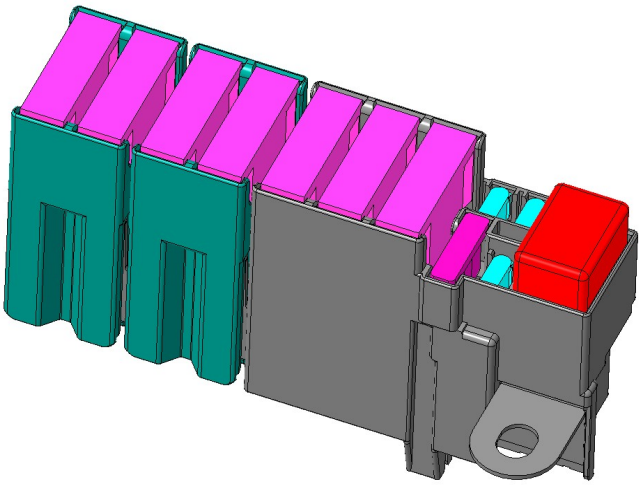
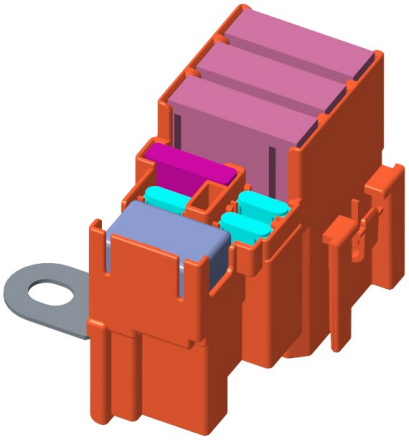
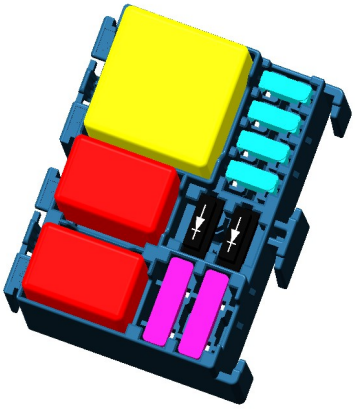
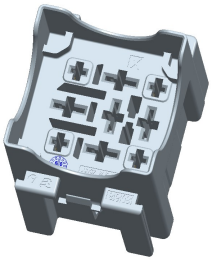
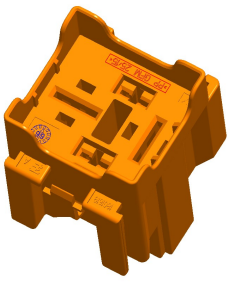
ENGINE COMPARTMENT FUSE AND RELAY BOX
ERFB AND RELAYS HOLDERS

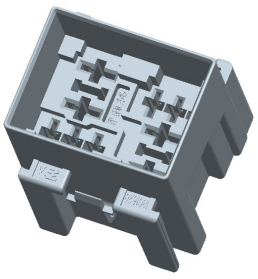


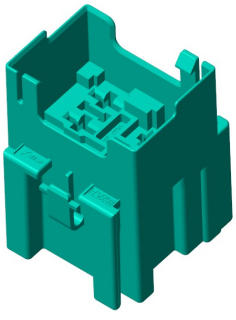












Rédigé par/*Drawing by* : O.Bouillot le 28-February 2020 Approuvé par/*Approved by* : I.SMIRANI 28-February-2020

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TABLE DES REVISIONS – *REVISION TABLE*

Revision	Date	Responsable	Modification
A	04/07/2012	T. VERNIER	Change Tyco Electronics for TE Connectivity Modification of requirements for test M1, M3, M4, M7, M9, M10, M12, M15, M17, M22, M31-32, M37 & O1 Clarification of requirement for test E1 Update 6.2 Program approval tests
B	03/03/2014	A. METTAVANT	Add other contacts, Program approval test for duplication tools of ERFB BOX and CRFB BOX 3 V2 into the BIM. Add test M26 & M27-
C	05/01/2018	A. METTAVANT	Add new reference ERFB BOX 4 HIGH CURRENT FUSES. Add DVP specific to ERFB BOX 4 MAXIFUSE. Add Test M39. Add Appendix 10 into the test T1 & T2
D	28/02/2020	O. BOUILLOT	Add new references ERFB BOX 3 HIGH CURRENT FUSES for NISSAN Add new reference 2 MICRO RELAY HOLDER for NISSAN Add specific DVP for ERFB BOX 3 NISSAN and 2 MICRO RELAY HOLDER NISSAN.

CONTENTS:

1. SCOPE 4
1.1. Content 4
2. DESCRIPTION 4
2.1. Composition of ERFB boxes 4
2.2. Relays holders 5
2.3. References 6
2.4. Overview 6
2.5. Electrical synoptic and fuse architecture: see appendix 1 6
2.6. Wiring architecture see appendix 2 6
2.7. Contacts used in the ERFB 7
2.8. Others contacts used for PNs 1801628-1/2/3 and 1801773-1 7
3. REFERENCE DOCUMENTS 8
3.1. Usable document 8
3.2. TE Connectivity specifications 8
3.3. Customer specifications (Renault) 8
4. Operating conditions 9
4.1. Temperatures 9
4.2. Water tightness & Protection rating 9
4.3. Vibration 9
4.4. Load scenario current at 85°C 9
5. TESTS 9
5.1. Test conditions: 9
6. QUALITY INSURANCE MEASURE 17
6.1. Qualification test 17
6.2. Program approval tests 18
6.3. Program approval tests for duplication tool of the main ERFB Holder in ERFB BOX 3/5/7 High Current Fuses: 20
6.3.1. Renault version 20
6.3.2. Nissan version 21
6.4. Program approval tests for ERFB BOX 4 HIGH CURRENT FUSES. 22
6.5. Program approval tests for CRFB BOX 3 V2 PN 1801773-1 23
6.6. General conditions of test 24
6.7. Test and conformity 24
Appendix 1 : Electrical synoptic and fuse architecture 25
Appendix 2 : Wiring architecture 26
Appendix 3 : Current load scenarios at 85°C 27
Appendix 4 : Current load scenarios at 40°C 28
Appendix 5 : Current load scenarios at 85°C 29
Appendix 6 : Contact resistance 32
Appendix 7: Vibration profilE 33
Appendix 8: Temperature humidity cycle 34
Appendix 9: Description of mechanical tests on boxes 35
Appendix 10 : Current load scenarios at 85°C FOR ERFB 4 HIGH CURRENT FUSES 36

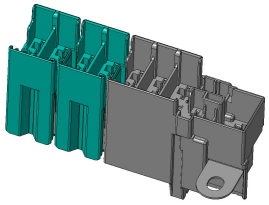
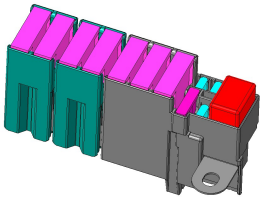
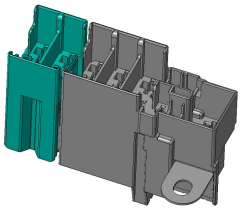
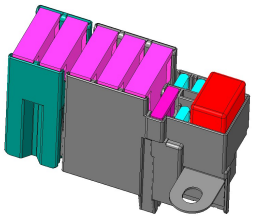
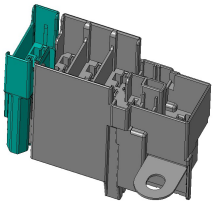
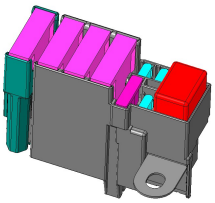
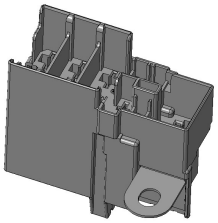
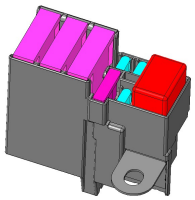
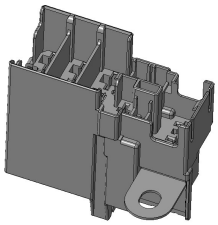
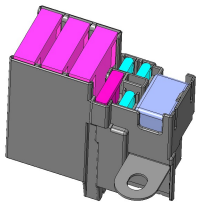
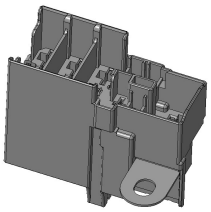
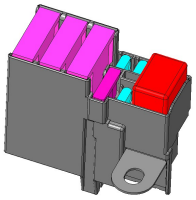
1. SCOPE

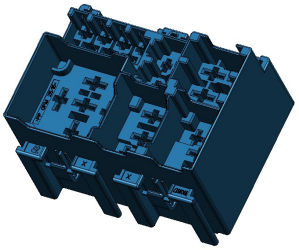
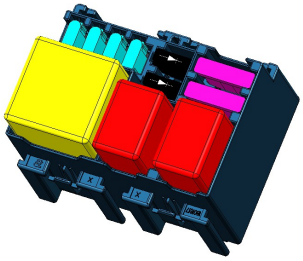
1.1. Content

This document covers the performances, tests, and quality requirements for all boxes ERFB (Engine Relay Fuse Box) used on the engine compartment. Due to the modular aspect of the boxes, different combinations can exist on the vehicle.

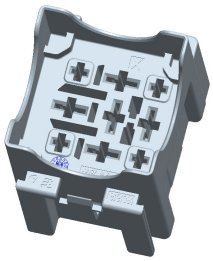
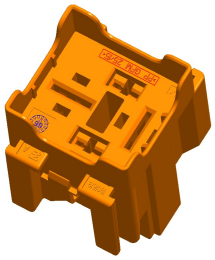
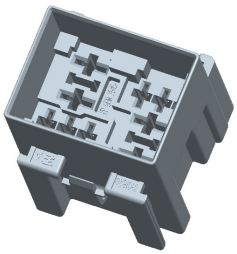
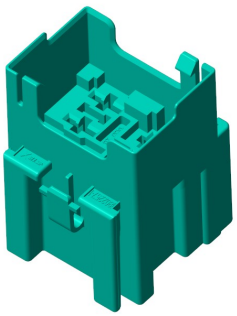
2. DESCRIPTION

2.1. Composition of ERFB boxes

	As delivered from TE	Final Assembly (for indication only)
ERFB BOX 7 HIGH CURRENT FUSES		
ERFB BOX 5 HIGH CURRENT FUSES		
ERFB BOX 4 HIGH CURRENT FUSES		
ERFB BOX 3 HIGH CURRENT FUSES (RENAULT)		
ERFB BOX 3 HIGH CURRENT FUSES WITH LOCKING LATCH FOR RELAY (NISSAN)		
ERFB BOX 3 HIGH CURRENT FUSES WITHOUT LOCKING LATCH FOR RELAY (NISSAN)		

	As delivered from TE	Final Assembly (for indication only)
CRFB – BOX 3 Or CRFB BOX 3 V2		

2.2. Relays holders

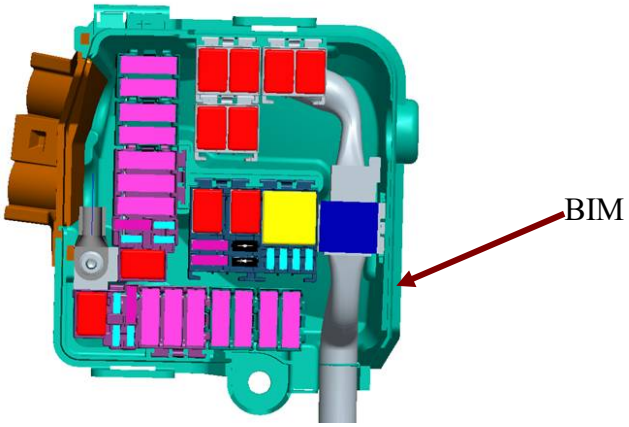
Relay ISO 40A Holder	Relay ISO 70A Holder
	
2 Micro-Relays Holder	
Renault version	Nissan Version
	

2.3. References

Nissan Ref.	Renault Ref.	TE P/N	Description
/	243 512 602R	1801628-1	ERFB BOX – 3 High current fuses
24381 6LA5A	/	1802254-1	ERFB BOX – 3 High current fuses with latch for relay
TBD	/	1802254-2	ERFB BOX – 3 High current fuses without latch for relay
/	243 514 171R	1801628-2	ERFB BOX – 5 High current fuses
/	243 510 925R	1801628-3	ERFB BOX – 7 High current fuses
/	243 515 881R	1801617-1	CRFB – BOX 3
/	243 805 704R	1801773-1	CRFB – BOX 3 V2
/	243 809 443R	1801618-1	Relay ISO 40A Holder
/	243 808 725R	1801619-1	Relay ISO 70A Holder
/	243 801 496R	1801620-1	2 Micro-Relays Holder
24383 6LA0A	/	1802257-1	2 Micro-Relays Holder

2.4. Overview

The view below shows the BIM full equipped with all components.



