Balance of Performance Publication

Date: 10.04.2019

Hankook 4+8H SPA 2019
(TCE & GT-Series)

To Sporting & Technical Regulations 24H SERIES power by Hankook 2018, Version 28 September 2017, with KNAF-permit No.: 0314.17.266

Dear Teams and Drivers

In this BOP-publication you will find:

- Balance of Performance (BOP)
- SP-BOP-CAT (Theoretical best lap times).

This BOP and other figures are in force with immediate application and replaces the figures of appendix 18 of the Sporting & Technical regulations and eventually previously published BOP-publications.

Notes on boost control:
Control of Pboost strategy as per document attached (Appendix: Control of Pboost strategy is updated), for all cars of which Pboost max is specified, unless explicit otherwise specified.

Approved:
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Petrol & Diesel Touring cars, up to 3500cc

Class	Cylinder capacity		Minimum Weight	Max Refuelling amount	Remarks	
A2	Diesel cars up to 2000cc		1100 kg	100L	Theoretical best lap time: **2min43 (SPA)**	
			1200 kg	120L		
	Petrol (up to - 2.000cc)	up to 1.300cc	710 kg	80 L		
		1.300 - 1.400cc	760 kg	80 L		
		1.400 - 1.600cc	820 kg	90 L		
		1.600 - 1.800cc	900 kg	100 L		
		1.800 - 2.000cc	980 kg	100 L		
	Petrol Supercharged engines (up to 1.650cc)	Supercharged engines up to 1.650cc	1000kg	70 L		
			1100kg	80 L		
		Peugeot RCZ 1.600cc / Turbo	1100 kg	80 L		
A3	Petrol (2.000 - 3.500cc)	2.000 - 2.500cc	1000 kg	120 L		Theoretical best lap time: **2min37 (SPA)**
		2.500 - 3.000cc	1100 kg	120 L		
		3.000 - 3.500cc	1200 kg	120 L		
	Petrol Supercharged engines (1.650 - 2.000cc)	Peugeot 208 GTI 1.600cc / Turbo	1050 kg	85 L		
		1.650 – 1.800cc	900 kg	100 L	e.g. Lotus Elise 1.8 Turbo	
			1000 kg	120 L	e.g. Seat Leon MK1	
		1.800 – 2.000cc	1000 kg	90 L	e.g. Seat Leon MK2, Opel Astra (NO TCR cars)	
			1100 kg	100 L		
			1200 kg	120 L		
	Diesel 2.000 – 3000cc	2.000 – 2.500cc	1100 kg	85 L		
		2.500 – 3.000cc	1200 kg	85 L		
CUP 1	BMW M235i Cup	3.000cc Twin Turbo	Remarks	Remarks	According to BMW M235i Cup regulations	

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Class TCR BOP and ECU-software version

Please note at SPA, TCR will run still with 2018 ECU-software according below table (for 12H BRNO this will be updated)

