



*YOUR DEVELOPMENT PARTNER*

# UN Regulation 118 Series 03

## Influence of adhesive agent in samples

27<sup>th</sup> November 2018

01\_ Objective of the work

02\_ Samples

03\_ Test results

04\_ Conclusions

## 0.1 – Objective of the work

- ⊕ To determine the influence of adhesive agents used by component manufacturers and bodybuilders to create components used in the interior compartment, the engine compartment and any separate heating compartment
- ⊕ Different samples of composite materials has been tested in two different testing laboratories to get a more accurate result
- ⊕ Laboratories involved in the project has been:



• Instituto Universitario de Investigación del Automóvil

Campus Sur UPM. Carretera de Valencia (A3) km.7 28031 Madrid. [www.insia-upm.es](http://www.insia-upm.es)



• Idiada Automotive Technology – Heavy Duty Vehicles Homologation Department

Pol. Ind. L'Albornar, 43710 Santa Oliva, Tarragona. [www.applusidiada.com](http://www.applusidiada.com)

- ⊕ The test done is the “test to determine the vertical burning rate of materials” according to Annex 8 to UN Regulation 118.02

01\_ Objective of the work

02\_ Samples

03\_ Test results

04\_ Conclusions

## 0.2 – Samples

- ⊕ All samples will be composite materials because they are created bonding materials using the same adhesive agent.
- ⊕ Sample size is 560x170 mm
- ⊕ The surface material has been always the same and has been changed the substrate material, it can be:
  - Metal sheet
  - Plywood (three layer plywood, thickness of 4,4 mm, density of 1,82 gr/cm<sup>3</sup>)
  - Fiberglass plates reinforced with polyester resin (FRP)
    - FRP type 1: Gelcoat+600 fiberglass+coremat+450 fiberglass+ resine
    - FRP type 2: Gelcoat+450 fiberglass+450 fiberglass+ resine
- ⊕ The surface material is a synthetic leather: (Poliurethane (exterior layer) + polyester, composite material, 2 layers, 1,25 mm – Gazebo Perla Liso)
- ⊕ The adhesive agent is (Contact glue, Golden Spray D-107 AY, comp: Isohexane+Toluene+Acetone+Ethyl Acetate)

## 0.2 – Samples

- ⊕ List of samples generated and the laboratory of testing

	INSIA	IDIADA
<ul style="list-style-type: none"><li>• Synthetic leather</li></ul>	CF-0811	HVI-1811/507
<ul style="list-style-type: none"><li>• Plywood</li></ul>	CF-0815	
<ul style="list-style-type: none"><li>• FRP type 1</li></ul>		HVI-1807/30
<ul style="list-style-type: none"><li>• FRP type 2</li></ul>		HVI-1807/41
<ul style="list-style-type: none"><li>• Metal sheet + Synthetic leather</li></ul>	CF-0812	HVI-1811/527
<ul style="list-style-type: none"><li>• Plywood + Synthetic leather</li></ul>	CF-0813	HVI-1811/524
<ul style="list-style-type: none"><li>• FRP type 1 + Synthetic leather</li></ul>	CF-0814	
<ul style="list-style-type: none"><li>• FRP type 2 + Synthetic leather</li></ul>		HVI-1811/513

01\_ Objective of the work

02\_ Samples

03\_ Test results

04\_ Conclusions

## 0.3 – Test Results

### ⊕ Sample identification

	<b>INSIA</b>	<b>IDIADA</b>
<ul style="list-style-type: none"><li>• Synthetic leather</li></ul>	CF-0811	HVI-1811/507
<ul style="list-style-type: none"><li>• Plywood</li></ul>	CF-0815	
<ul style="list-style-type: none"><li>• FRP type 1</li></ul>		HVI-1807/30
<ul style="list-style-type: none"><li>• FRP type 2</li></ul>		HVI-1807/41
<ul style="list-style-type: none"><li>• Metal sheet + Synthetic leather</li></ul>	CF-0812	HVI-1811/527
<ul style="list-style-type: none"><li>• Plywood + Synthetic leather</li></ul>	CF-0813	HVI-1811/524
<ul style="list-style-type: none"><li>• FRP type 1 + Synthetic leather</li></ul>	CF-0814	
<ul style="list-style-type: none"><li>• FRP type 2 + Synthetic leather</li></ul>		HVI-1811/513