2.5. Electrical synoptic and fuse architecture:_____see appendix 1

2.6. Wiring architecture _____ see appendix 2

2.7. Contacts used in the ERFB

Clip, tab description	Wire (mm2)	RSA P/N	TE P/N	Use
Clip JPT Type	0,2² to 0,5²	8200 943 862	0-964280-2	Miniature Fuse & Micro relay & cavity SBB
Clip JPT Type A	0,5² to 1²	8200 943 856	0-964284-2	Miniature Fuse & Micro relay & cavity SBB
Clip JPT Type A	>1²- to 2,5²	8200 943 851	0-965999-2	Miniature Fuse & cavity SBB
Clip JPT Type A	>2.5² to 4²	8 200 790 713	0-1241978-1	Miniature Fuse & cavity SBB
Clip SPT	0.5² to 1²	7 703 497 431	0-0927831-2	Medium fuse & Micro, 40A 70A relays
Clip SPT	1² to 3²	7 703 497 424	0-0144617-1	Medium fuse & Micro, 40A 70A relays
Clip SPT	3² to 5²	7 703 497 403	0-0144433-1	Medium fuse & Micro, 40A 70A relays
Clip MPT	2.5² to 4²	8 200 057 143	0-0962928-1	For 70A relays
Clip MPT	4² to 6²	8 200 046 228	0-0962930-1	For 70A relays
Clip MPT	7² to 10²	8 200 046 229	0-0962932-1	For 70A relays
Clip 8 MM MAXIFUSE+	2,5² to 4²	8200945148	0-1801431-1	High current fuse
Clip 8 MM MAXIFUSE+	5² à 6²	8200945223	0-1801432-1	High current fuse
Clip 8 MM MAXIFUSE+	7² à 10²	8200945209	0-1801433-1	High current fuse

2.8. Others contacts used for PNs 1801628-1/2/3 and 1801773-1

Clip, tab description	Wire	RSA P/N	Supplier	P/N	Use
Clip 2.8 AFK	0,35²	7703497833	LEAR	26700201185	Miniature fuse & Micro relay
Clip 2.8 AFK	0,5² to 1²	7703497835	LEAR	26701201185	Miniature fuse & Micro relay
Clip 2.8 AFK	1.25² to 2,5²	7703497837	LEAR	26705201185	Miniature fuse
Clip 2.8 DSC2	0,2²- to 0,35²	7703497879	FCI	60012811	Miniature fuse & Micro relay
Clip 2.8 DSC2	0.5² to 1²	7703497880	FCI	60012831	Miniature fuse & Micro relay
Clip 2.8 DSC2	1² to 2.5²	7703497881	FCI	60012841	Miniature fuse
Clip 4.8 AFK	0.35²	7703497845	LEAR	26697330186	Medium fuse & Micro relays
Clip 4.8 AFK	0.5² to 1²	7703497846	LEAR	26649330186	Medium fuse & Micro relays
Clip 4.8 AFK	1.4² to 2.5²	7703497847	LEAR	26648330186	Medium fuse & Micro relays
Clip 4.8 AFK	3² to 4²	7703497848	LEAR	26650330186	Medium fuse & Micro relays

3. REFERENCE DOCUMENTS

3.1. Usable document

In the event of conflict between the requirements of this specification and the drawing, the drawing shall take precedent.
In the event of conflict between the requirement of this specification and the referenced documents, this specification shall take precedent.

3.2. TE Connectivity specifications

108-18013 rev E	JPT contact
108-18025 rev G	SPT contact
108-15122 rev A	SPT contact
108-15392 rev A	8mm MaxiFuse + contact

3.3. Customer specifications (Renault)

403/CM/MO/65660/09 --B	Ensemble Boitier Fusible Relais Moteur
36-05-219/--C	Wired part for relay and / or fuses
36-05-019/--G	Electrical connections and connectors
36-05-205/--E	Flat fuses with connector blades
36-05-210/--C	Plastic connector supports and protectors for electrical wiring assemblies and wiring components.
36-05-217/--A1	Relay with diode
36-05-046/---	Relay with resistor

4. OPERATING CONDITIONS

4.1. Temperatures

Class(*)	Operating temperature	Test temperature *	
3	-40°C to 125°C	+150°C	For electrical connection area
2	-40°C to +100°C	+125°C	For locking devices

(*): Without current load

4.2. Water tightness & Protection rating

- Water tightness: Class 0 - Unsealed

4.3. Vibration

- Class 1 according to 36-05-019/--E § 6.6

4.4. Load scenario current at 85°C

- : See appendix 3

5. TESTS

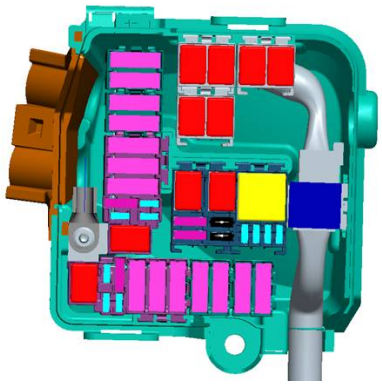
5.1. Test conditions:

- Supply voltage: 13.5V ± 0.5V
- Ambient temperature: 23°C ± 5°C
- Relative humidity: 60%± 15%
- Atmospheric pressure: 96kPa ± 10kPa
- If not over wised specified mechanical test: v = 50 mm/min
- Different box configurations are defined:

	Plastic boxes	Wire contact	Fuses & Relays	BIM
Configuration A	X			
Configuration B	X	X		
Configuration C	X	X	X	
Configuration D	X	X	X	X

- The combinations below are used for some tests.

Configuration D Assembly



GENERAL INSPECTION				
	Test description	**Ref. RSA** For indication	**Procedure**	**Requirement**
BOX ERFB				
V1	**Visual inspection**	36-05-019 /--G § 6.1	Shall be performed with the naked eye.	No working damage No visible damage, cracking or defect.
MECHANICAL TESTS				
	Test description	**Ref. RSA** For indication	**Procedure**	**Requirement**
BOX ERFB				
M1	**Insertion force of the ERFB BOX 7 High current fuses on the BIM**	36-05-219 /--C § 7.2.4.1	➔ ERFB BOX 7 High current fuses in configuration A (see appendix 9)	▪ F< 60N
M2	**Removal force of the ERFB BOX 7 High current fuses on the BIM**	36-05-219 /--C § 7.2.4.1	➔ ERFB BOX 7 High current fuses in configuration A (see appendix 9)	▪ F ≤ 60 N
M3	**Retention force of the ERFB BOX 7 High current fuses on the BIM**	36-05-219 /--C § 7.2.4.1	➔ ERFB BOX 7 High current fuses in configuration A (see appendix 9)	▪ F ≥ 100 N
M4	**Insertion force of the CRFB BOX 3 on the BIM**	36-05-219 /--C § 7.2.4.1	➔ CRFB Box 3 in configuration A (see appendix 9)	▪ F < 60N
M5	**Removal force of the CRFB BOX 3 on the BIM**	36-05-219 /--C § 7.2.4.1	➔ CRFB Box 3 in configuration A (see appendix 9)	▪ F ≤ 60 N
M6	**Retention force of the CRFB BOX 3 on the BIM**	36-05-219 /--C § 7.2.4.1	➔ CRFB Box 3 in configuration A (see appendix 9)	▪ F ≥ 120 N
M7	**Insertion force of the µ-Relays Holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ µ-Relays Holder in configuration A (see appendix 9)	▪ F < 60N
M8	**Removal force of the µ-Relays Holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ µ-Relays Holder in configuration A (see appendix 9)	▪ F ≤ 60 N
M9	**Retention force of the µ-Relays Holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ µ-Relays Holder in configuration A (see appendix 9)	▪ F > 90N
M10	**Insertion force of Relay ISO 70A holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders 70A in the configuration A (see appendix 9)	▪ F < 60N
M11	**Removal force of Relay ISO 70A holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders in the configuration A (see appendix 9)	▪ F ≤ 60 N
M12	**Retention force of Relay ISO 70A holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders in the configuration A (see appendix 9)	▪ F > 100N
M13	**Shock impact test**	36-05-219 /--C § 7.3.1 36-05-019 /--G § 6.21	➔ERFB box 7 High current fuses in configuration C Impact hammer weight: 300gr Falling height: 100 mm Striker described in NF R 13-415 Impact zone see appendix 9	▪ Visual examination: ▪ No break, cracking nor deformation

M14	**Drop resistance**	36-05-019 /--G § 6.22	➔ERFB box 7 High current fuses in configuration A and C 1m free fall test, on each face, on concrete floor. Test temperature: 0 °C	No incipient rupture but unconcealed damage permissible Whereas 36-05-019/--G No damage or incipient rupture shall be observed.
M15	**Insertion force of Relay ISO 40A holder into BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders in the configuration A (see appendix 9)	▪ F < 60N
M16	**Removal force of Relay ISO 40A holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders in the configuration A (see appendix 9)	▪ F ≤ 60 N
M17	**Retention force of Relay ISO 40A holder into the BIM**	36-05-219 /--C § 7.2.4.1	➔ Relays holders in the configuration A (see appendix 9)	▪ F > 100N
		CONTACTS		
M21	**Terminal insertion** See §2.7	36-05-219 /--C § 7.2.4.5 36-05-019 /--G § 5.3.4	➔ ERFB box 7 High current fuses configuration A Two insertion force measurement possible: . 1) Validation performed on a machine with a mobile jaw displacement speed of 50 mm/min ± 5 mm/min. . 2) The connector, installed on the measurement fixture, is manually loaded. The force is recorded at each insertion.	▪ Clip JPT 2.8 ≤ 10 N Whereas 36-05-019/--G: ≤ 8 N ▪ Clip JPT 2.8 ≤ 20 N on busbar ▪ Clip SPT 4.8 ≤ 15 N Whereas 36-05-019/--G: ≤ 12 N ▪ 8mm MaxiFuse ≤ 20 N
M22	**Terminal retention force** See §2.7	36-05-219 /--C § 7.2.4.5 36-05-019 /--G § 5.3.5	➔ ERFB box 7 High current fuses configuration A The same measurement technique is used as the method described in M21 "terminal insertion". Under no circumstances must the mechanical strength of the wire be used as a reference.	▪ Clip JPT 2.8 > 120 N ▪ Clip JPT 2.8 > 100 N on busbar ▪ Clip SPT 4.8 > 120 N Whereas 36-05-019/--G: >150 N ▪ 8mm MaxiFuse > 150 N Whereas 36-05-019/--G: >200 N After the ageing tests: Clip JPT 2.8 > 72 N Clip SPT 4.8 > 72 N 8mm MaxiFuse > 90 N
M23	**Busbar retention into the ERFB Box 7 High current fuses**	Specific test	➔ ERFB Box 7 High current fuses in the configuration A	F>110N
M24	**Busbar Retention into the ERFB Box 5 High current fuses**	Specific test	➔ ERFB Box 5 High current fuses in the configuration A	F>110N
M25	**Busbar Retention into the ERFB Box 3 High current fuses**	Specific test	➔ ERFB Box 3 High current fuses in the configuration A	F>110N
M39	**Busbar Retention into the ERFB Box 4 High current fuses**	Specific test	➔ ERFB Box 4 High current fuses in the configuration A	F>110N

M26	**Other terminal insertion force** See §2.8	36-05-219 /--C § 7.2.4.5 36-05-019 /--G § 5.3.4	ERFB Box 3 High current fuses in configuration A Two insertion force measurement possible: . 1) Validation performed on a machine with a mobile jaw displacement speed of 50 mm/min ± 5 mm/min. . 2) The connector, installed on the measurement fixture, is manually loaded. The force is recorded at each insertion.	▪ Clip 2.8 ≤ 10 N Cavity SBB : must not be performed Whereas 36-05-019/--G: ≤ 8 N ▪ Clip 4.8 ≤ 15 N Whereas 36-05-019/--G: ≤ 12 N
M27	**Other terminal retention force** See §2.8	36-05-219 /--C § 7.2.4.5 36-05-019 /--G § 5.3.5	ERFB Box 3 High current fuses in configuration A The same measurement technique is used as the method described in M21 “terminal insertion”. Under no circumstances must the mechanical strength of the wire be used as a reference.	▪ Clip 2.8 > 100 N Cavity SBB : must not be performed ▪ Clip 4.8 > 100 N Whereas 36-05-019/--G: > 150 N
			FUSES & RELAYS	
M31	**Fuse insertion force**	36-05-219 /--C § 7.2.4.2	➔ ERFB box 7 High current fuses configuration B	Fuse insertion force : ▪ Miniature fuse : F < 40N Whereas 36-05-219/--C: < 30N ▪ Medium fuse : F < 55N Whereas 36-05-219/--C: < 45N ▪ High current fuse: F < 95N Whereas 36-05-219/--C: < 45N
M32	**Fuse extraction force**	36-05-219 /--C § 7.2.4.2	➔ ERFB box 7 High current fuses configuration B	Fuse extraction force: ▪ Miniature fuse: 7N ≤ F ≤ 40N Whereas 36-05-219 / --C: 10N ≤ F ≤ 40N ▪ Medium fuse : 10N ≤ F ≤ 50N Whereas 36-05-219/--C: 20N ≤ F ≤ 50N ▪ High current fuse: 30N ≤ F ≤ 100N
M33	**Diode insertion force**	36-05-219 /--C § 7.2.4.2	➔ CRFB Box 3 Configuration B	Diode insertion force : ▪ Diode : F < 40N Whereas 36-05-219/--C < 30N
M34	**Diode extraction force**	36-05-219 /--C § 7.2.4.2	➔CRFB Box 3 Configuration B	Diode extraction force: ▪ Diode: 7N ≤ F ≤ 40N
M35	**Relays insertion force**	36-05-219 /--C § 7.2.4.2	➔ ERFB box 7 High current fuses configuration B	Relay insertion force : ▪ Micro: F ≤ 85N
M36	**Relays uncoupling force**	36-05-219 /--C § 7.2.4.2	➔ ERFB box 7 High current fuses configuration B	Relay uncoupling force : ▪ Micro: 30 ≤ F ≤ 115N

