Working Group could be consulted to help determine an applicable inspection task and interval in accordance with established transfer policies and procedures.

**4.2. Effectiveness Criteria - Safety**

The task must reduce the risk of failure to assure safe operation.

**4.3. Effectiveness Criteria - Operational**

The task must reduce the risk of failure to an acceptable level.

**4.4. Effectiveness Criteria - Economic**

The task must be cost-effective.

**5. Restoration (All Categories)**

QUESTION 5C, 6C, 7C, 8D, & 9D. IS A RESTORATION TASK TO REDUCE FAILURE RATE APPLICABLE AND EFFECTIVE?

IP Template Rev 5, dated 04/06/2015

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That work necessary to return the item to a specific standard.

Since Restoration may vary from cleaning or replacement of single parts up to a complete overhaul, the scope of each assigned restoration task has to be specified.

**5.1. Applicability Criteria**

The item must show functional degradation characteristics at an identifiable age and a large proportion of units must survive to that age. It must be possible to restore the item to a specific standard of failure resistance.

**5.2. Effectiveness Criteria - Safety**

The task must reduce the risk of failure to assure safe operation.

**5.3. Effectiveness Criteria - Operational**

The task must reduce the risk of failure to an acceptable level.

**5.4. Effectiveness Criteria - Economic**

The task must be cost-effective.

**6. Discard (All Categories)**

QUESTION 5D, 6D, 7D, 8E, 9E IS A DISCARD TASK TO AVOID FAILURES OR TO REDUCE THE FAILURE RATE APPLICABLE AND EFFECTIVE?

The removal from service of an item at a specified life limit.

Discard tasks are normally applied to so-called single celled parts such as cartridges, canisters, cylinders, engine disks, safe-life structural members, etc.

**6.1. Applicability Criteria**

The item must show functional degradation characteristics at an identifiable age and a large proportion of units must survive to that age.

**6.2. Effectiveness Criteria - Safety**

A task must reduce the risk of failure to assure safe operation.

**6.3. Effectiveness Criteria - Operational**

The task must reduce the risk of failure to an acceptable level.

**6.4. Effectiveness Criteria - Economic**

The task must be cost-effective.

**7. Combination (Safety Categories Only)**

QUESTION 5E, 8F. IS THERE A TASK OR COMBINATION OF TASKS APPLICABLE AND EFFECTIVE?

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Since this is a safety category question and a task is required, all possible avenues must be analyzed. To do this, a review of the task(s) that are applicable is necessary. From this review the most effective task(s) must be selected.

**Changes to Appendix A. Glossary**

**Multiple Failure**

At least two failures occurring independently which in combination have an effect on the aircraft.

Not to be confused with repeatedly occurring failure or with failure occurring as secondary damage directly caused by the first failure.

**IMRBPB Position:**

**Date: 08/JUL/2015**

**Position: Correction introduced at Revision 1 accepted by IMRBPB by email**

**Status of Issue Paper (when closed state the closure date): April 23, 2015**

**Recommendation for implementation: Implementation during next revision of MSG-3.**

**Retroactive: N**

**Important Note:** The IMRBPB positions are not policy. Positions become policy only when the policy is issued formally by the appropriate National Aviation Authority.