## 0.3 – Test Results

### 0.3.1 – Test results from INSIA

		1st marker threads			2nd marker threads			3rd marker threads		
		t1	d1	v1	t2	d2	v2	t3	d3	v3
Synthetic leather	t=5 seg		220			150			150	
	t=15 seg	13	220	1015,4	12	150	750,0	31	150	290,3
	t=15 seg		220			150			150	
Metal sheet + Synthetic leather	t=5 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
Plywood + Synthetic leather	t=5 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
FRP type 1 + Synthetic leather	t=5 seg		220			150			150	
	t=15 seg	146	220	90,4	120	150	75,0	58	150	155,2
	t=15 seg		220			150			150	
Plywood	t=5 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg	64	220	206,3	48	150	187,5	34	150	264,7

## 0.3 – Test Results

### 0.3.2 – Test results from IDIADA

		1st marker threads			2nd marker threads			3rd marker threads		
		t1	d1	v1	t2	d2	v2	t3	d3	v3
Synthetic leather										
	t=15 seg		220			150			150	
	t=15 seg	1	220	13200,0	(*)	150			150	
	t=15 seg		220			150			150	
FRP type 1		t1	d1	v1	t2	d2	v2	t3	d3	v3
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
FRP type 2		t1	d1	v1	t2	d2	v2	t3	d3	v3
	t=5 seg	95,5	220	138,2	10,8	150	833,3	24,5	150	367,3
	t=5 seg	97,6	220	135,2	12,3	150	731,7	26,6	150	338,3
	t=5 seg	102,6	220	128,7	14,1	150	638,3	23,4	150	384,6
Metal sheet + Synthetic leather		t1	d1	v1	t2	d2	v2	t3	d3	v3
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
Plywood + Synthetic leather		t1	d1	v1	t2	d2	v2	t3	d3	v3
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
FRP type 2 + Synthetic leather		t1	d1	v1	t2	d2	v2	t3	d3	v3
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	
	t=15 seg		220			150			150	

(\*) Burn while the burner flame is applied

01\_ Objective of the work

02\_ Samples

03\_ Test results

04\_ Conclusions

## 0.4 – Conclusions

### Test results

	INSIA	IDIADA	RESULTS
• Synthetic leather	CF-0811	HVI-1811/507	BURN
• Plywood	CF-0815		BURN
• FRP type 1		HVI-1807/30	DO NOT BURN
• FRP type 2		HVI-1807/41	BURN
• Metal sheet + Synthetic leather	CF-0812	HVI-1811/527	DO NOT BURN
• Plywood + Synthetic leather	CF-0813	HVI-1811/524	DO NOT BURN
• FRP type 1 + Synthetic leather	CF-0814		BURN
• FRP type 2 + Synthetic leather		HVI-1811/513	DO NOT BURN

## 0.4 – Conclusions

### Test results comments for base materials

We have chosen for the test some base materials that have burn in previous tests, but we have obtained also one “estrange result”

The plywood has burn, we think that the reason is that it’s a plywood very thin, of low quality and low density. Due to that the material has not been isotropic at the test

	INSIA	IDIADA	RESULTS
• Synthetic leather	CF-0811	HVI-1811/507	BURN
• Plywood	CF-0815		BURN
• FRP type 1		HVI-1807/30	DO NOT BURN
• FRP type 2		HVI-1807/41	BURN
• Metal sheet + Synthetic leather	CF-0812	HVI-1811/527	DO NOT BURN
• Plywood + Synthetic leather	CF-0813	HVI-1811/524	DO NOT BURN
• FRP type 1 + Synthetic leather	CF-0814		BURN
• FRP type 2 + Synthetic leather		HVI-1811/513	DO NOT BURN

## 0.4 – Conclusions

### Test results comments for composite materials

FRP type 1 + Synthetic leather has burn, and we think this is also a “Strange result”, the FRP is hand made and in some cases could have density variations that could reduce the activation energy needed, so it can burn, only in one sample.