M37	**Durability insertion and uncoupling components**	36-05-219 /--C § 7.2.4.4	➔ ERFB box 7 High current fuses configuration B Mount and remove each fuse and relay 10 times. - With 50% of the samples with the same component - With 50% of the samples with new component for each operations Record the first and the tenth: ▪ Mounting and removing forces ▪ Contact resistances	▪ Component insertion force (see M31, M33 & M35) or/and the decrease must be lower than 10% of the 1st operation ▪ Component removing force (see M32, M34 & M36) or/and the decrease must be lower than 10% of the 1st operation ▪ Contact resistance Maxi (see E1) Whereas 36-05-219/--C Between the first to the tenth manipulation no variation of the strength and of the contact resistance of more than 10%
M38	**Protection of the contacts during the working and the handling**	36-05-219 /--C § 6.4.4	➔ ERFB box 7 High current fuses configuration B Mount and remove each fuse and relay 5 times in worst opposite combination clip/component. Record before the and after the test: ▪ Contact resistances ▪ Component removing forces	▪ Contact resistance Maxi (see E1) ▪ Component removing force: the decrease must be lower than 20% of the 1st operation
M40	**Relays retention force (for information)**	36-05-219 /--C § 7.2.4.2	➔ ERFB in configuration B only for **PN 1802254-1**	Relay retention force: ▪ Micro: F > 50N

ELECTRICAL TESTS				
	Test description	**Ref. RSA** For indication	**Procedure**	**Requirement**
E1	**Contact resistance**	36-05-219 /--C § 7.2.2 36-05-019 /--G § 6.2	➔ ERFB Box 7 High current fuses, CRFB Box 3 and relays holders. Configuration C "MilliVolts" level method: ▪ Test voltage : 20 mV ▪ Test current : 50 mA	Initial contact resistance: ▪ Miniature & Medium Fuses ≤ 6 mΩ ▪ High current fuses ≤ 4 mΩ ▪ Relays µ & 40A ≤ 6 mΩ (see appendix 6) ▪ JPT 2.8 ≤ 3 mΩ ▪ SPT 4.8 ≤ 3 mΩ ▪ 8mm MaxiFuse ≤ 1 mΩ After the ageing tests: ▪ Miniature & Medium Fuses ΔRc ≤ 8 mΩ ▪ Relays µ & 40A ΔRc ≤ 6 mΩ ▪ High current fuses ΔRc ≤ 4 mΩ (see appendix 6) ▪ JPT 2.8 ΔRc ≤ 4 mΩ ▪ SPT 4.8 ΔRc ≤ 3 mΩ ▪ 8mm MaxiFuse + ΔRc ≤ 1 mΩ
E2	**Insulation resistance**	36-05-219 /--C § 7.7 36-05-019 /--G § 6.11	ERFB Box 7 High current fuses, Configuration B Measures must be performed between each contacts and between each contacts connected together and a metal sheet covering the housing Voltage test : 500V dc / 1 min	Ri ≥ 100 MΩ
E3	**Voltage resistance**	36-05-219 /--C § 7.6 36-05-019 /--G § 6.12	ERFB Box 7 High current fuses, Configuration B 1 000 Vac eff. 50 Hz or 60 Hz (or 1400 Vcc) / 1 min between each contacts and between each contacts connected together and a metal sheet covering the housing	No dielectric breakdown or flash-over during the test. Contacts must be without damage, oxide trace, or all other defect Housing must be without damage
E4	**Fuse blowing test**	36-05-219 /--C § 7.11	ERFB Box 7 High current fuses Configuration C A test shall be conducted to ensure that the box is capable of resisting constraints associated with the utilization of fuses under limit conditions. The test is performed at ambient temperature.	<u>First test:</u> The box is equipped with a « Miniature » 30 A fuse. No deformation shall appear following passage of a 36 A current during 1800s between 600s and 1800s and a 60A current between 0,15s and 5s. <u>Second test:</u> The box is equipped with a « Medium » 40 A fuse. No deformation shall appear following passage of a 48 A current between 600s and 1800s and 80A between 0,15s and 5s <u>Third test:</u> The box is equipped with a « High current » 80 A fuse. No deformation shall appear following passage of a 108 A current between 60s and 1800s and a 160A current between 4s and 60s.

THERMALELECTRICAL TESTS				
	Test description	**Ref. RSA** For indication	**Procedure**	**Requirement**
T1	**Current cycling at high temperature**	36-05-219 /--C § 7.4 36-05-019 /--G § 6.15	➔ Boxes in configuration D Assy In an oven at 85°C, the box is powered: ▪ 500 cycles of scenario at 85°C (see appendix 3) (see appendix 10 for program approval test for ERFB BOX 4 HIGH CURRENT FUSES) 1 cycle: ▪ 45 min box powered ▪ 15 min box not powered	▪ Contact resistance (see E1)
T2	**Temperature rise: fuses, relays, busbars**	36-05-219 /--C § 7.2.3.1 § 7.2.3.2 § 7.2.3.3	➔ Boxes in configuration D Assy Boxes are placed in an oven protected from forced convection. The different loads described in appendix 3 and 4 (Appendix 10 for ERFB 4 High current fuses) are applied during 30min each (until the thermal stability). Reliability test (for indication purpose only): After the storage at T=85°C, the temperature is increased by step of 10°C with stabilisation during 30min until a first defect (fuse blowing, relay break…).	▪ Contact temperature: ▪ Clip JPT 2.8 ≤ 130°C ▪ Clip SPT 4.8 ≤ 130°C ▪ Busbar ≤ 130°C ▪ Clip 8mm Maxifuse +≤ 150°C Whereas 36-05-219/--C < 125°C
T3	**Current cycling at high temperature (For information)**	36-05-219 /--C § 7.4 36-05-019 /--G § 6.15	➔ Boxes in configuration D Assy In an oven at 85°C, the box is powered: ▪ 500 cycles of scenario at 85°C (see appendix 5) 1 cycle: ▪ 45 min box powered ▪ 15 min box not powered	For information

AGEING TESTS				
	Test description	**Ref. RSA** For indication	**Procedure**	**Requirement**
A1	**Atmospheric corrosion test**	36-05-219 /--C § 7.5.1 36-05-019 /--G § 6.7	➔ ERFB Box 7 High current fuses, CRFB Box 3 and relays holders configuration D. Method regarding CEI 68-2-60 with ▪ Preconditioning : 1 H ▪ Method : C ▪ Duration : 4 h	▪ Contact resistance (see E1)
A2	**Vibrations**	36-05-219 /--C § 7.3.2 36-05-019 /--E § 6.6	➔ Boxes in configuration D Assy Vibration: Class 1 see appendix 7 Only on vertical axis	▪ During sequence : No breakdown above 1µs ▪ Contact resistance (see E1) ▪ For information: Perform the test 36-05-019/--G
A3	**Temperature humidity cycle**	36-05-219 /--C § 7.5.2 36-05-019 /--G § 6.16	➔ Boxes in configuration C Assy ▪ Box not powered ▪ 10 cycles of 24 Hrs. Cycles described in appendix 8 Tmax=125°C Whereas 36-05-219/--C Tmax=150°C	▪ Visual examination ▪ Contact resistance ((see E1) ▪ Withstanding voltage ▪ Insulation resistance
A4	**Thermal shocks**	36-05-219 /--C § 7.5.3 36-05-019 /--G § 6.17	➔ Boxes in configuration D Assy ▪ Box not powered ▪ 100 cycles (1 cycle : 1H/-40°C + 1H/+125°C) ▪ transient time < 15s	▪ Visual examination ▪ Contact resistance (see E1)
A5	**Climatic endurance**	36-05-219 /--C § 7.5.4 36-05-019 /--G § 6.19	➔ Boxes in configuration D Assy ▪ Box not powered ▪ 240 Hrs at 125°C Whereas 36-05-219/--C 240 Hrs at 150°C	▪ No visible deformation nor crack ▪ Contact resistance (see E1)
A6	**Climatic endurance (For information)**	36-05-019 /--G § 6.19	➔ Relays Holders in configuration B ▪ Holder not powered ▪ 240 Hrs at 150°C	▪ No visible deformation nor crack
A7	**Nissan Climatic endurance (for information)**	36-05-019 /--G § 6.19	➔ Box in configuration B ▪ Holder not powered ▪ 120 Hrs at 120°C	▪ No visible deformation nor crack

OTHER TESTS				
	Test description	**Ref. RSA**	**Procedure**	**Requirement**
O1	**Speed of combustibility**	36-05-219 /--C § 7.9.1	Test on standard material sample According test method D45 1333	Classe E Combustibility rate < 100mm/min Whereas 36-05-219/--C< 50mm/min
O2	**Glow wire test** **Essai doigt chauffant**	36-05-219 /--C § 7.9.2	➔ ERFB Box 7 High current fuses Test method D45 1730 with Wire temperature 750°C ± 10°C Duration of incandescent wire application is 30 s ± 1s	No presence of a flame shall be observed 30 seconds after the incandescent wire has been moved away.
O3	**Resistance to fluids**	36-05-019 /--G § 6.18	➔ ERFB Box 7 High current fuses, CRFB Box 3 and relays holders in configuration A The tests are performed in accordance with Test Method D47 1924. Test with the following fluids: Engine oil Battery electrolyte Mechanical gearbox oil Coolants Brake fluid Fuels "Severely cold" windscreen Washing fluid	At the end of the test, the parts tested must meet the following test requirements: ▪ No deformation or cracks shall be observed. ▪ Voltage resistance. ▪ Terminal resistance variation, ΔRc,

6. QUALITY INSURANCE MEASURE

6.1. Qualification test

Samples must be in accordance with drawings and be taken in a random way in the production in progress.

6.2. Program approval tests

In the groups defined below, the boxes undergo all the tests in the chronological order of the figure

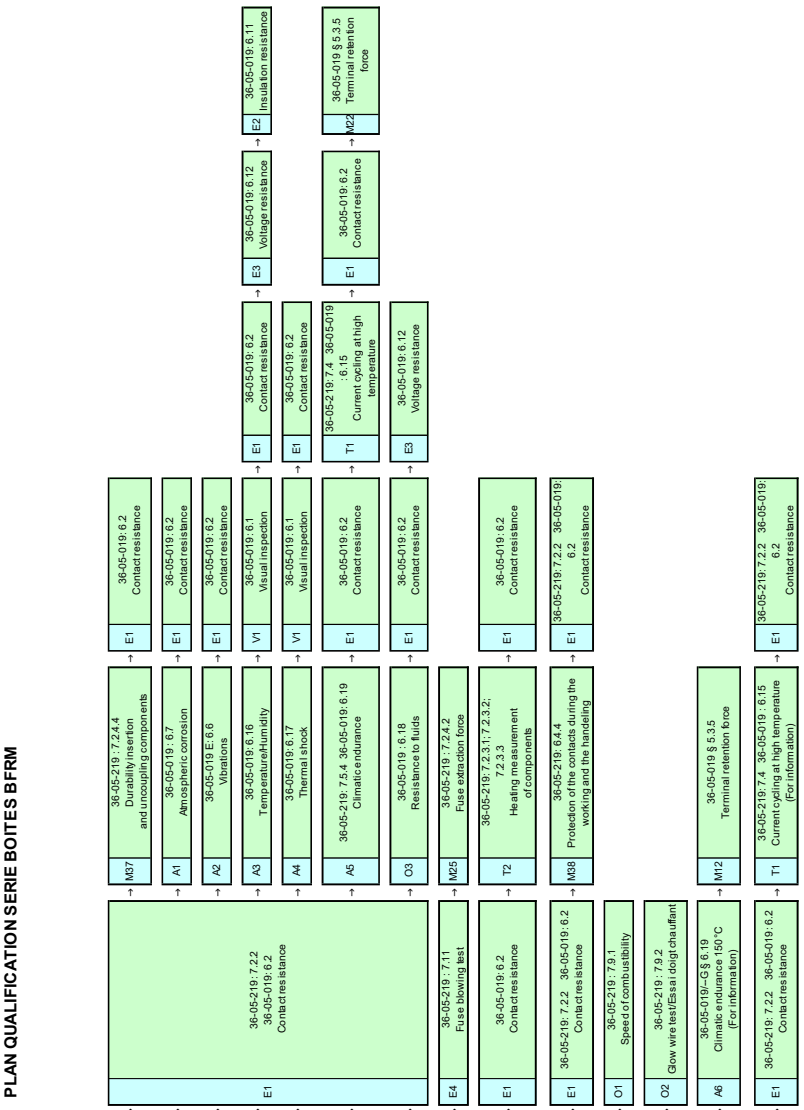
PLAN QUALIFICATION SERIE BOITES BFRM

N° Sequence	RSA Sequence (36-05-219)	Number of parts requested in 36-05-219	Individual Components number						Configuration D Assy	
			ERFB 7 Maxifuse	BFRH BOX 3	Relay Holder ISO 40	Relay Holder ISO 70	Relay Holder µ-Relays	BIM (for information)		Number of sample
1	C	10	8	NA	NA	NA	NA	4	→ M1	NA
2	C	10	NA	4	NA	NA	NA	2	→ M4	NA
3	C	10	NA	NA	NA	NA	8	4	→ M7	NA
3 bis	C	10	NA	NA	8	NA	NA	4	→ M15	NA
4	C	10	NA	NA	NA	8	NA	4	→ M10	NA
5	I	5	8	NA	NA	NA	NA	0	→ M13	NA
6			12	NA	NA	NA	NA	0	→ M14	NA
7	C	10	4	NA	NA	NA	NA	0	→ M21	NA
8			15	NA	NA	NA	NA	0	→ M23	NA
9	C	10	4	NA	NA	NA	NA	0	→ M31	NA
10	C	10	NA	4	NA	NA	NA	0	→ M33	NA
11	C	10	10	NA	NA	NA	NA	0	→ M35	NA