Brand & Type	Minimum Weight	Max Refuel amount	Ride height	TCR Technical form Certification Nr. / Variant Option	Power level (%)	SW Name ECU-software version This version overrules the TCR TECH FORM	SW Identification (Checksum or ID)	Max Pboost* & Rev limiter
ALFA ROMEO GIULIETTA TCR RF	1200 kg	100 L	70mm	22 & VO23/31	102.5	1.600_TCR2018_BOP_102,5%	1828/1314	See TCR-13**
AUDI RS3 LMS SEQ	1250 kg	100 L	70mm	10 & VO18/25/29/45/72	100	5F6906259M	CVN	See TCR-13**
AUDI RS3 LMS DSG	1230 kg	100 L	70mm	9 & VO18/25/29/45/63	102.5	5F6906259L	CVN	See TCR-13**
CUPRA TCR SEQ	1240 kg	100 L	70mm	35 & VO44	100	5F6906259M	CVN	See TCR-13**
CUPRA TCR DSG	1230 kg	100 L	70mm	43 & VO44	102.5	5F6906259L	CVN	See TCR-13**
HONDA CIVIC FK7 TCR SEQ (2018)	1260 kg	100L	80mm	33 & VO34 ER75/ER87	97.5	TCR_H70_REV_1.02.33	97.5	See TCR-13**
HONDA CIVIC FK2 TCR SEQ (2017)	1250 kg	100L	70mm	11 & VO 20	100	TCR-V2.6.98+7.5	100	See TCR-13**
HYUNDAI i30 N TCR	1260 kg	100 L	80mm	27 & VO 28/76	97.5	V1.606.X1_i30_TCR_BOPv2_975_prod_003.LRC	24960/60966	See TCR-13**
						V1.606.X1_i30_TCR_BOPv2_975_Endurance_002	29867/60345	
HYUNDAI Veloster N TCR	TBA	100L	TBA	TBA	TBA	TBA	TBA	TBA
KIA CEE'D TCR	1200 kg	100 L	70mm	24	100	1502_Kia_TCR_18_-100%v05	Firmware ID	See TCR-13**
OPEL ASTRA TCR	1230 kg	100 L	70mm	5 & VO77	100	12.7.3.30_Bop2_100-prozent	4B22B3F6A366C34Ah	See TCR-13**
PEUGEOT 308 TCR	TBA	TBA	TBA	37	102.5	Soft 12.10.3.0	8D5EDC65h	See TCR-13**
PEUGEOT 308 RACING CUP	1100 kg	100 L	70mm	8 & VO78	90	T9TCR_12.8.4.7_17S15_90%	3D47360C	2750mbar
RENAULT MEGANE RS TCR	TBA	100 L	TBA	39	100	MS6A_VMTCR_0601_-Megane_100p_FIX_V01	VMTCR_0601 7050 rpm 100%	See TCR-13***
SEAT LEON CUP RACER V1 DSG (2015)	1200 kg	100 L	60 mm	TCN2-C-001	100	5F6906259_0001	72 DC 3A 5C	NA
SEAT LEON TCR V2 SEQ (2016)	1200 kg	100 L	70 mm	002	100	5F6906259C (0001)	CVN	NA
SEAT LEON TCR V2 DSG (2016)	1200 kg	100 L	60 mm	004	100	5F6906259B (0001)	CVN	NA
SEAT LEON TCR V3 SEQ	1240 kg	100 L	70mm	16 & VO 17	100	5F6906259M	CVN	See TCR-13**
SEAT LCR TCR V3 DSG	1230 kg	100 L	70mm	15 & VO 17	102.5	5F6906259L	CVN	See TCR-13**
SUBARU STi TCR	TBA	100 L	TBA	7 & VO84	100	2018 mappa 95.m1pkg	CVN	See TCR-13**
VOLKSWAGEN GOLF GTI TCR SEQ (2016)	1210 kg	100 L	70 mm	003	100	5F6906259C (0001)	CVN	NA
VOLKSWAGEN GOLF GTI TCR SEQ	1250 kg	100 L	70mm	14 / 40 & VO19/41/46/82	100	5F6906259M	CVN	See TCR-13**
VOLKSWAGEN GOLF GTI TCR DSG	1230 kg	100 L	70mm	12 / 48 & VO19/41/46/80	102.5	5F6906259L	CVN	See TCR-13**
Your (TCR) car not listed here? Please make an individual request to info@creventic.com								

*Boost pressure will be monitored and interpreted according to the TCR Technical Bulletin no. 12 / 2018. (Date: 2018, August 14th) (TCR Turbocharger Boost Pressure Monitor Method)
**TCR-13: For Max Pboost / Rev limiter: see 2018 TCR TECHNICAL BULLETIN no.13 Page 2 (Date: 2018, August, 15th)