	INSIA	IDIADA	RESULTS
• Synthetic leather	CF-0811	HVI-1811/507	BURN
• Plywood	CF-0815		BURN
• FRP type 1		HVI-1807/30	DO NOT BURN
• FRP type 2		HVI-1807/41	BURN
• Metal sheet + Synthetic leather	CF-0812	HVI-1811/527	DO NOT BURN
• Plywood + Synthetic leather	CF-0813	HVI-1811/524	DO NOT BURN
• FRP type 1 + Synthetic leather	CF-0814		BURN
• FRP type 2 + Synthetic leather		HVI-1811/513	DO NOT BURN

## 0.4 – Conclusions

### General comments

1- In general when a composite material is created by bonding two materials using glue, the new material created do not burn, because it has more density and less air between the layers, so it need more heat to be added to make it burn.

2- Any simple material that is bonded to another material becomes a new material that should be tested.

3- The composition of the bonding material must be declared in the documentation of the definition of composite materials

Thank you very much for your kind attention





YOUR DEVELOPMENT PARTNER

**Applus IDIADA Belgium**

T +32 2 757 27 07 (Brussels)  
e-mail: [idiada\\_belgium@idiada.com](mailto:idiada_belgium@idiada.com)

**Applus IDIADA Brazil**

T +55 11 4330 9880 (São Paulo)  
T +55 31 3591 6832 (Betim)  
T +55 11 4330 9880 (Curitiba)  
T +55 24 3355 3133 (Resende)  
e-mail: [idiada\\_brasil@idiada.com](mailto:idiada_brasil@idiada.com)

**Applus IDIADA China**

T +86 (21) 6210 0894 (Shanghai)  
T +86 10 8446 3317 (Beijing)  
T +86 431 8190 9680 (Changchun)  
T +86 23 6756 8060 (Chongqing)  
T +86 20 2282 9202 (Guangzhou)  
T +86 (772) 3166 619 (Liuzhou)  
T +86 (772) 0532 66019017 (Qingdao)  
T +86 (755) 29184532 (Shenzhen)  
T +86 0535 8933658 (Zhaoyuan)  
e-mail: [idiada\\_china@idiada.com](mailto:idiada_china@idiada.com)

**Applus IDIADA Czech Republic**

T +420 493 654 811 (Hradec Králové)  
T +420 778 430 095 (Brno)  
T +420 482 424 243 (Liberec)  
T +420 326 736 860 (Mladá Boleslav)  
e-mail: [info@idiada.cz](mailto:info@idiada.cz)

**Applus IDIADA France**

T +33 (0) 141 146 085 (Paris)  
e-mail: [idiada\\_france@idiada.com](mailto:idiada_france@idiada.com)

**Applus IDIADA Germany**

T +49 (0) 841 88538-0 (Ingolstadt)  
T +49 (0) 69 97503116 (Frankfurt)  
T +49 (0) 89 309056-0 (Munich)  
T +49 (0) 711 67400109 (Stuttgart)  
T +49 (0) 5374 920606-0 (Wolfsburg)  
e-mail: [idiada\\_germany@idiada.com](mailto:idiada_germany@idiada.com)

**Applus IDIADA India**

T +91 994 0679 933 (Chennai)  
T +91 124 4028 888 (New Delhi)  
T +91 20 6605 6800 (Pune)  
e-mail: [idiada\\_india@idiada.com](mailto:idiada_india@idiada.com)

**Applus IDIADA Indonesia**

T +6221 2939 1143 (Jakarta)  
e-mail: [idiada\\_indonesia@idiada.com](mailto:idiada_indonesia@idiada.com)