M1	36-05-219 § 7.2.4.1 Insertion force of the ERFB BOX 7 maxfuse on the BIM	→ M2
M2	36-05-219 § 7.2.4.1 Removal force of the ERFB BOX 7 maxfuse on the BIM	→ M3
M3	36-05-219 § 7.2.4.1 Retention force of the ERFB BOX 7 maxfuse on the BIM	
M4	36-05-219 § 7.2.4.1 Insertion force of the CRFB BOX 3 on the BIM	→ M5
M5	36-05-219 § 7.2.4.1 Removal force of the CRFB BOX 3 on the BIM	→ M6
M6	36-05-219 § 7.2.4.1 Retention force of the CRFB BOX 3 on the BIM	
M7	36-05-219 § 7.2.4.1 Insertion force of the µ-Relays Holder into the BIM	→ M8
M8	36-05-219 § 7.2.4.1 Removal force of the µ-Relays Holder into the BIM	→ M9
M9	Specific test Retention force of the µ-Relays Holder into the BIM	
M10	36-05-219 § 7.2.4.1t Insertion force of Relay ISO 70A holder into the BIM	→ M11
M11	36-05-219 § 7.2.4.1 Removal force of Relay ISO 70A holder into the BIM	→ M12
M12	36-05-219 § 7.2.4.1 Retention force of Relay ISO 70A holder into the BIM	
M13	36-05-019: 6.21 Shock impact	→ V1
M14	36-05-019: 6.22 Drop test	
M15	36-05-219 § 7.2.4.1t Insertion force of Relay ISO 40A holder into the BIM	→ M16
M16	36-05-219 § 7.2.4.1 Removal force of Relay ISO 40A holder into the BIM	→ M17
M17	36-05-219 § 7.2.4.1 Retention force of Relay ISO 40A holder into the BIM	
M21	36-05-019 § 5.3.4 Terminal insertion	→ M22
M22	36-05-019 § 5.3.5 Terminal retention force	
M23	Specific test Busbar retention into the ERFB Box 7 Maxfuses	→ M24
M24	Specific test Busbar Retention into the ERFB Box 5 Maxfuses	→ M25
M25	Specific test Busbar Retention into the ERFB Box 3 Maxfuses	
M31	36-05-219 : 7.2.4.2 Fuses insertion force	→ M32
M32	36-05-219 : 7.2.4.2 Fuse extraction force	
M33	36-05-219 : 7.2.4.2 Diode insertion force	→ M34
M34	36-05-219 : 7.2.4.2 Diode extraction force	
M35	36-05-219 : 7.2.4.2 Relays insertion force	→ M36
M36	36-05-219 : 7.2.4.2 Relays uncoupling force	

PLAN QUALIFICATION SERIE BOITES BFRM

N° Sequence	RSA Sequence (36-05-219)	Number of parts requested in 36-05-219	Individual Components number						Configuration D Assy
			ERFB 7 Maxifuse	BFRH BOX 3	Relay Holder ISO 40	Relay Holder ISO 70	Relay Holder µ-Relays	BIM (for information)	Number of sample
12	H	3	2	NA	NA	NA	NA	0	NA
13	E	1	2	1	NA	NA	3	1	1
14	A	3	2	1	NA	NA	3	1	1
15	F	3	4	2	NA	NA	6	2	2
16	G	3	4	2	NA	NA	6	2	2
17	A	3	4	2	NA	NA	6	2	2
18	L	1	2	2	NA	NA	2		0
19	K	1	1	NA	NA	NA	NA	0	NA
20	B	3	4	2	NA	NA	6	2	2
21			2	NA	NA	NA	NA	0	NA
22	D	1	Plastic material certificate						
23	D	1	4	NA	NA	NA	NA	0	NA
24	A	3	2	1	NA	NA	3	1	1
25	A	3	2	1	NA	NA	3	1	1



6.3. Program approval tests for duplication tool of the main ERFB Holder in ERFB BOX 3/5/7 High Current Fuses:

6.3.1. Renault version

VALIDATION PLAN FOR ERFB DUPLICATION

N° Sequence	RSA Sequence (36-05-219)	Number of parts requested in 36-05-219	Individual Components number: ERFB 3 High current fuses	ERFB 5 High current fuses	ERFB 7 High current fuses	BIM (for information)	Configuration D Assy: Number of sample	Test 1	Test 2	Test 3
1	C	10	8	NA	NA	4	NA	→ M1: 36-05-219 § 7.2.4.1 Insertion force of the ERFB BOX on the BIM	→ M2: 36-05-219 § 7.2.4.1 Removal force of the ERFB BOX on the BIM	→ M3: 36-05-219 § 7.2.4.1 Retention force of the ERFB BOX on the BIM
7	C	10	4	NA	NA	0	NA	→ M21: 36-05-019 § 5.3.4 Terminal insertion	→ M22: 36-05-019 § 5.3.5 Terminal retention force	
8			5	5	5	0	NA	→ M23: Specific test Busbar retention into the ERFB Box 7 High current fuses	→ M24: Specific test Busbar Retention into the ERFB Box 5 High current fuses	→ M25: Specific test Busbar Retention into the ERFB Box 3 High current fuses
24	A	3	2	NA	NA	0	NA	→ A6: 36-05-019/--G § 6.19 Climatic endurance 150°C (For information)	→ M12: 36-05-019 § 5.3.5 Terminal retention force	
26	C	10	4	NA	NA	0	NA	→ M26: 36-05-019 § 5.3.4 Terminal insertion with competitors (LEAR and FCI) contacts	→ M27: 36-05-019 § 5.3.5 Terminal retention force with competitors (LEAR and FCI) contacts	

6.3.2. Nissan version

Design Verification Plan and Report					DVP Number		Dept#	Engineering
					Plan Date	DD-Month-Year	Plan Originator	Isabelle CHARVET +33 (0)13 420 87 98
Component: ERFB BOX		Customer P/N		TE P/N 1802254-1/-2			Manager Appv'l	Imad SMIRANI +33 (0)13420 83 79
Model Year	Applications: FUSES AND RELAYS BOX CABIN	Sub-Assy: Carlines		Source: TE Connectivity	Report Date	DD-Month-Year	Reporting Engineer	

TEST PLAN									TEST REPORT				
Item N°	Procedure, Technical Regulation or Standard	Test Description	Acceptance Criteria	Target / Requirements	Sample Qty	Sample Type (configuration)	Duration	Timing (YYwWW) Start	Timing (YYwWW) Compl	Samples Tested Qty	Samples Tested Type	Samples Tested Phase	Actual Results	NOTES
MECHANICAL TESTS														
Sequence 1														
1.1	36-05-219	M1: Insertion force of the ERFB on the BIM	§7.2.4.1	F < 60N	8	A								
1.2	36-05-219	M2 : Removal force of the ERFB on the BIM	§7.2.4.1	F ≤ 60N	4	A								
1.3	36-05-219	M3 : Retention force of the ERFB on the BIM	§7.2.4.1	F ≥ 100N	4	A								
Sequence 2														
2.1	36-05-019	M13 : Shock impact	§6.20	No break, cracking nor deformation	8	A								
2.2	36-05-019	V1 : Visual inspection	§6.1	Any failure spotted during examionation must be identified	8	A								
Sequence 3														
3.1	36-05-019	M14 : Drop test	§6.21	No incipient rupture but unconcealed damage permissible	12	A & C								
Sequence 4														
4.1	36-05-019	M21 : Terminal insertion	§5.3.4	Clip JPT 2,8 : ≤ 10N Clip JPT 2,8 on busbar : ≤ 20N Clip SPT 4,8 : ≤ 15N 8mm Maxifuse : ≤ 20N	4	A								
4.2	36-05-019	M22 : Terminal retention force	§5.3.5	Clip JPT 2,8 : > 120N Clip JPT 2,8 on busbar : > 100N Clip SPT 4,8 : > 120N 8mm Maxifuse : > 150N	4	A								
Sequence 5														
5.1	Specific test	M25 : Busbar retention into the ERFB Box 3 Maxifuses		F > 110N	5	A								
Sequence 6														
6.1	36-05-219	M35 : Relays insertion force	§7.2.4.2	F < 85N	8	B								
6.2	36-05-219	M36 : Relays uncoupling force	§7.2.4.2	30N < F < 115N	4	B								
6.3	36-05-219	M40 : Relays retention force	§7.2.4.2	F > 50N only for PN 1802254-1	4	B								
Sequence 7														
7.1	36-05-219	M31 : Fuse insertion force	§7.2.4.2	> Miniature Fuse : F < 40N > Medium Fuse : F < 55N > High Current Fuse : F < 95N	2	B								
7.2	36-05-219	M32 : Fuse uncoupling force	§7.2.4.2	> Miniature Fuse : 7N ≤ F ≤ 40N > Medium Fuse : 10N ≤ F ≤ 50N > High Current Fuse : 30N ≤ F ≤ 100N	2	B								
Sequence 8														
8.1	36-05-019	E1 : Contact resistance	§6.2	Initial contact resistance : > Micro Relay : ≤ 6mΩ > JPT 2,8 : ≤ 3mΩ > SPT 4,8 : ≤ 3mΩ After ageing tests : > Micro Relay ΔRc ≤ 6mΩ > JPT 2,8 : ΔRc ≤ 4mΩ > SPT 4,8 : ΔRc≤ 3mΩ	3	C								
8.2	36-05-219	M37 : Durability insertion and uncoupling components (relay only)	§7.2.4.4	> Component insertion force or/and the decrease must be lower than 10% of the 1st operation > Component removing force or/and the decrease must be lower than 10% of the 1st operation > Contact resistance maxi	3	B								
8.3	36-05-019	E1 : Contact resistance	§6.2	Initial contact resistance : > Micro Relay : ≤ 6mΩ > JPT 2,8 : ≤ 3mΩ > SPT 4,8 : ≤ 3mΩ After ageing tests : > Micro Relay ΔRc ≤ 6mΩ > JPT 2,8 : ΔRc ≤ 4mΩ > SPT 4,8 : ΔRc≤ 3mΩ	3	C								
Sequence 9														
9.1	36-05-019	E1 : Contact resistance	§6.2	Initial contact resistance : > Micro Relay : ≤ 6mΩ > JPT 2,8 : ≤ 3mΩ > SPT 4,8 : ≤ 3mΩ After ageing tests : > Micro Relay ΔRc ≤ 6mΩ > JPT 2,8 : ΔRc ≤ 4mΩ > SPT 4,8 : ΔRc≤ 3mΩ	2	C								
9.2	36-05-019 E	A2 : Vibration	§6.9	No breakdown above 1µs	2	C								
9.3	36-05-019	E1 : Contact resistance	§6.2	Initial contact resistance : > Micro Relay : ≤ 6mΩ > JPT 2,8 : ≤ 3mΩ > SPT 4,8 : ≤ 3mΩ After ageing tests : > Micro Relay ΔRc ≤ 6mΩ > JPT 2,8 : ΔRc ≤ 4mΩ > SPT 4,8 : ΔRc≤ 3mΩ	2	C								
Sequence 10														
10.1	36-05-019 G	A7 : Climatic endurance (for information) > Holder not powered > 120Hours at 120°C	§6.19	No visible deformation nor cracks	10	B								
10.2	36-05-219	M36 : relays uncoupling force	§7.2.4.2	30N < F < 115N	10	B								

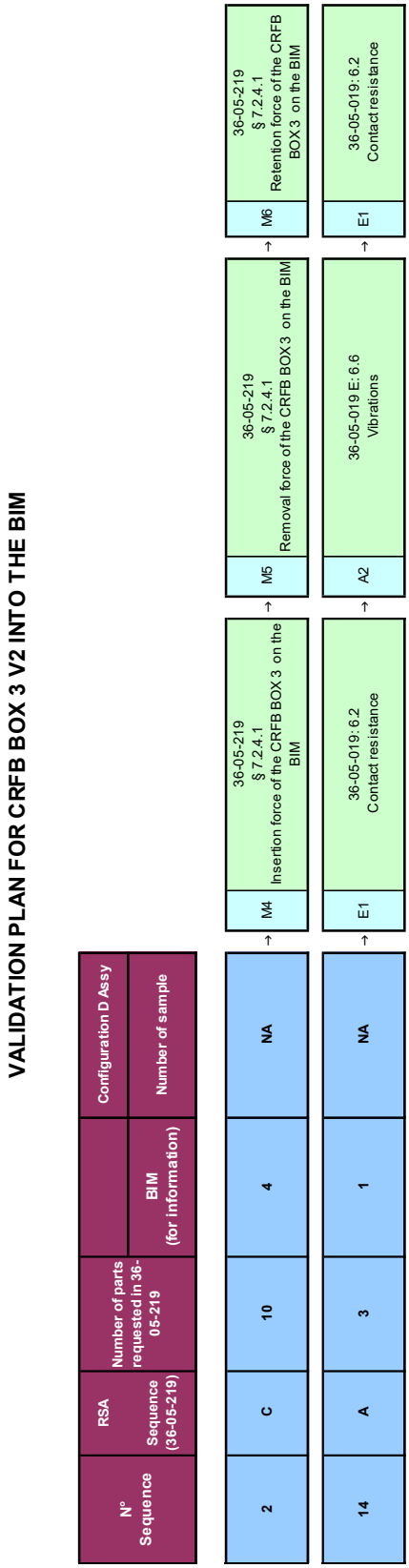
6.4. Program approval tests for ERFB BOX 4 HIGH CURRENT FUSES.