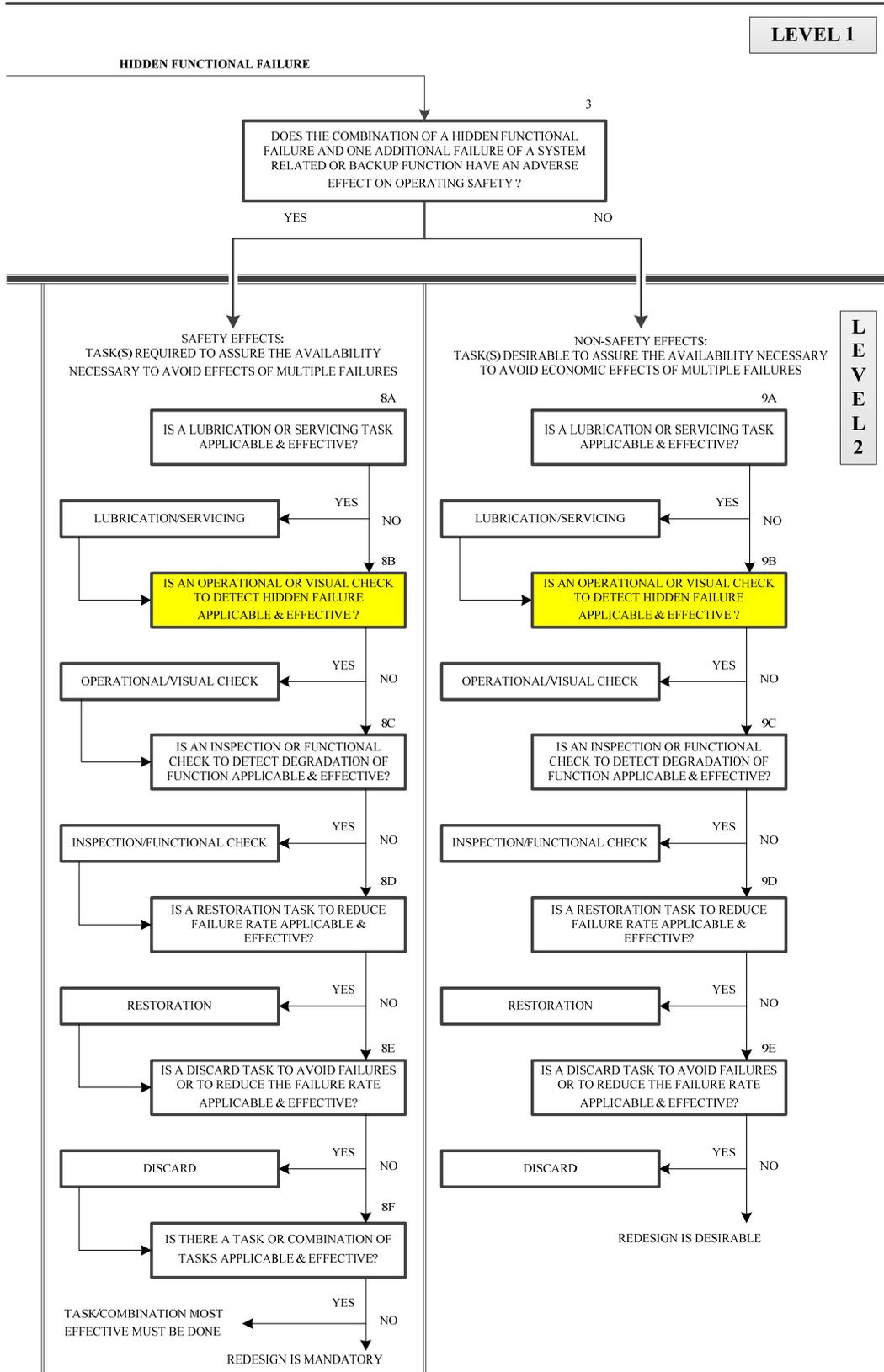
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**Figure 2-2.1 Systems Powerplant Logic Diagram (Part 2 of 2)**



