



**Project name:** RECIF Project - Safety system

File date: 15/05/2023 13:09:44 Report date: 15/05/2023 Checksum: 91dfcda8d7e857515123eae5fe44519c

## PR Project name: RECIF Project - Safety system

Project file name:	C:\Users\ferrucci\OneDrive\UPF\projects\recif\studies\DD-019-note_calcul_systeme_securite\rev00\DD-019_rev01.ssm
Creation date:	05/04/2022 16:59:40
Project status:	Done
Project number:	
Project version:	
Authors:	Franco FERRUCCI
Project managers:	Pascal ORTEGA
Inspectors:	
Dangerous point/machine:	
Documentation:	In French: Système de sécurité projet RECIF
Document:	
Version of software:	2.0.8 build 4
Version of standard:	ISO 13849-1:2015, ISO 13849-2:2012
Checksum:	91dfcda8d7e857515123eae5fe44519c
Options:	<input checked="" type="checkbox"/> Use DC intermediate levels for calculation of PFHD (more precise) <input type="checkbox"/> MTTFD capping for category 4 lower from 2500 to 100 years.
Status:	green
Note:	There are no warnings listed for this project (or it's subordinate basic elements).

### Print options

- ☒ Show Safety functions ☒ also show Subsystems  
☒ also show Blocks ☒ also show Elements

### Contained safety functions

**SF** Name: Disconnection of fuel cell H2 solenoid valve power supply [SIF #1a]

Required: PLr d Reached: PL d PFHD [1/h]: 2E-7 Status: green

### Contained subsystems

**SB** Name: Hydrogen transmitters

Resulting PL: d PFHD [1/h]: 1,9E-7 Category: 3  
 MTTFD [a]: 66,7 (High) DCavg [%]: 60,1 (Low) CCF Points: 90 (fulfilled)

### Contained channels / blocks / Elements

**CH** Name: Channel 1 (MTTFD [a]: 100)

**BL** Name: H2 transmitter #1 [-B1]

MTTFD [a]: 1809,1 (High) DC [%]: 81,4 (Low)

**BL** Name: H2 transmitter controller [-K.2.30]

MTTFD [a]: 3869,7 (High) DC [%]: 89,5 (Low)

**CH** Name: Channel 2 (MTTFD [a]: 3)



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**BL** Name: H2 transmitter #2 [-B3]

MTTFD [a]: 3 (Low)

DC [%]: 60 (Low)

**SB** Name: Safety programmable logic controller (PLC) [-K.2.53]

Resulting PL: e

PFHD [1/h]: 2E-9

Category: 4

MTTFD [a]: not relevant

DCavg [%]: not relevant

CCF Points: not relevant

**SB** Name: Safety expansion relay connected to PLC safety output [-K.2.54]

Resulting PL: e

PFHD [1/h]: 1,2E-8

Category: 4

MTTFD [a]: not relevant

DCavg [%]: not relevant

CCF Points: not relevant

**SF** Name: Disconnection of electrolyzer power supply [SIF #1b]

Required: PLr d

Reached: PL d

PFHD [1/h]: 2,3E-7

Status: green

### Contained subsystems

**SB** Name: Hydrogen transmitters

Resulting PL: d

PFHD [1/h]: 1,9E-7

Category: 3

MTTFD [a]: 66,7 (High)

DCavg [%]: 60,1 (Low)

CCF Points: 90 (fulfilled)

### Contained channels / blocks / Elements

**CH** Name: Channel 1 (MTTFD [a]: 100)

**BL** Name: H2 transmitter #1 [-B1]

MTTFD [a]: 1809,1 (High)

DC [%]: 81,4 (Low)

**BL** Name: H2 transmitter controller [-K.2.30]

MTTFD [a]: 3869,7 (High)

DC [%]: 89,5 (Low)

**CH** Name: Channel 2 (MTTFD [a]: 3)

**BL** Name: H2 transmitter #2 [-B3]

MTTFD [a]: 3 (Low)

DC [%]: 60 (Low)

**SB** Name: Safety programmable logic controller (PLC) [-K.2.53]

Resulting PL: e

PFHD [1/h]: 2E-9

Category: 4

MTTFD [a]: not relevant

DCavg [%]: not relevant

CCF Points: not relevant

**SB** Name: Safety expansion relay connected to PLC safety output [-K.2.54]

Resulting PL: e

PFHD [1/h]: 1,2E-8

Category: 4

MTTFD [a]: not relevant

DCavg [%]: not relevant

CCF Points: not relevant

**SB** Name: Two trip contactors connected to expansion relay

Resulting PL: e

PFHD [1/h]: 2,5E-8

Category: 3

MTTFD [a]: 100 (High)

DCavg [%]: 99 (High)

CCF Points: 75 (fulfilled)

### Contained channels / blocks / Elements

**CH** Name: Channel 1 (MTTFD [a]: 100)

**BL** Name: Trip contactor #1 [-K.2.50]

MTTFD [a]: 1141552,5 (High)

DC [%]: 99 (High)

**CH** Name: Channel 2 (MTTFD [a]: 100)

**BL** Name: Trip contactor #2 [-K.2.51]



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MTTFD [a]: 1141552,5 (High)

DC [%]: 99 (High)

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## **EXCLUSION OF LIABILITY**

Care has been taken in production of the software SISTEMA, which corresponds to the state of the art. It is made available to users free of charge.

Die Software wurde gemäß dem Stand von Wissenschaft und Technik sorgfältig erstellt. Sie wird dem Nutzer unentgeltlich zur Verfügung gestellt.

Die Haftung des IFAs/ DGUV ist damit auf Vorsatz und grobe Fahrlässigkeit (§ 521 BGB) bzw. bei Sach- und Rechtsmängel auf arglistig verschwiegene Fehler beschränkt (523, 524 BGB).

The IFA undertakes to keep its website free of viruses; nevertheless, no guarantee can be given that the software and information provided are virus-free. The user is therefore advised to take appropriate security precautions and to use a virus scanner prior to downloading software, documentation or information.

## **CONTACT**

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