PLAN QUALIFICATION SERIE BOITES ERFB BOX 4 High Current Fuses

N° Sequence	RSA Sequence (36-05-219)	Number of parts requested in 36-05-219	Individual Components number: ERFB 4 High current fuses	Configuration D Assy: Number of sample	Test 1	Test 2	Test 3
7	C	10	10	NA	→ M21 36-05-019 § 5.3.4 Terminal insertion	→ M22 36-05-019 § 5.3.5 Terminal retention force	
8			5	NA	→ M39 Specific test Busbar retention into the ERFB Box 4 High current fuses		
9	C	10	4	NA	→ M31 36-05-219 : 7.2.4.2 Fuses insertion force	→ M32 36-05-219 : 7.2.4.2 Fuse extraction force	
12	H	3	2	NA	→ E1 36-05-219: 7.2.2 36-05-019: 6.2 Contact resistance	→ M37 36-05-219 : 7.2.4.4 Durability insertion and uncoupling components	→ E1 36-05-019: 6.2 Contact resistance
17	A	3	2	NA	→ E1 36-05-219: 7.2.2 36-05-019: 6.2 Contact resistance	→ T1 36-05-219: 7.4 36-05-019 : 6.15 Current cycling at high temperature	→ E1 36-05-019: 6.2 Contact resistance
20	B	3	2	NA	→ E1 36-05-019: 6.2 Contact resistance	→ T2 36-05-219: 7.2.3.1; 7.2.3.2; 7.2.3.3 Heating measurement of components	→ E1 36-05-019: 6.2 Contact resistance
24	A	3	2	NA	→ A6 36-05-019/--G § 6.19 Climatic endurance 150°C (For information)	→ M12 36-05-019 § 5.3.5 Terminal retention force	

	ERFB 4 Maxifuse	D assy
Total	27	0

6.5. Program approval tests for CRFB BOX 3 V2 PN 1801773-1



6.6. General conditions of test

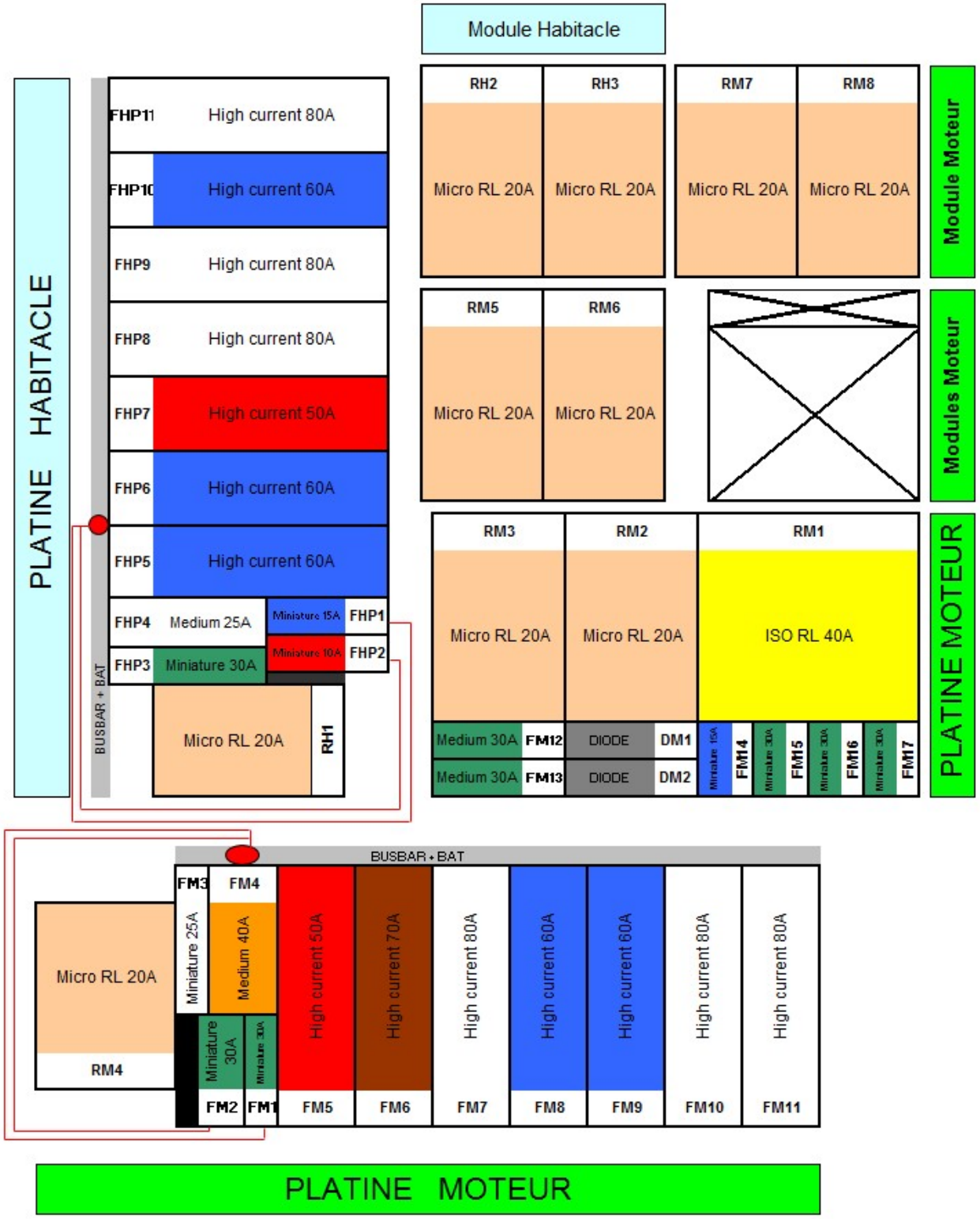
Unless otherwise specified, the tests are conducted in the following conditions.
Minimum test samples quantity: 2 parts (1 by cavity)

The table below gives the number of samples for a complete qualification.

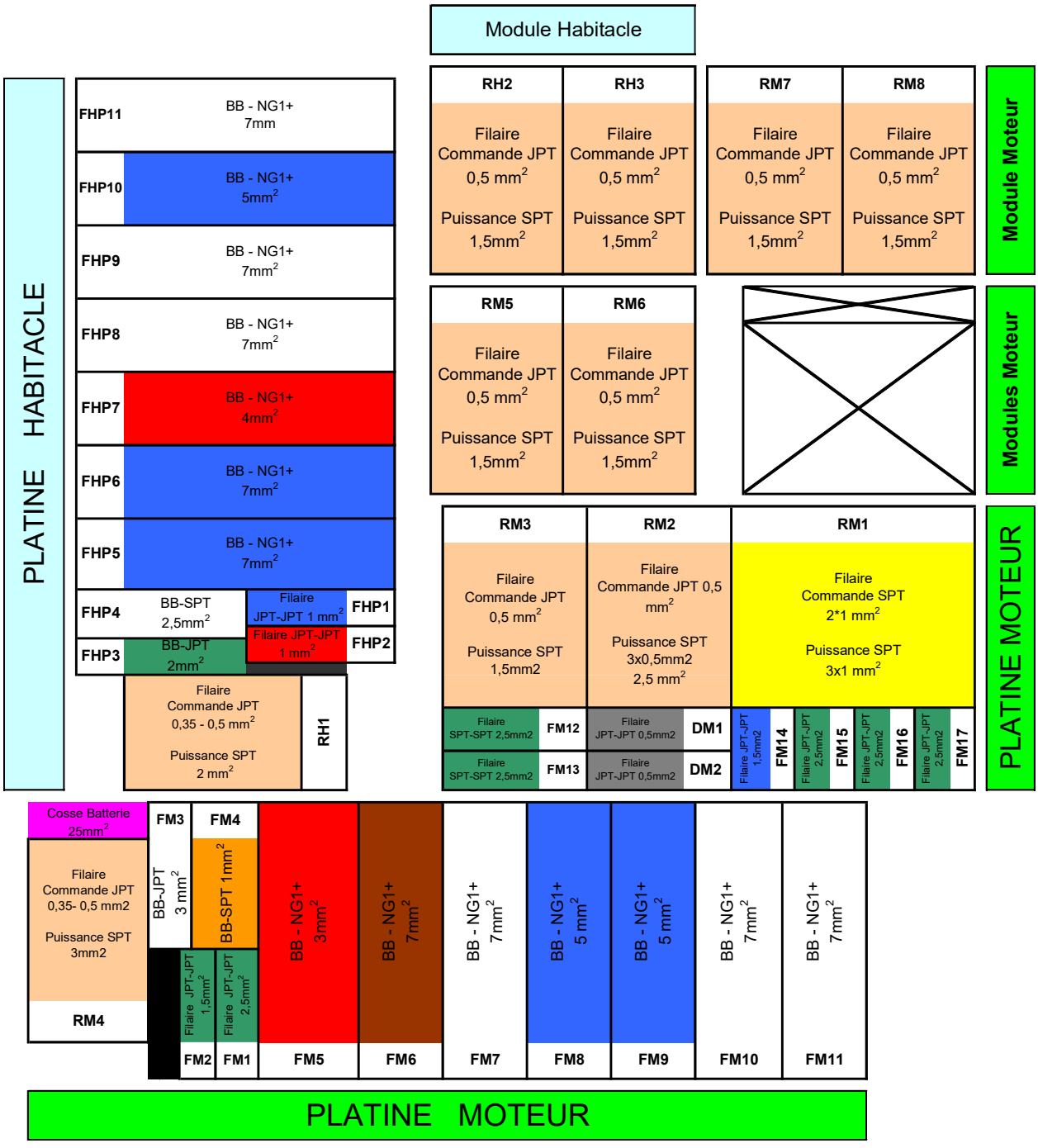
6.7. Test and conformity

Conformity test is made regarding specific Tyco Electronics quality inspection plan which define acceptable quality limit based on number of samples.
Dimensional and functional requirement must meet production drawing and that specification.

