

Failure Mode and Effects Analysis (FMEA)

AIAG – VDA, 2019 Latest version



Objective of this initiative :

- To help the FMEA practitioners to follow right ranking methods, while performing the FMEAs
- For free circulation only

Design FMEA



FMEA Ranking tables

Severity [S]

Occurrence [O]

Detection [D]

Design FMEA



- ✓ These SOD ranking tables are aligned to the Version 2, 2nd June 2020
- ✓ All who have qualified by us on the latest version – may take a note of these tables to implement
- ✓ Best wishes

Design FMEA : Severity Table (AIAG – VDA 1st Edition)

(Reference : Pg 62 FMEA (AIAG – VDA) Handbook 1st edition *)

SEV	Effect	Severity criteria	Corporate or product Line Examples
10	Very high	Affects safe operation of the vehicle and/or other vehicles, the health of driver or passenger(s) or road users or pedestrians	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> The table may be augmented to include product specific examples. </div>
9		Non-compliance with regulations	
8	High	Loss of primary vehicle function necessary for normal driving during expected service life	
7		Degradation of primary vehicle function necessary for normal driving during expected service life	
6	Moderate	Loss of Secondary vehicle function	
5		Degradation of secondary vehicle function	
4		Very objectionable appearance, sound, vibration, harshness, or haptics	
3	Low	Moderately objectionable appearance, sound, vibration, harshness, or haptics	
2		Slightly objectionable appearance, sound, vibration, harshness, or haptics	
1	Very low	No discernible effect	

* Note : This table has been aligned to Errata Version 2, June 2020

Design FMEA : Occurrence Table (AIAG – VDA 1st Edition)

(Reference : Pg 64 & 65 FMEA (AIAG – VDA) Handbook 1st edition *)

OCC	Prediction of Failure cause occurring	Occurrence criteria - DFMEA		Corporate or product Line Examples
10	Extremely high	First application of new technology anywhere without operating experience and/or under controlled operating conditions. No product verification and / or validation experience	Standards do not exist and best practices have not yet been determined. Prevention controls not able to predict the field performance or do not exist	
9	Very high	First use of design with technical innovations or materials within the company. New application or change in duty cycle / operating conditions. No product verification and / or validation experience	Prevention controls not targeted to identify performance to specific requirements.	
8		First use of design with technical innovations or materials on a new application. New application or change in duty cycle / operating conditions. No product verification and / or validation experience.	Few existing standards and best practices, not directly applicable for this design. Prevention controls not reliable indicator of field performance.	
7	High	New design based on similar technology and materials; new application or change in duty cycle / operating conditions. No product verification and / or validation experience.	Standards, best practices and design rules apply to the baseline design, but not the innovations. Prevention controls provide limited indication of performance.	The table may be augmented to include product specific examples.
6		Similar to previous designs, using existing technology and materials. Similar application, with changes in duty cycle or operating conditions. Previous testing or field experience.	Standards and design rules exist but are insufficient to ensure that the failure cause will not occur. Prevention controls provide some ability to prevent a failure cause.	
5	Moderate	Detail changes to previous design, using proven technology and materials. Similar application, duty cycle or operating conditions. Previous testing or field experience, or new design with some test experience related to the failure.	Design addresses lessons learned from previous designs. Best practices re-evaluated for this design, but have not yet been proven. Prevention controls capable of finding deficiencies in the product related to the failure cause & provide some indication of performance .	
4		Almost identical design with short – term field exposure. Similar application, with minor change in duty cycle or operating conditions. Previous testing or field experience.	Predecessor design and changes for new design conform to best practices, standards and specifications. Prevention controls capable of finding deficiencies in the product related to the failure cause & indicate likely design conformance.	
3	Low	Detail changes to known design (same application, with minor change in duty cycle or operating conditions) and testing or field experience under comparable operating conditions, or new design with successfully completed test procedure.	Design expected to conform to standards and best practices, considering lessons learned from previous designs. Prevention controls capable of finding deficiencies in the product related to the failure cause & predict conformance of production design.	
2	Very low	Almost identical mature design with long term field exposure. Same application, with comparable duty cycle and operating conditions. Testing or field experience under comparable operating conditions.	Design expected to conform to standards and best practices, considering lessons learned from previous designs, with significant margin of confidence. Prevention controls capable of finding deficiencies in the product related to the failure cause & indicate confidence in design conformance.	
1	Extremely low	Failure eliminated through prevention control & failure cause is not possible by design.		

* Note : Occurrence can drop based on product validation activities

* Note : This table has been aligned to Errata Version 2, June 2020

- May also use the alternative table from page # 188 & 189, which has numeric also as incidents per 1000 items / vehicles

Design FMEA : Detection Table (AIAG – VDA 1st Edition)

(Reference : Pg 67 FMEA (AIAG – VDA) Handbook 1st edition *)

DET	Ability to Detect	Detection method maturity	Opportunity for detection	Corporate or product Line Examples
10	Very low	Test procedure yet to be developed.	Test method not defined.	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> The table may be augmented to include product specific examples. </div>
9		Test method not designed specifically to detect the failure mode or cause	Pass-fail, test-to-fail, degradation testing	
8	Low	New test method; not proven.	Pass-fail, test-to-fail, degradation testing	
7			Pass-fail testing	
6	Moderate	<i>New test method; not proven; planned timing is sufficient to modify production tools before release for production. *</i>	Test-to-failure	
5			Degradation testing	
4	High	Proven test method for verification of functionality or validation of performance, quality, reliability and durability; Planned timing is sufficient to modify production tools, before release for production.	Pass-fail testing	
3			Test-to-failure	
2			Degradation testing	
1	Very high	Prior testing confirmed that failure mode or cause cannot occur, or detection methods proven to always detect the failure mode or failure cause.		

*Note : This table has been aligned to Errata Version 2, June 2020