Class GT4: GT4 Grand Touring Cars

Brand & Type	Cylinder capacity	Minimum Weight	Max Refuelling amount	Restrictor	Remarks *
ASTON MARTIN V8 VANTAGE GT4	4700cc/8cyl	1350 kg	100 L	NA	ECU BOP 2016
ASTON MARTIN VANTAGE AMR GT4	4000cc/8cyl Turbo	1460 kg	105 L	NA	Max Boost(barA/rpm) 1,618/4000 1,690/4500 1,640/5000 1,640/5500 1,595/6000 1,565/6500 1,565/7000
Audi R8 LMS GT4	5200cc/10cyl	1480 kg	110 L	2x41mm	Restrictor thickness 5mm. Acc. Audi R8 GT4 restrictor drawing ECU BOP 2018
BMW M3 GT4		1350 kg	110 L	NA	ECU BOP 2015
BMW M4 GT4	3000cc/6cyl Turbo	1460 kg	110 L	2017 USB Powerstick "Silver" (Max Engine power: 440Hp)	
CHEVROLET CAMARO GT4		1450 kg	100 L	60mm	FIA-restrictor design ECU BOP 2018
GINETTA G55 GT4 Evo 2015	3700cc/6cyl	1080 kg	120 L	NA	ECU BOP 2015
GINETTA G55 GT4 Evo 2017/2018	3700cc/6cyl	1100 kg	95 L	47,5mm	Restrictor: G55-E0392 FIA-restrictor design
KTM X-BOW GT4	2000cc/4cyl Turbo	1130 kg	90 L	Pboost max: 2,3bar Max rpm: 7000 rpm (at all gears)	
LOTUS EVORA GT4		Tba	Tba	Tba	
MCLAREN 570S GT4	3800cc/8cyl Turbo	1440 kg	110 L	Max engine Torque 470Nm Pboost-max: 1,8 bar ECU BOP 2018	
MERCEDES AMG GT4	4000cc/8cyl Turbo	1490 kg	100 L	Pboost-max: 1,65 bar (Max Engine power: 300kW (408Hp)	
NISSAN 370Z GT4	3800cc/6cyl	1250 kg	100 L	Tba	ECU BOP 2016/2017
PORSCHE 997 CUP GT4	3800cc/6cyl	1250 kg	95 L	NA	ECU BOP 2014
PORSCHE CAYMAN GT4 CLUPSPORT MR	3800cc/6cyl	1290 kg	100 L	ECU 2017 BOP	
SIN R1 GT4	6200cc/8cyl	1250 kg	100 L	NA	Max 43,5% Throttle opening
Your (GT) car not listed here? Please make an individual request to info@creventic.com					

* Specified Max Pboost pressure are absolute pressure at ambient of 1010mbar.

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Class 991: Porsche 991 Cup classes (Generation I and II)

Class	Brand & Type	Cylinder capacity	Minimum Weight	Max Refuelling amount	Remarks
Class 991	Porsche Cup 991-I	3.800 cc	1220 kg	100L	Models 2013 .. 2016 NO Restrictor-Blende
Class 991	Porsche Cup 991-II	4.000 cc	1240 kg	100L	Models 2017 .. 2018 *Restrictor-Blende: 65 mm

* Restrictor Blende must be according “Manthey TZN” drawing, see 24H Series bulletin

Class 991-BOP-TABLE

BOP- table class 991-PRO & 991-AM

Class*	Balance Of Performance**	
	Weight	Refuelling
991-Am	+/- 0kg	100 L
991-Pro	+ 30kg	90 L

* Class and corresponding BOP is determined by Team composition (Drivers categories)
Please note: In case Class 991-AM and 991-PRO is combined to one Class 991, the BOP, 991-AM-BOP or 991-PRO-BOP is still applicable determined by Team composition (Drivers categories)

** BOP adjusted (+/-) ballast weight and refuelling amount, referred to initial value specified in Appendix 18 (See BOP-publication of the specific event)

Class A6-BOP-TABLE

BOP- table class A6-PRO & A6-AM

Class*	BOP	Balance of Performance**	
		Weight	Refuelling
A6-PRO	**BOP-Pro**	+ 30 kg	-/- 5 L
A6-AM	**BOP-Neutral**	+/- 0 kg	+/- 0 L
	BOP-Advantage	-/- 50 kg	120 L

* Class and corresponding BOP is determined by Team composition (Drivers categories)
Please note: In case Class A6-AM and A6-PRO is combined to one Class A6, the BOP, A6-AM-BOP or A6-PRO-BOP is still applicable determined by Team composition (Drivers categories)

** BOP adjusted (+/-) ballast weight and refuelling amount, referred to initial value specified in Appendix 18 (See BOP-publication of the specific event)

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GT cars (Mainly GT cars, also American GT's are eligible)