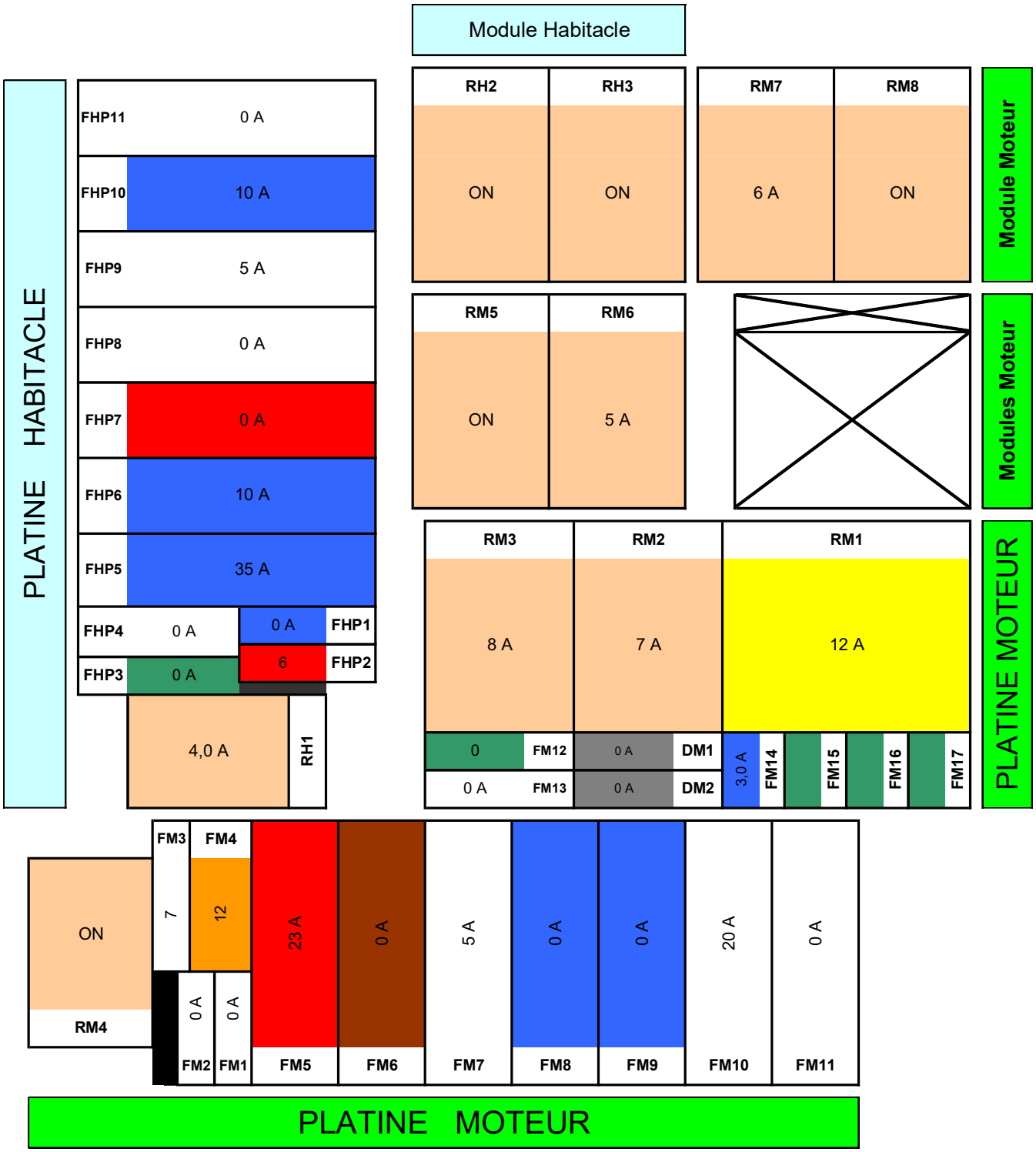
APPENDIX 1 : ELECTRICAL SYNOPTIC AND FUSE ARCHITECTURE



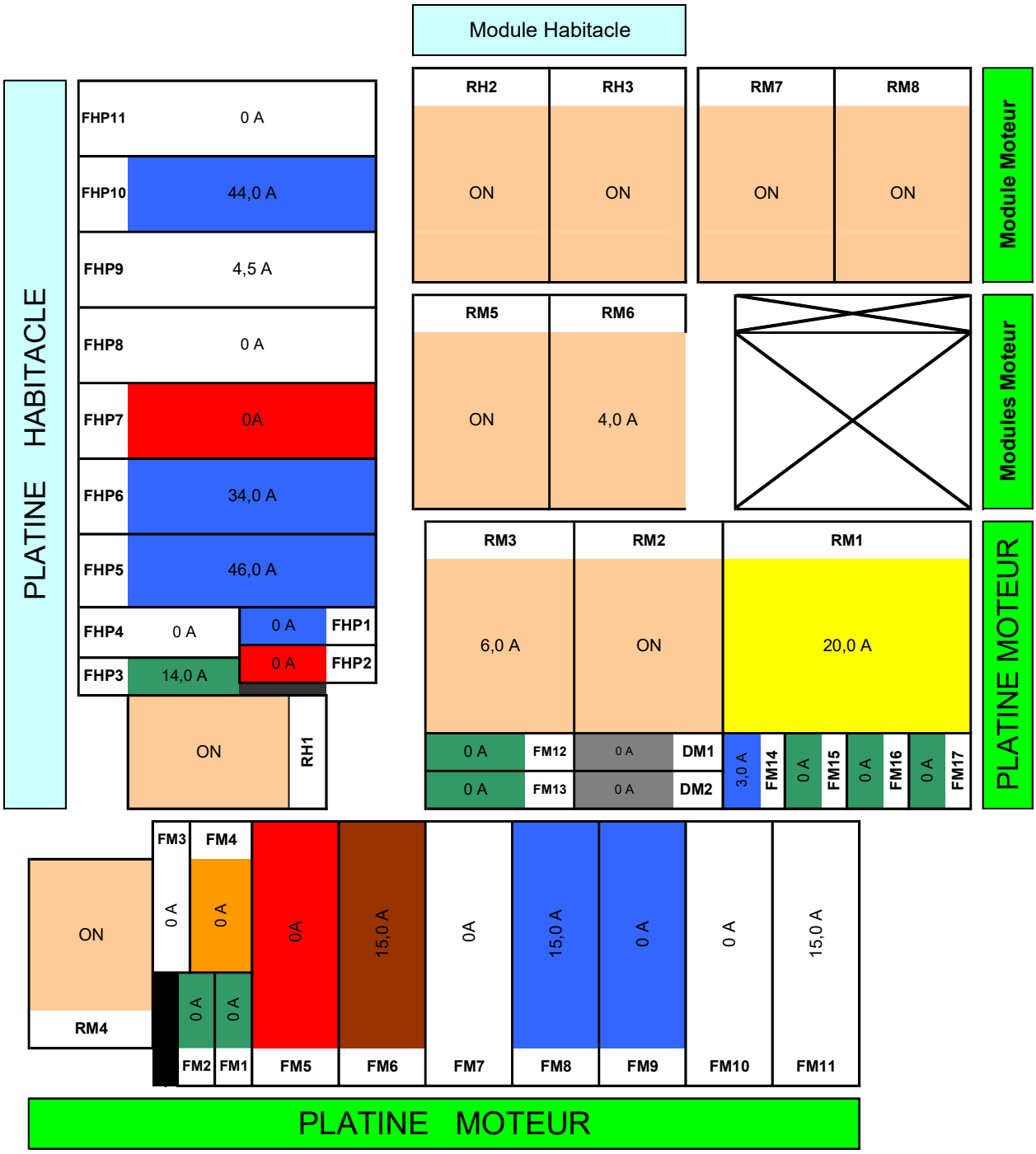
APPENDIX 2 : WIRING ARCHITECTURE



APPENDIX 3 : CURRENT LOAD SCENARIOS AT 85°C

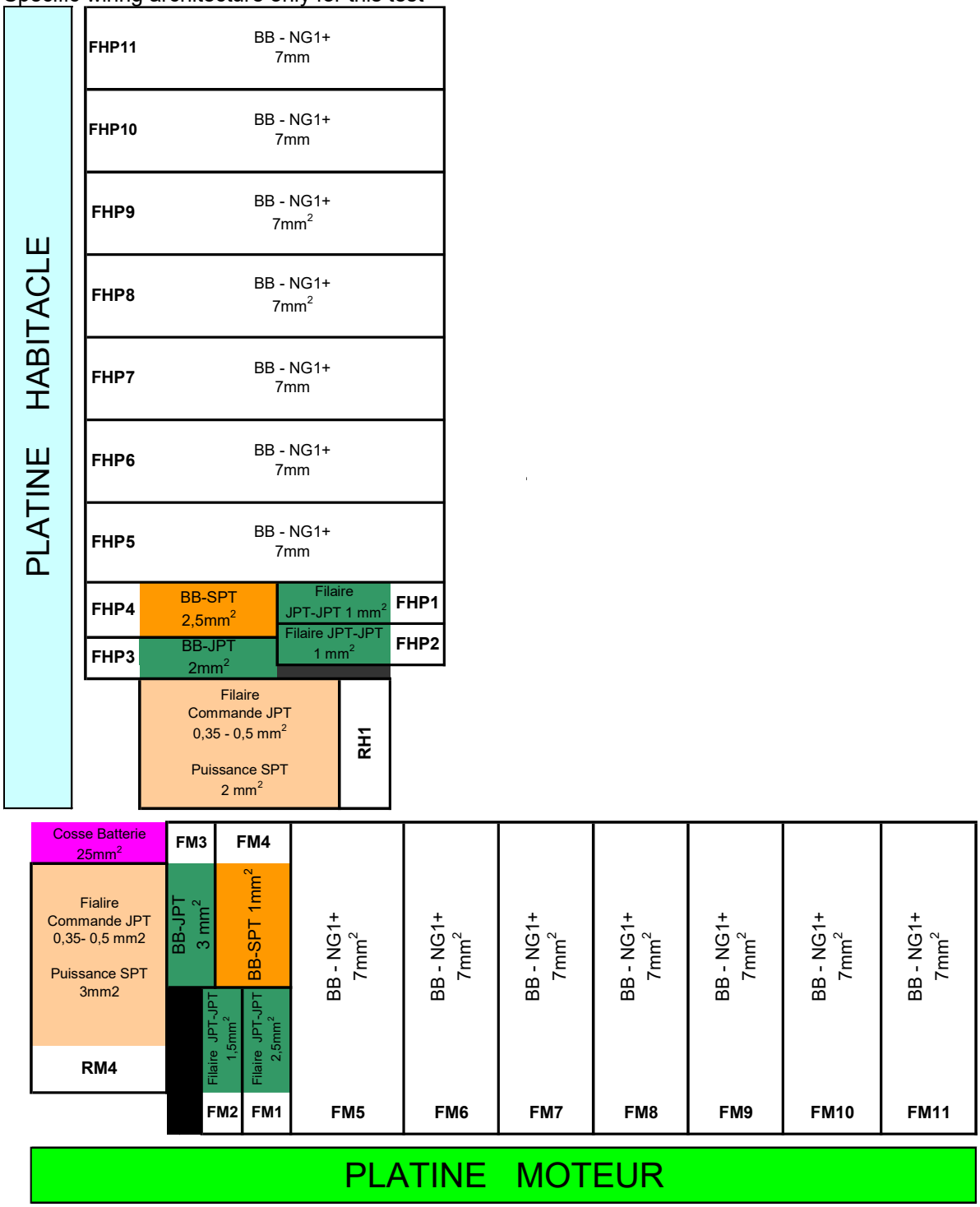


APPENDIX 4 : CURRENT LOAD SCENARIOS AT 40°C

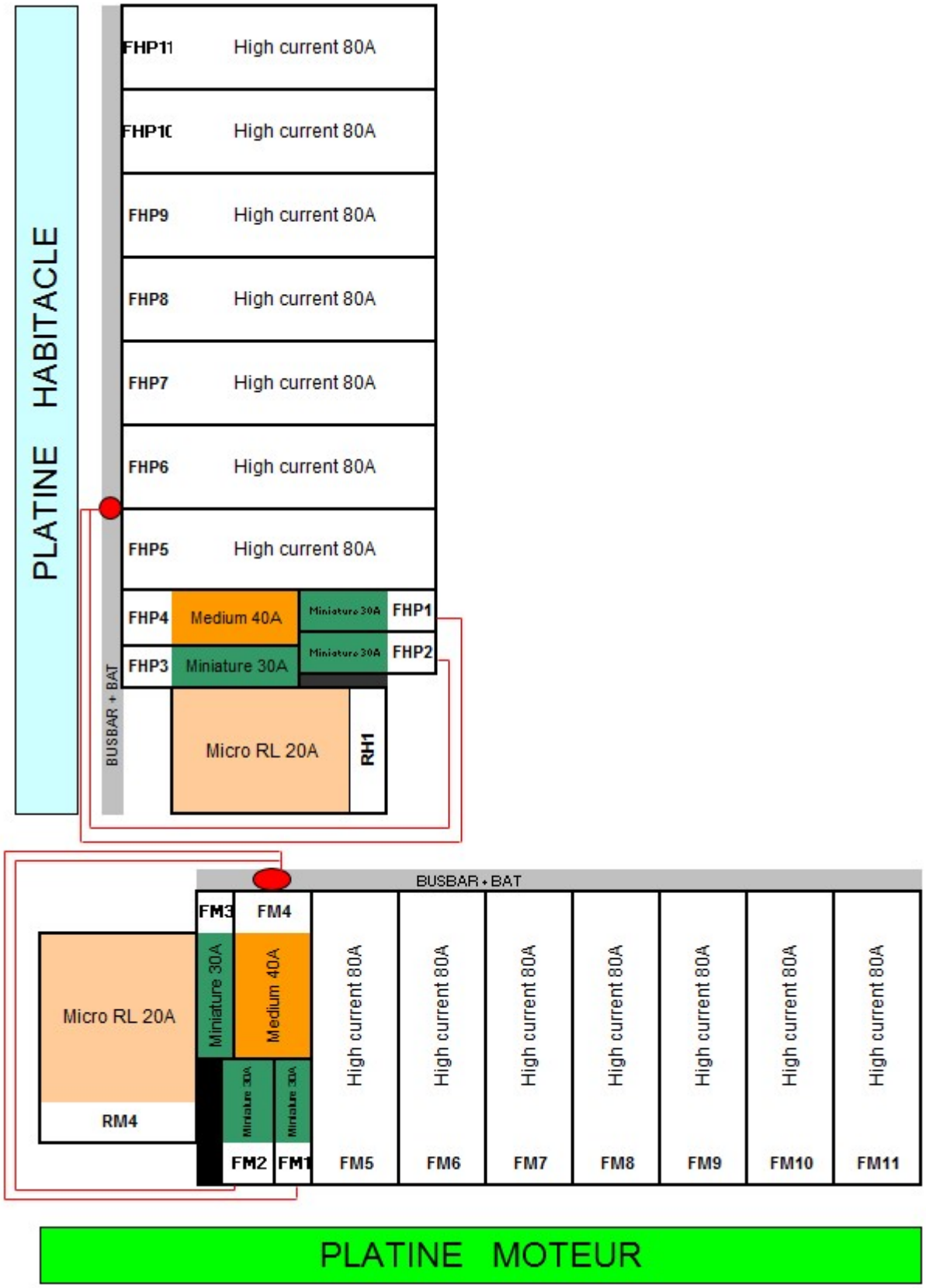


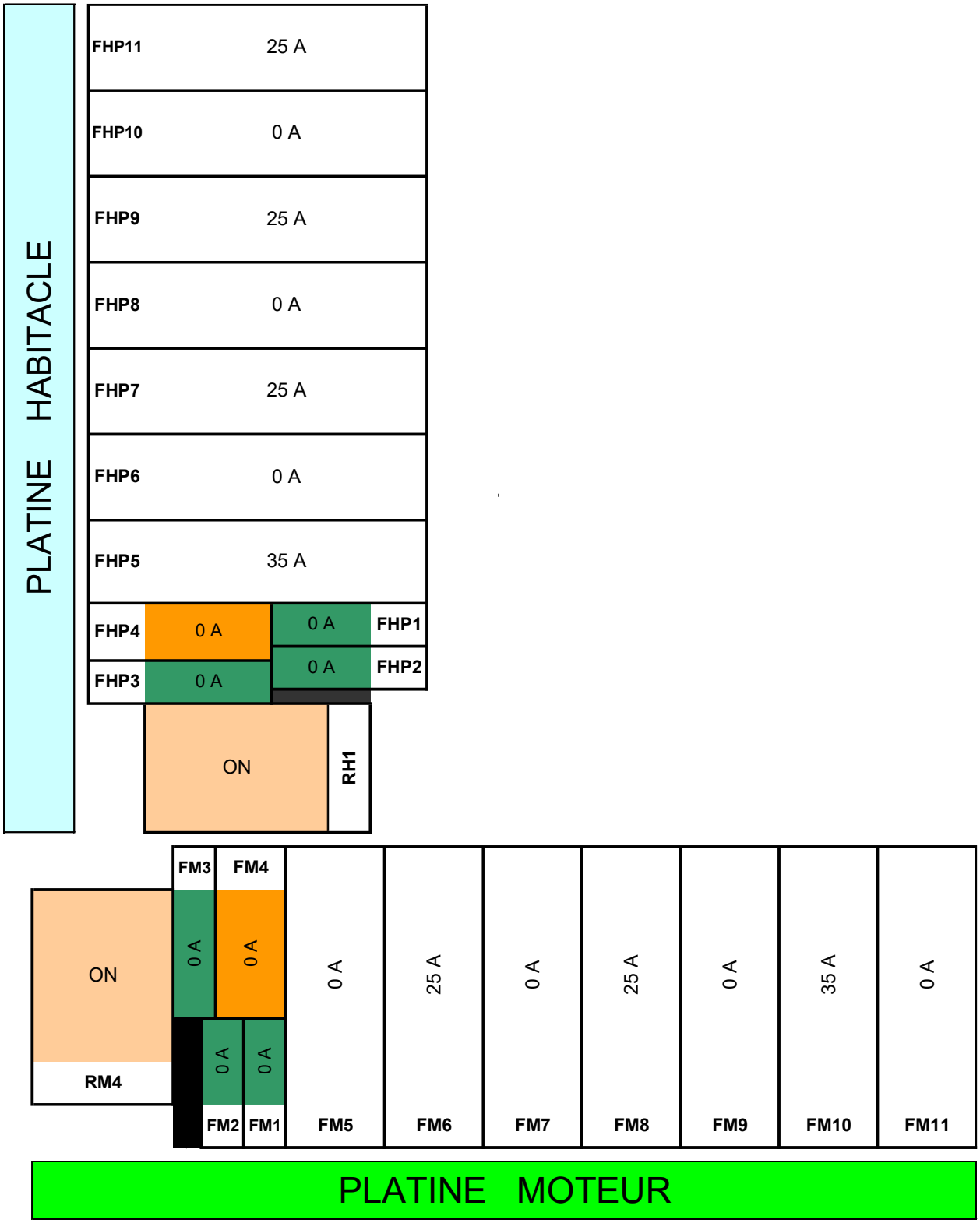
APPENDIX 5 : CURRENT LOAD SCENARIOS AT 85°C

Specific wiring architecture only for this test



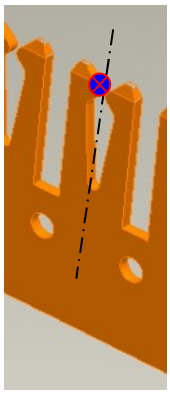
Specific fuse rating only for this test




PLATINE HABITACLE
FHP11 25 A
FHP10 0 A
FHP9 25 A
FHP8 0 A
FHP7 25 A
FHP6 0 A
FHP5 35 A
FHP4 0 A
0 A FHP1
FHP3 0 A
0 A FHP2
ON
RH1
FM3
FM4
ON
0 A
0 A
0 A
25 A
0 A
25 A
0 A
35 A
0 A
RM4
0 A
0 A
FM2
FM1
FM5
FM6
FM7
FM8
FM9
FM10
FM11
PLATINE MOTEUR

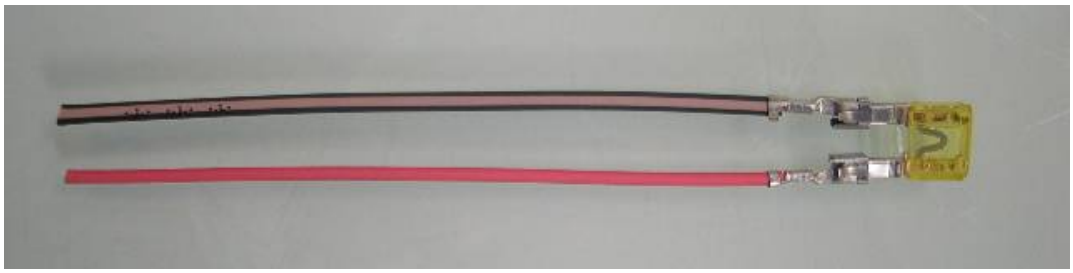
APPENDIX 6 : CONTACT RESISTANCE

Contact resistance measurement point for busbar:



Contact resistance measurement for fuses:

The method is similar for fuses wired on both tabs and fuses wired on one side and connected to the busbar on the other side.



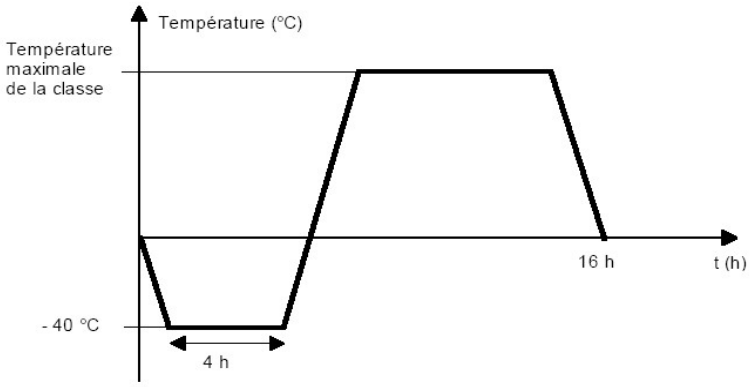
The wire length is 100mm. depending on the configuration (wire or busbar).
The resistance of:

- The fuse,
- The one or two wires

are removed from the resistance measurement.
The criterion of acceptance is the sum of both connexions on the both fuse tabs.

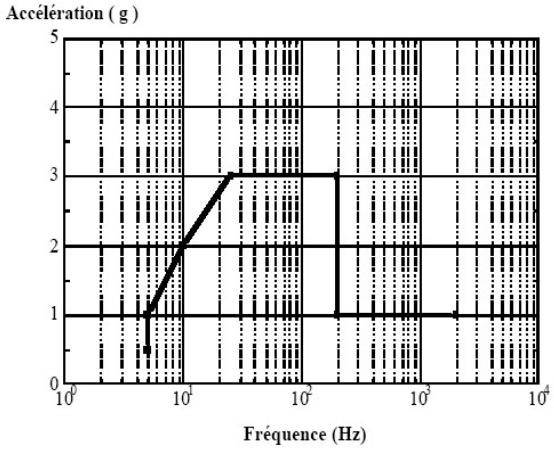
APPENDIX 7: VIBRATION PROFILE

- Temperature cycling during vibration endurance test:



Tmin = -40°C
Tmax = +100°C
Temperature variation: 40°C/hour
Maintaining at extreme temperature: 4h

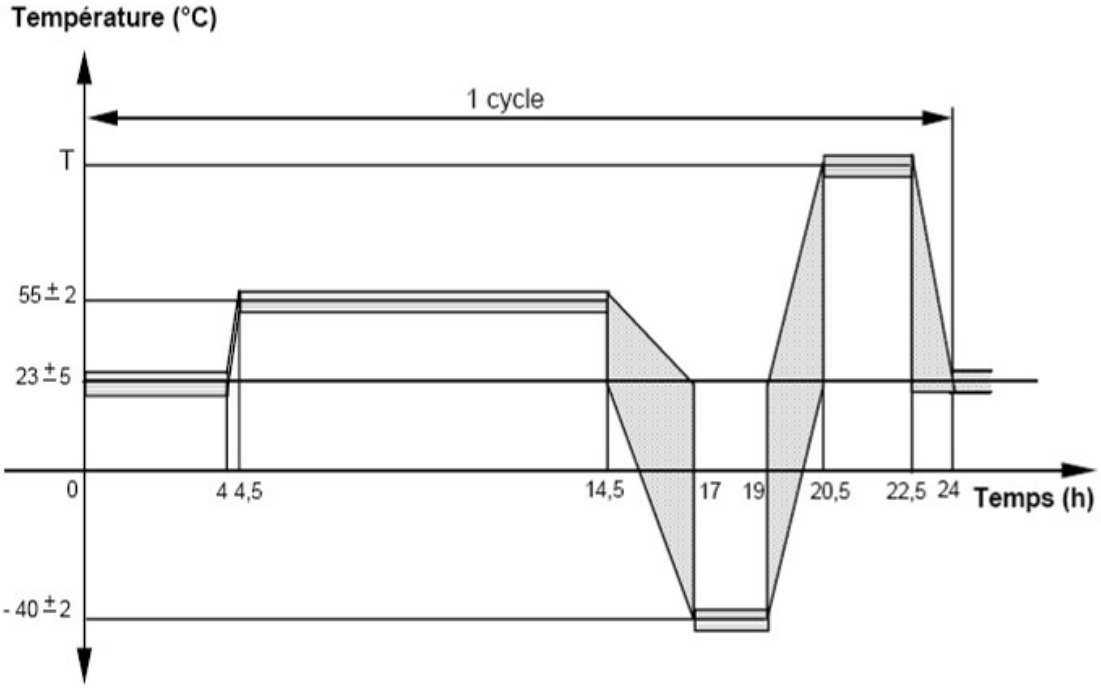
- Vibration profile:

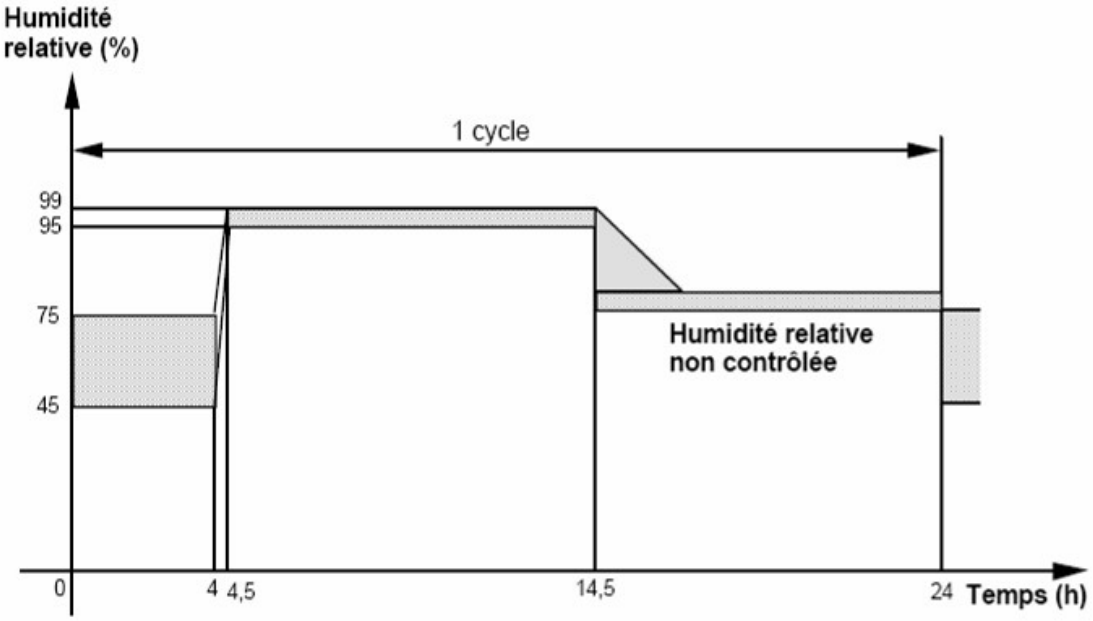


Fréquences	Accélération
5 Hz	0,5 g à 1 g
10 Hz	2 g
25 Hz à 200 Hz	3 g
200 Hz	3 g à 1g
200 Hz à 2000 Hz	1 g