**Applus IDIADA Italy**

T +390 11 2644000 (Leini)  
T +390 51 0923530 (Bologna)  
T +390 05 10923500 (Erbusco)  
e-mail: [idiada\\_italia@idiada.com](mailto:idiada_italia@idiada.com)

**Applus IDIADA Japan**

T +81 (0) 42 512 8982 (Tokyo)  
T +81 (0) 56 464 3463 (Aichi)  
e-mail: [idiada\\_japan@idiada.com](mailto:idiada_japan@idiada.com)

**Applus IDIADA Malaysia**

T +603 9207 7018 (Kuala Lumpur)  
T +601 2410 7686 (Penang)  
e-mail: [idiada\\_malaysia@idiada.com](mailto:idiada_malaysia@idiada.com)

For further information:

**Applus IDIADA**

Headquarters and Main Technical Centre  
L'Albornar – PO Box 20  
E-43710 Santa Oliva (Tarragona) Spain  
T +34 977 166 000  
F +34 977 166 007  
e-mail: [idiada@idiada.com](mailto:idiada@idiada.com)

**www.idiada.com**

**Applus IDIADA Mexico**

T +52 (222) 644 1374 (Puebla)  
e-mail: [idiada\\_mexico@idiada.com](mailto:idiada_mexico@idiada.com)

**Applus IDIADA Poland**

T +48 61 6226 905 (Poznan)  
e-mail: [idiada\\_polska@idiada.com](mailto:idiada_polska@idiada.com)

**Applus IDIADA Russia**

T +7 (831) 297 94 32 (Nizhny Novgorod)  
T +7 (831) 261 37 06 (Togliatti)  
e-mail: [idiada\\_russia@idiada.com](mailto:idiada_russia@idiada.com)

**Applus IDIADA Scandinavia**

T +46 (0) 31 320 1844 (Gothenburg)  
e-mail: [idiada\\_scandinavia@idiada.com](mailto:idiada_scandinavia@idiada.com)

**Applus IDIADA Slovakia**

T +420 778 430 098 (Košice)  
e-mail: [idiada\\_slovakia@idiada.com](mailto:idiada_slovakia@idiada.com)

**Applus IDIADA South Africa**

T +27 83 450 8925 (Pretoria)  
e-mail: [idiada\\_southafrica@idiada.com](mailto:idiada_southafrica@idiada.com)

**Applus IDIADA South Korea**

T +82 31 478 1821 (Seoul)  
e-mail: [idiada@idiada.co.kr](mailto:idiada@idiada.co.kr)

**Applus IDIADA Spain**

T +34 977 166 000 (Santa Oliva)  
T +34 928 587 447 (Las Palmas)  
T +34 915 095 795 (Madrid)  
T +34 950 473 256 (Mojácar)  
T +34 868 912 179 (Murcia)  
T +34 948 292 921 (Pamplona)  
T +34 986 900 300 (Vigo)  
e-mail: [idiada@idiada.com](mailto:idiada@idiada.com)

**Applus IDIADA Taiwan**

T +886 47 810 702 (Lukang)  
e-mail: [idiada\\_taiwan@idiada.com](mailto:idiada_taiwan@idiada.com)

**Applus IDIADA Thailand**

T +66 86 7917 071 (Bangkok)  
e-mail: [idiada\\_thailand@idiada.com](mailto:idiada_thailand@idiada.com)

**Applus IDIADA Turkey**

T +90 216 250 6050 (Istanbul)  
e-mail: [idiada\\_turkey@idiada.com](mailto:idiada_turkey@idiada.com)

**Applus IDIADA UK**

T +44 1223 441 434 (Cambridge)  
T +44 2476 328 083 (Nuneaton)  
T +44 1926 623 132 (Warwick)  
e-mail: [idiada\\_uk@idiada.com](mailto:idiada_uk@idiada.com)

**Applus IDIADA USA**

T +1 248 978 0111 (Detroit)  
T +1 760 246 1672 (Los Angeles)  
e-mail: [idiada\\_USA@idiada.com](mailto:idiada_USA@idiada.com)