

# **FTA and ETA Procedure**

**ECC RAMS Enginering Procedure: ECC-01-2023-14-PD-001** 

#### **APPROVAL**

The Procedure preparation, review and approved shall be performed by different professional with proved competencies on RAMS fields. This procedure review take place along the lifecycle whenever it's necessary based on directive, regulation, standards or internal procedure or client requirements.

	Version	Prepared by	Signature	Reviewed by	Approved By	Date
Review	1	Eduardo Calixto				01/01/23
Review						
Review						

# **Table of Contents**

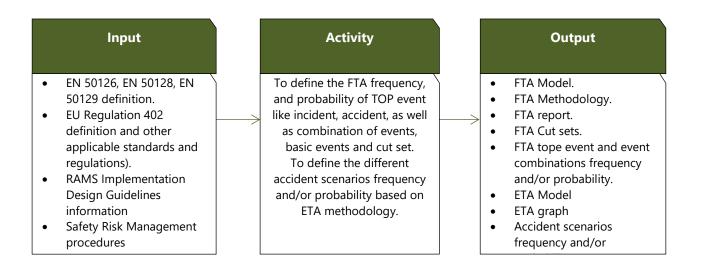
TA	BLE C	OF CONTENTS	2
1	OBJ	ECTIVES, SCOPE & RESPONSIBILITIES	3
•	1.1 1.2 1.3	Introduction & Purpose  General Process Description	3
•	1.4	TERMS & DEFINITIONS	4
•	1.5	ACRONYM	9
2	SYS	TEM DESCRIPTION	11
	2.1. 2.1. 2.1. FTA	3	11 11 12 13
3	3.1. 3.2. 3.3.	RELIABILITY AND MAINTAINABILITY INPUT INFORMATION	15
4	ETA	METHODOLOGY	20
5	FTA	AND ETA DEMONSTRATION, VERIFICATION AND VALIDATION.	21
6	FTA	AND ETA IMPLEMENTATION ALONG LIFE CYCLE	22
A۱	INEX	A – RELIABILITY AND MAINTAINABILITY INPUT DATA.	0
A٨	INEX	B – FTA EXAMPLE - BRAKE CONTROL LOSS (ISOGRAPH FTA SOFTWARE)	1
A١	INEX	C – FTA EXAMPLE - BRAKE FAILURE (BLOCKSIM FTA SOFTWARE)	2
A۱	INEX	D – FTA EXAMPLE - BRAKE FAILURE (BLOCKSIM FTA SOFTWARE) – CONTINUOUS	3
ΑN	INEX	E – ETA EXAMPLE – COLLISION ACCIDENT	4
LIS	ST OF	FIGURES	
Fig	gure 1:	FTA Selection along Life cycle	13
Fig	gure 2:	Example of Railway PBS.	14
Fio	ure 3.	FTA gates events list	17

## 1 Objectives, Scope & Responsibilities

## 1.1 Introduction & Purpose

The purpose of this procedure is to describe the FTA and ETA methodologies applied Top event probability and/or frequency calculation based on combination of events as well as probability and/or Frequency calculation of different accident scenarios respectively.

### 1.2 General Process Description



### 1.3 References

Reference / Title					
	Standards and Regulations				
[S.1]	Commission Implementing Regulation (EU) No. 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009, 2013				
[S.2]	EN 50126-1: Railway applications — The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) — Part 1 Generic RAMS Process, 2017				
[S.3]	EN 50126-2: Railway Applications – The Specification and Demonstration of Reliability, Availability Maintainability and Safety (RAMS) — Part 2 Systems Approach to Safety, 2017				
[S.4]	EN 50128: Railway applications — Communication, signalling and processing systems — Software for railway control and protection systems, 2020				
[S.5]	EN 50129: Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling, 2018				
[S.6]	Commission Implementing Regulation (EU) 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union, 2014				

Document Ref. ECC-01-2023-14-PD-001