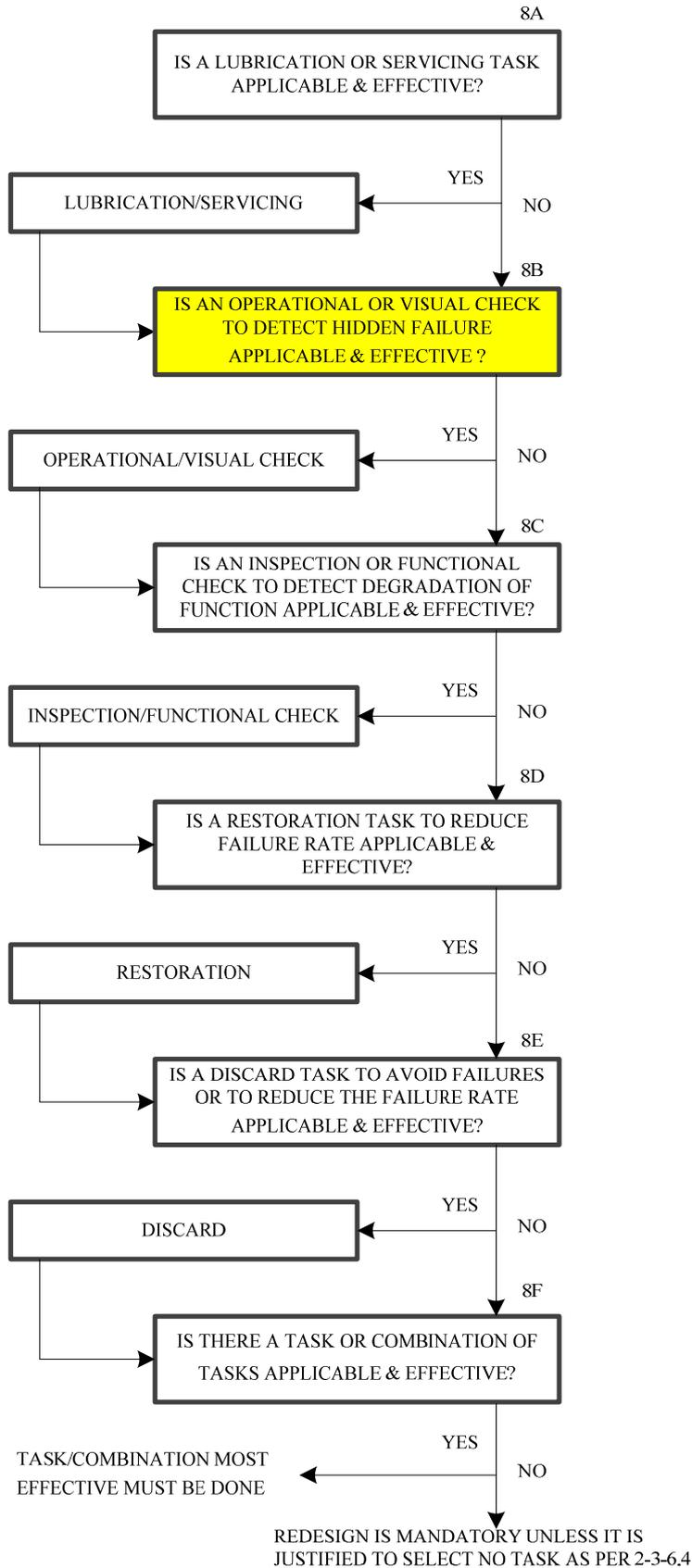
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**Figure 2-3-6.4. Functional Failures that have Hidden Function Safety Effects**