Class A6-Am & Class A6-Pro

Brand & Type	Minimum Weight	Max Refuel amount	Restrictor	Remarks *
ASTON MARTIN V12 VANTAGE GT3	1280 kg	110 L	2x41,5mm	FIA-restrictor design
AUDI R8 LMS Ultra	1245 kg	110 L	2x47,2mm	up to and incl. 2014
AUDI R8 LMS (GT3-038) Evo 2018	1260 kg	100 L	2x39,0mm	Or 1280kg/2x40mm (only for A6-AM-Advantage) FIA-restrictor design
AUDI R8 LMS (GT3-038) Evo 2019	1290 kg	100 L	2x40,0mm	FIA-restrictor design
BMW M6 GT3	1310	105 L	N/A	Max Boost(barA/rpm) 1,78/4000 1,86/4500 1,92/5000 1,94/5500 1,89/6000 1.73/6500 1,65/7000
CHEVROLET CORVETTE C6-ZR1	1200 kg	105 L	2x32,1mm	LMGTE-2-04
FERRARI 458 ITALIA GT3	1260 kg	110L	2x50,0mm	FIA-restrictor design
FERRARI 488 GT3	1300 kg	95L	N/A	Max Boost(barA/rpm) 1,47/4000 1,51/4500 1,56/5000 1,60/5500 1,63/6000 1.59//6500 1,54/7000 1,49/>7250
Ford GT3 (Lambda)	1220 kg	105 L	1x58mm	FIA-restrictor design
LAMBORGHINI HURACAN GT3 Evo2018	1260 kg	100 L	2x39,0mm	FIA-restrictor design
LAMBORGHINI HURACAN GT3 Evo2019	1290 kg	100 L	2x39,0mm	FIA-restrictor design
McLaren MP4-12C GT3	1255 kg	115 L	2x36,0mm	Max Boost(barA/rpm) 1,82/4000 1,80/4500 1,78/5000 1,76/5000 1,72/6000 1,65//6500 1,59/7000 1,53/>7500
McLaren 650S GT3	Tba	Tba	Tba	Max Boost Tba
MERCEDES SLS AMG GT3	1330 kg	105 L	2x38,0mm	FIA-restrictor design
MERCEDES AMG GT3	1330 kg	105 L	2x35,0mm	FIA-restrictor design
NISSAN GT-R Nismo GT3 2015 (GT3-030)	1280 kg	110 L	2x40,0mm	EVO 2015 Max Pboost 2,0 barA (all rpm)
NISSAN GT-R Nismo GT3 2018 (GT3-048)	1300 kg	110 L	N/A	Max Boost(barA/rpm) 2,00/4000 2,00/4500 2,00/5000 1,95/5500 1,95/6000 1.95/6500 1,90/6900 1,70/7000
PORSCHE 911 GT3 R (991)	1245 kg	95 L	2x41,5mm	FIA-restrictor design
PORSCHE 911 GT3 R (991 II)	1240 kg	95 L	2x43,0mm	FIA-restrictor design
RADICAL SPORTSCARS RXC TURBO GT3	Tba	Tba	Tba	Max Boost Tba
RENAULT SPORT RS01 Configuration BOP GT3	1220 kg	105L	2x42,0mm	Max Pboost 1,95 barA (all rpm) See also appendix Renault RS01 aerodynamics
SCG 003C	1280 kg	115 L	2x35,0mm	Max Pboost 1,85 barA (all rpm) (acc. Technical form SP-X 010 2018 & modified air-inlet)
SRT VIPER GT3-R	Tba	Tba	Tba	

* Specified Max Pboost pressure are absolute pressure at ambient of 1010mbar.

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Class SPX Special cars

Class SPX Cars with partly fixed BOP

Brand & Type	Cylinder capacity	Minimum Weight	Max Refuelling amount	BOP*	*In case car will be amalgamated to class A6. Initial BOP will be:
Lamborghini Huracán Super Trofeo Evo2017/2018	5200cc/10cyl	1275 kg	Acc. BOP-table below	2x40,0mm	1275kg/110L/2x42mm
Porsche GT America	4000cc/6cyl	1250 kg	Acc. BOP-table below	N/A	TBA
Porsche 911 GT3 Cup model (991-I) Modified	3800cc/6cyl	1200 kg	Acc. BOP-table below	N/A	TBA
Porsche 911 GT3 Cup model (991-II) Modified	4000cc/6cyl	1250 kg	Acc. BOP-table below	N/A	TBA
Porsche 991 Cup MR	4000cc/6cyl	1250 kg	Acc. BOP-table below	Restrictor: Free	TBA
Vortex 1.0	6200cc/8cyl	1100 kg	Acc. BOP-table below	N/A	1100kg/105 L
KTM X-bow (SPX-special)	2000cc/4cyl.	1000 kg	According BOP-table below @ column 1050 kg	Pboost max is 2,7bar (independent of ambient air pressure) Max rpm 7000 at all gears Ride height is free	1000kg/120L Pboost max is 2,7bar (independent of ambient air pressure) Max rpm 7000 at all gears Ride height is free