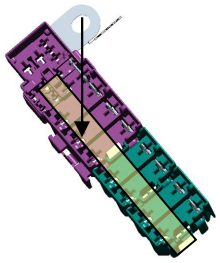
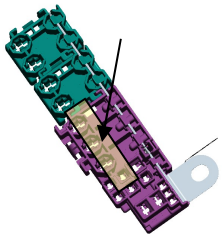
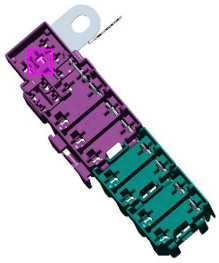
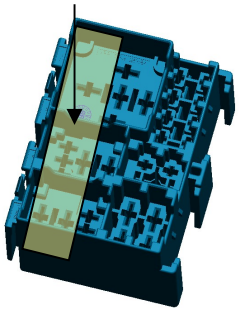
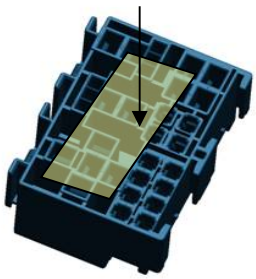
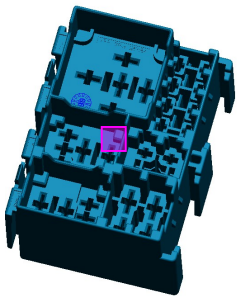
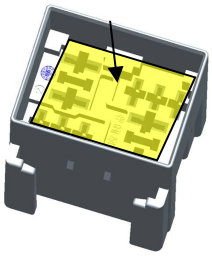
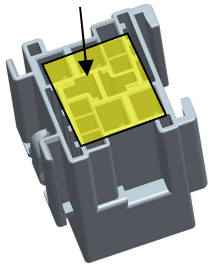
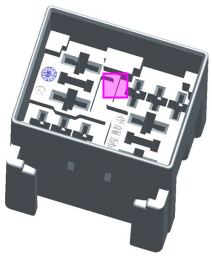
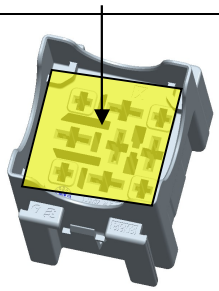
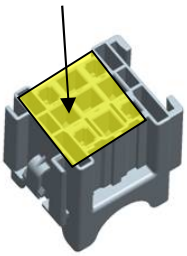
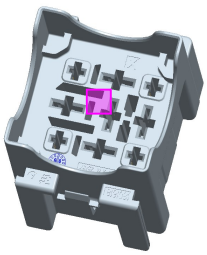
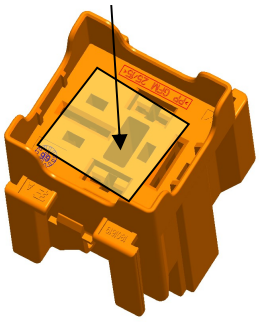
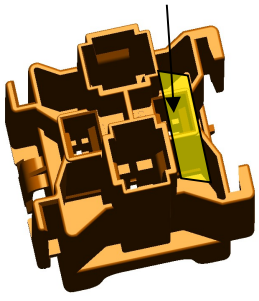
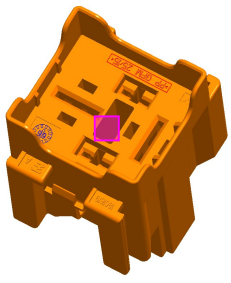
APPENDIX 8: TEMPERATURE HUMIDITY CYCLE

Tmax = 100°C

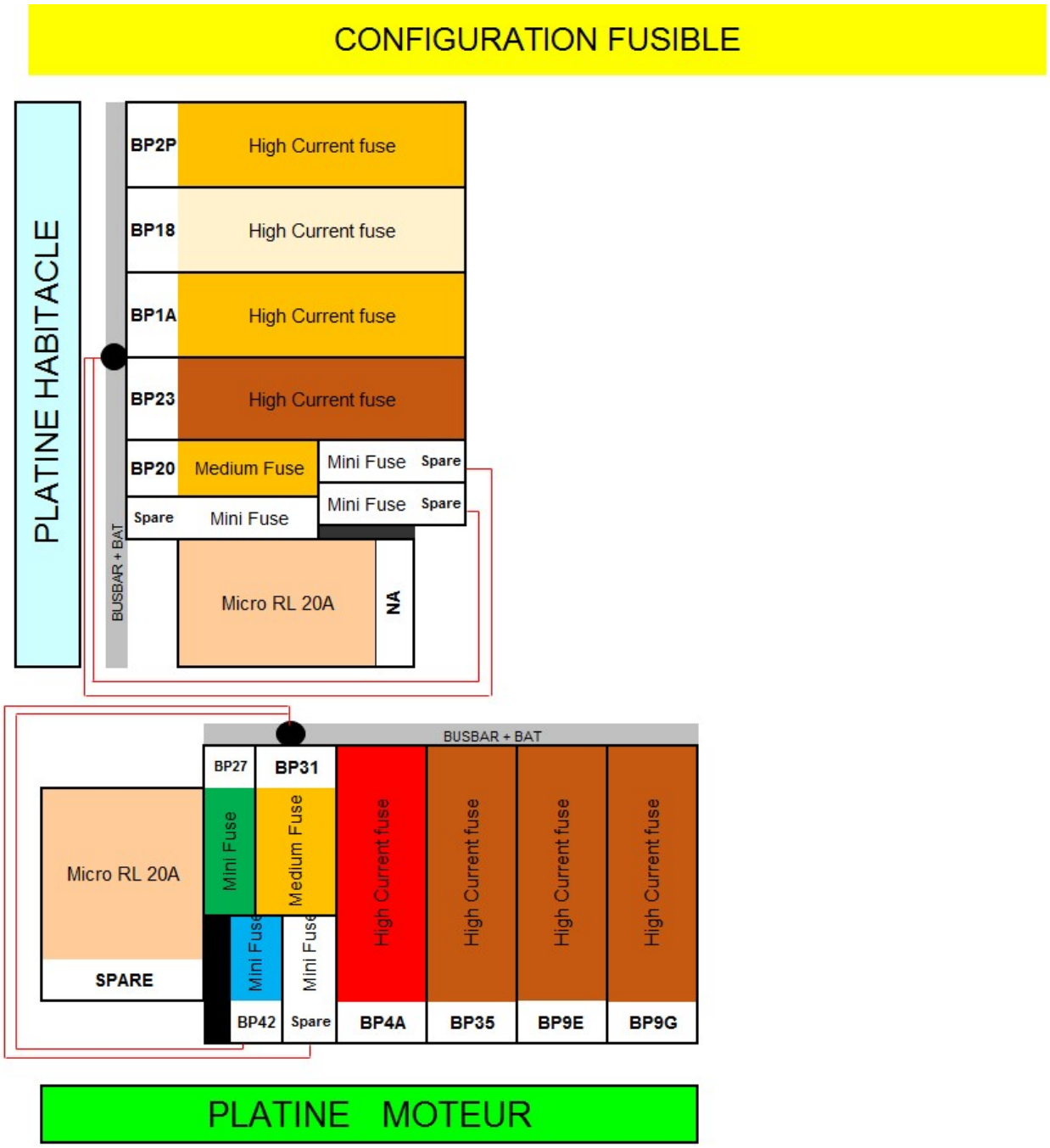




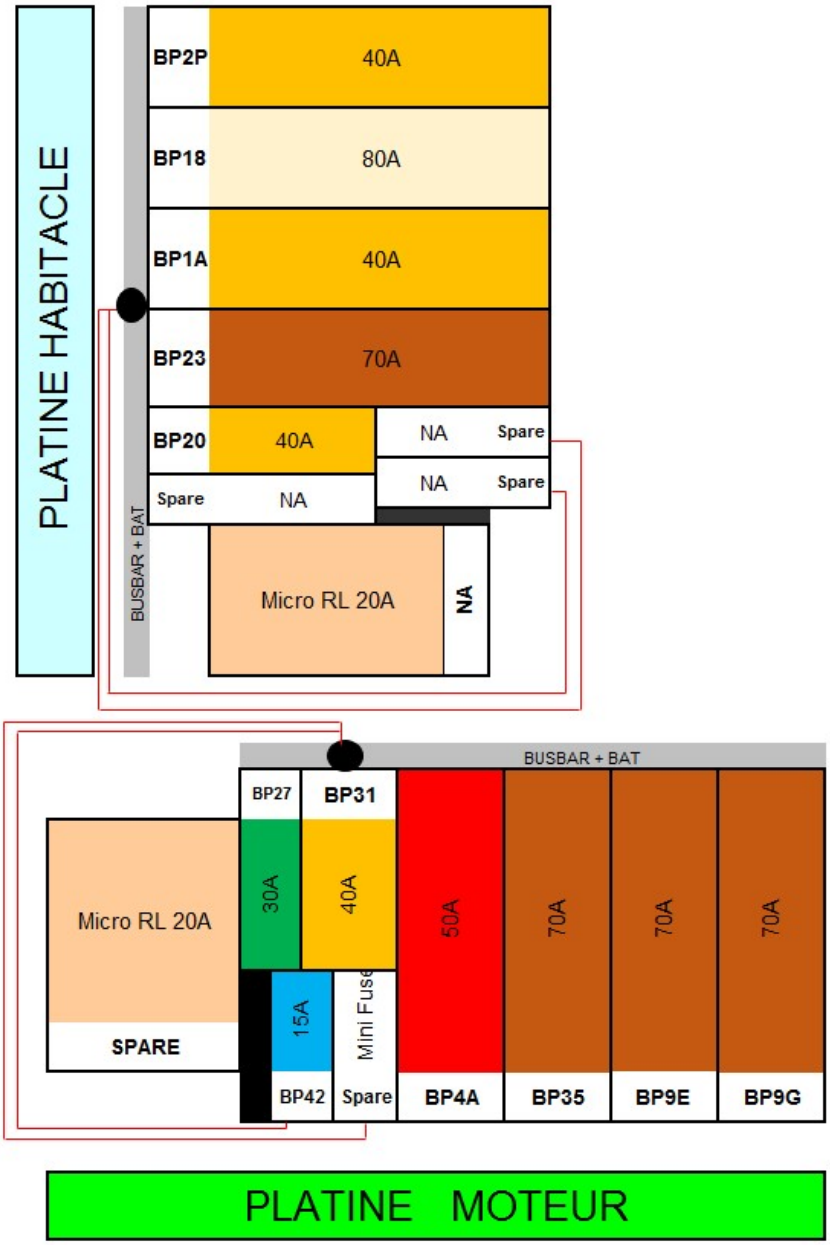
APPENDIX 9: DESCRIPTION OF MECHANICAL TESTS ON BOXES

	Insertion test	Removal test Locking system inactive	Retention forces test	Area for shock impact test
ERFB BOX				
Box3				
Relay holder 20A micro-relay				
Relay holder 40A				
Relay holder 70A				

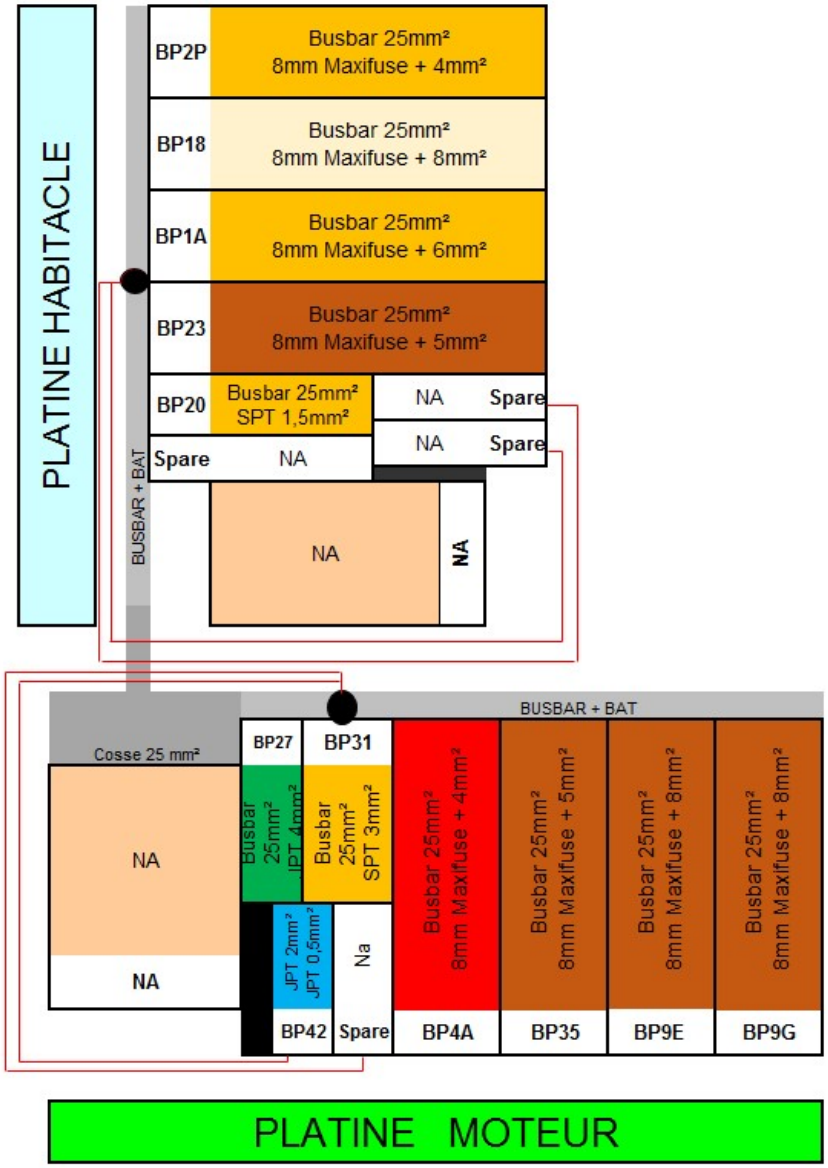
APPENDIX 10 : CURRENT LOAD SCENARIOS AT 85°C FOR ERFB 4 HIGH CURRENT FUSES



CONFIGURATION CALIBRE



CONFIGURATION SECTION DE CÂBLES



CONFIGURATION SCENARIO 85°C 10 min / 35 min