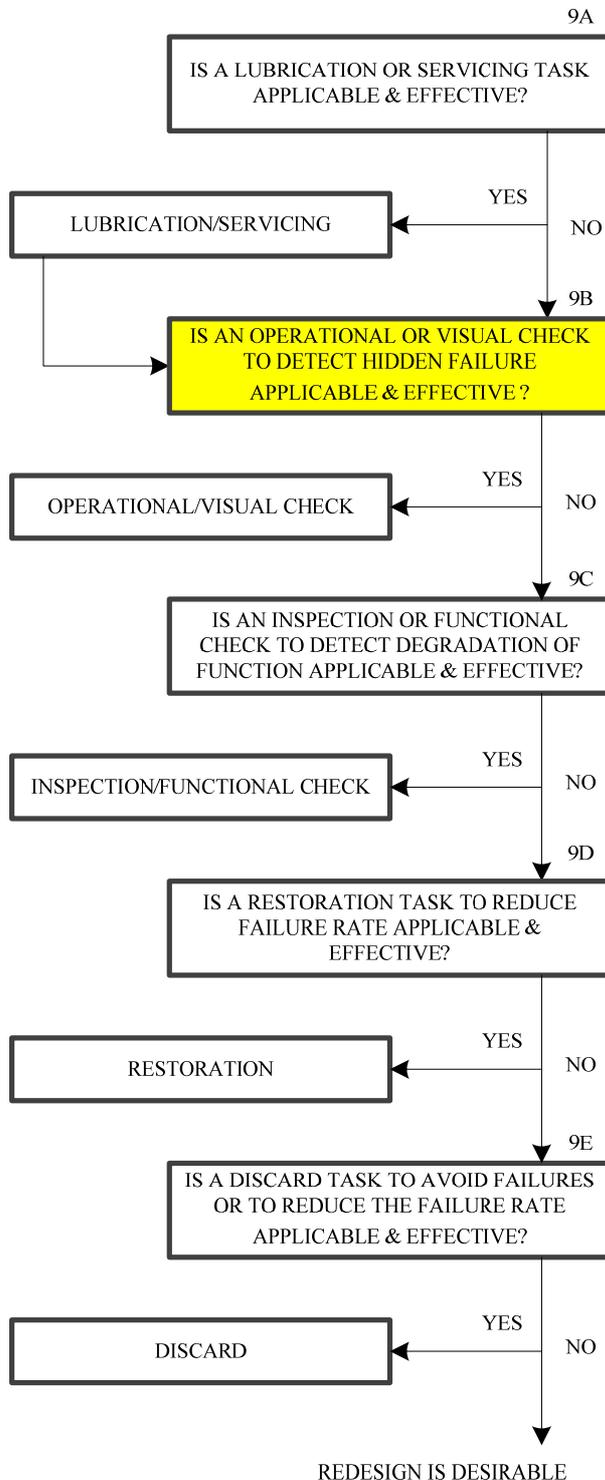
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**Figure 2-3-6.5. Functional Failures that have Hidden Function Non-Safety Effects**



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**Table 2-3-7.1. Criteria for Task Selection**

TASK	APPLICABILITY CRITERIA	EFFECTIVENESS CRITERIA					
		SAFETY		NON - SAFETY			
		FEC 5	FEC 8	OPERATIONAL		ECONOMIC	
		FEC 5	FEC 8	FEC 6	FEC 9	FEC 7	FEC 9
<b>LUBRICATION OR SERVICING</b>	The replenishment of the consumable must reduce the rate of functional deterioration.	The task must reduce the risk of failure to assure safe operation.		The task must reduce the risk of failure to an acceptable level.		The task must be cost effective,	
<b>OPERATIONAL CHECK</b>	Confirmation that an item is fulfilling its intended purpose must be possible  <i>Note: not applicable for an evident failure.</i>	Not applicable to FEC 5.	The task must ensure adequate availability of the hidden function to reduce the risk of multiple failures	Not applicable to FEC 6	The task must ensure adequate availability of the hidden function in order to avoid operational effects of multiple failures	Not applicable to FEC 7.	The task must ensure adequate availability of the hidden function in order to avoid economic effects of multiple failures and must be cost effective.
<b>VISUAL CHECK</b>	Visual identification of pass / fail state must be possible  <i>Note: not applicable for an evident failure.</i>	Not applicable to FEC 5.	The task must confirm a state of a component which indicates that a function required for safe operation is available and reduces the risk of multiple failures	Not applicable to FEC 6	The task must confirm a state of a component which indicates availability of the hidden function in order to avoid operational effects of multiple failures.	Not applicable to FEC 7	The task must confirm a state of a component which indicates availability of the hidden function in order to avoid economic effects of multiple failures and must be cost effective.
<b>INSPECTION OR FUNCTIONAL CHECK</b>	Reduced resistance to failure must be detectable and there exists a reasonably consistent interval between a deterioration condition and functional failure.	The task must reduce the risk of failure to assure safe operation		The task must reduce the risk of failure to an acceptable level.		The task must be cost effective;	
<b>RESTORATION</b>	The item must show functional degradation characteristics at an identifiable age, and a large proportion of units must survive to that age. It must be possible to restore the item to a specific standard of failure resistance.	The task must reduce the risk of failure to assure safe operation		The task must reduce the risk of failure to an acceptable level.		The task must be cost effective	
<b>DISCARD</b>	The item must show functional degradation characteristics at an identifiable age and a large proportion of units must survive to that age.	The task must reduce the risk of failure to assure safe operation.		The task must reduce the risk of failure to an acceptable level.		The task must be cost effective	