For all other SPX cars:
Class SPX-BOP-Table (for this class "Dynamic BOP" is applicable)

Class	SP-BOP-CAT Theoretical Best lap time Category	Max Refuelling amount		
		Minimum Weight **1050 kg**	Minimum Weight **1150 kg**	Minimum Weight **1250 kg**
SPX	**2min24** SPA (range 2.24 – 2.25)	60 L	70 L	80 L
	2min25 SPA (range 2.25 – 2.26)	70 L	80 L	90 L
	2min26 SPA (range 2.26 – 2.27)	80 L	90 L	100 L
	2min27 SPA (range 2.27 – 2.28)	90 L	100 L	110 L
	2min28 SPA (range 2.28 – 2.29)	100 L	110 L	120 L
	2min29 SPA (range > 2.29 *Initial Max refuelling amount	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60

** This is the initial Max refuelling amount, all teams in class SPX starts with.*

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Class SP2 Special cars

Class SP2 Cars with partly fixed BOP

Brand & Type	Cylinder capacity	Minimum Weight	Max Refuelling amount	BOP / Remarks
Porsche 997	3600cc/6cyl	1150 kg	Acc. BOP-table below	N/A
Porsche 997	3800cc/6cyl	1200 kg	Acc. BOP-table below	Restrictor-Blende: 65mm
GC Automobile V8	6200cc/8cyl	1100 kg	Acc. BOP-table below	N/A
KTM X-bow (SP2-special)	2000cc/4cyl.	1000 kg	Acc. BOP-table below	Datalogger obligatory Pboost max is 2,3bar (independent of ambient air pressure) Max rpm 7000 at all gears Ride height is free

For all other SP2 cars:
Class SP2-BOP-Table (for this class "Dynamic BOP" is applicable)

Class	SP-BOP-CAT Theoretical Best lap time Category	Max Refuelling amount		
		Minimum Weight **750 kg**	Minimum Weight **1000 kg**	Minimum Weight **1250 kg**
SP2	**2min29** SPA (range 2.29 – 2.30)	80 L	90 L	100 L
	2min30 SPA (range 2.30 – 2.31)	90 L	100 L	110 L
	2min31 SPA (range 2.31 – 2.32)	100 L	110 L	120 L
	2min32 SPA (range > 2.32) *Initial Max refuelling amount	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60

** This is the initial Max refuelling amount, all teams in class SP2 starts with.*

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Class SP3 Special cars

Class SP3 Cars with partly fixed BOP

Brand & Type	Cylinder capacity	Minimum Weight	Max Refuelling amount	BOP / Remarks
KTM X-bow (SP3-special)	2000cc/4cyl.	1100 kg	Acc. BOP-table below	Datalogger obligatory Pboost max is 2,3bar (independent of ambient air pressure) Max rpm 7000 at all gears Ride height is free
BMW M3 V8 (4L)	4000cc/8cyl.	1300 kg	Acc. BOP-table below, minus 10 Litre (Equivalent of 1200kg min weight column)	Datalogger obligatory

For all other SP3 cars:
Class SP3-BOP-Table (for this class "Dynamic BOP" is applicable)

Class	SP-BOP-CAT Theoretical Best lap time Category	Max. refuelling amount				
		Minimum Weight **750 kg**	Minimum Weight **1000kg**	Minimum Weight **1100kg**	Minimum Weight **1200kg**	Minimum Weight **1300kg**
SP3	**2min32** SPA (range 2.32 – 2.33)	60 L	70 L	80 L	90 L	100 L
	2min33 SPA (range 2.33 – 2.34)	70 L	80 L	90 L	100 L	110 L
	2min34 SPA (range 2.34 – 2.35)	80 L	90 L	100 L	110 L	120 L
	2min35 SPA (range > 2.35) *Initial Max refuelling amount	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60)	120 L @ green 120 L @ code60	120 L @ green 120 L @ code60

** This is the initial Max refuelling amount, all teams in class SP3 starts with.*

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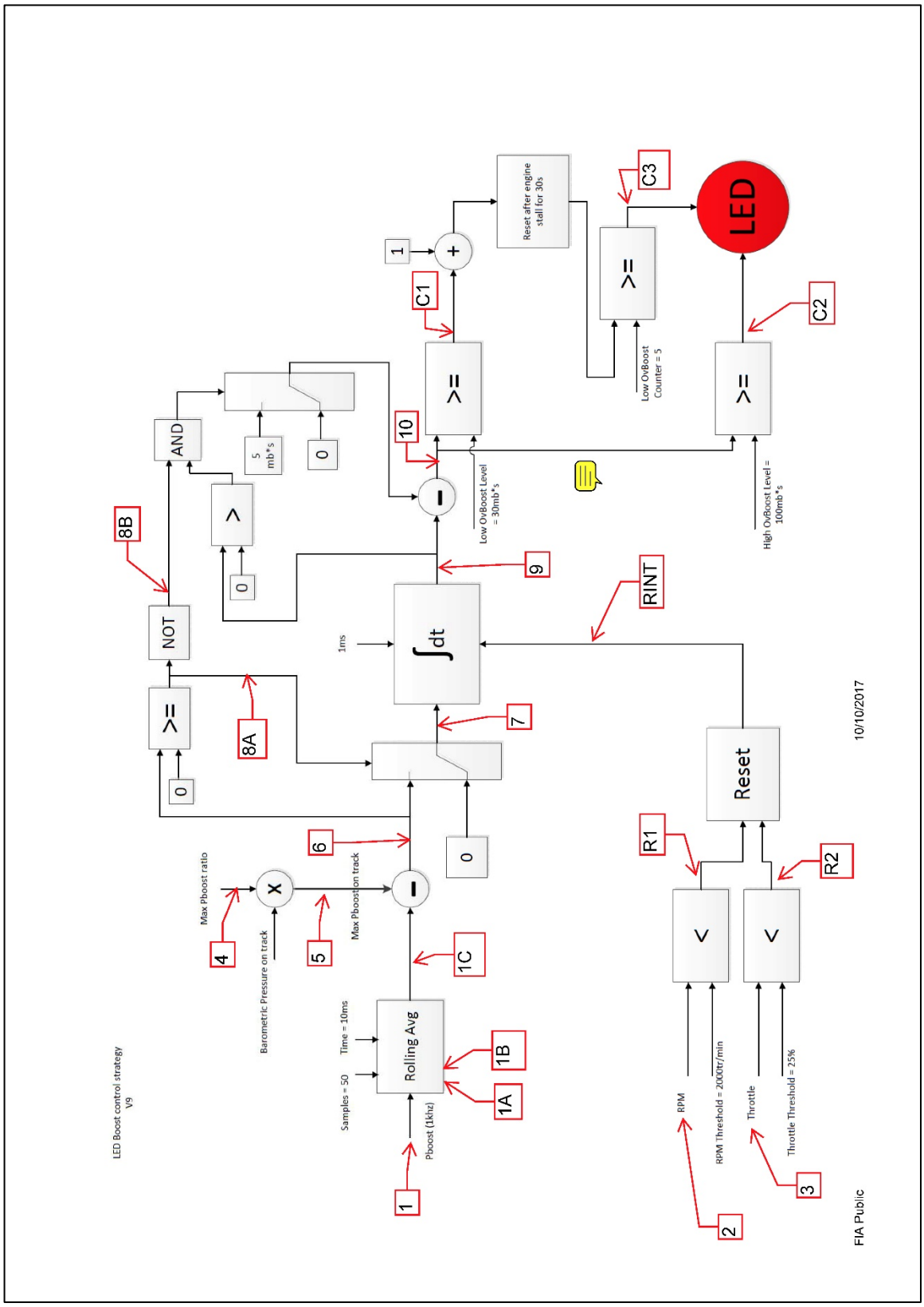
Appendix: Control of Pboost strategy



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Appendix: Renault RS01 aerodynamics

Rear Bumper Gurney (31mm) is allowed

PHOTO N° 01

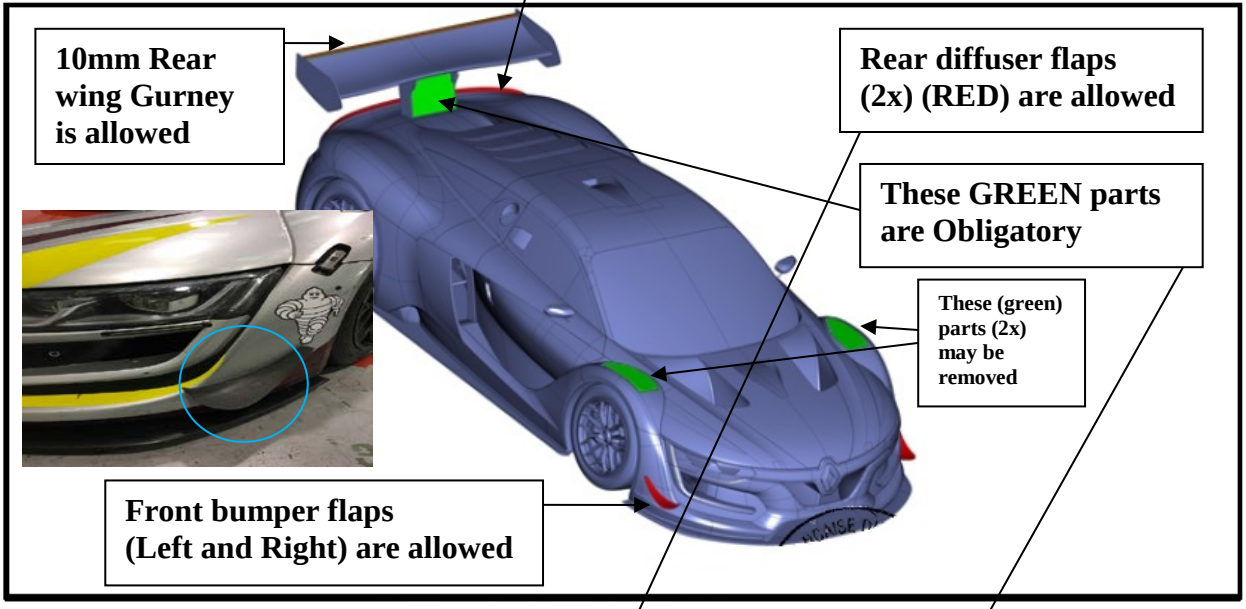
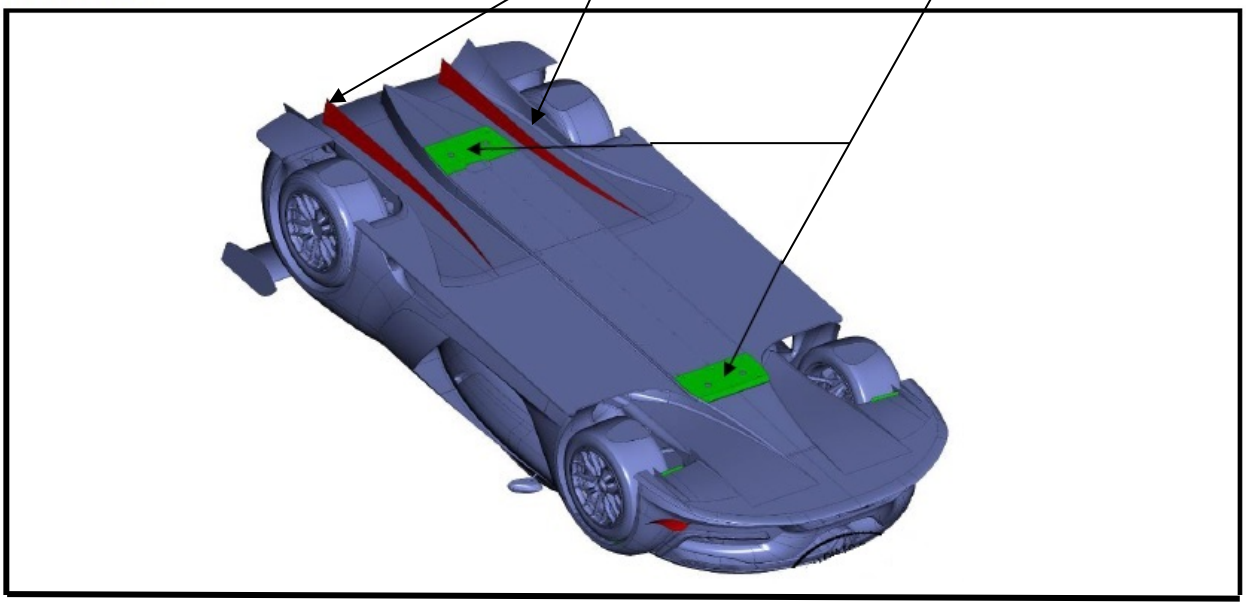


PHOTO N° 02



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