THE FORMULA ONE™ TECHNOLOGY CHALLENGE

2015 Technical Regulations

Novice Category

Bloodhound SSC Class Categories

Secondary Novice

F1 Class Category

Secondary Novice

F1 in Schools - 2015 Season Rules & Regulations

This document has been ratified and approved for release by F1 in Schools. Any approved revisions will be officially released as supplementary regulations through the F1 in Schools website. This is accessible via www.f1inschools.com.sg at the rules and regulations notices and downloads page.

Feedback is welcome and should be sent to rules@f1inschools.com.sg

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Bloodhound SSC CLASS

The Bloodhound SSC project aims to break the world Land Speed Record, recorded by achieving 1000 mph or Mach 1.4. It is an iconic engineering adventure that will push our science and engineering knowledge beyond current boundaries.

It's number one aim however, is to inspire more young people to take up exciting careers in Science and Engineering.

A SSC is a Super Sonic Car that is a car which travels faster than the speed of sound and in Bloodhound's case, faster than a bullet.

The F1 in Schools Bloodhound SSC category is built around speed and aerodynamic with just one key design rule stating that the vehicle must have a minimum of four wheels.

The Land Speed Record is currently held by Thrust SSC which stands at 763.035 mph.

All information about Bloodhound SSC will be shared with schools and colleges across the UK, including research, design, build, test and the problems they encounter. Ensure your school is registered to receive posters and email updates by visiting **www.BLOODHOUNDSSC.com**

BLOODHOUND SSC CLASS TECHNICAL REGULATIONS

All cars must comply with the following minimum and maximum dimensions (all dimensions stated in millimetres, mm)		
Description	**Min**	**Max**
T1. ASSEMBLED CAR DIMENSIONS ➢ Full Assembled Car Length (measured between front and rear extremities of car) ➢ Weight of assembled car	170mm 45g	290mm
T2. WHEELS ➢ All cars must have a minimum of **4 wheels**, two at the front and two at the rear. ➢ All four wheels must rotate freely about their own centre axis to facilitate motion of the car during racing. The scrutineering judge must be able to validate this with reasonably minimal effort. Wheel systems designed to impede free rotation during racing may be deemed as unsafe due to risk of damage to the track surface. ➢ All 4 wheels should touch the racing surface at all times.		
T3. POWER PLANT ➢ Lowest point of chamber to track surface	22.5mm	40mm
T4. TETHER GUIDES ➢ Each car must have **2 tether guides** firmly secured at the front and rear of the car body, running along the car body base centre line. The tether line guide must pass through the two tether guides. ➢ Each tether guide must not make contact with the racing surface. Teams are allowed to use tether line guides of their own sourcing. ➢ It is permissible for use of glue in securing tether guides. ➢ Teams must make sure that the tether guide holes are tightly closed to prevent the string from slipping out of the tether guides. This should be done prior to registration at the event. ➢ Guide separation, the shortest distance between inside edges of the guides, measured parallel to the track surface and vertical reference plane	150mm	270mm
T5. CAR BODY ➢ No add-ons, such as body strengtheners, fenders, plastic canopies, exhausts or airfoils should be attached or enclosed within the car body. Any add-ons will result in disqualification. ➢ The car body should be made from one whole piece of balsa wood. Two or more, like or unlike, pieces of balsa wood or any other material will not be considered one piece. ➢ Designs will be tested and examined for any hidden implants within the car body/wheels. Any implants will result in disqualification. ➢ Must include a **team logo** of size greater or equal to **30 mm by 15 mm** on the assembled racer. Team logo must be clearly visible when		

viewed from the top or the side or the front of the racer. ➢ All cars must clearly display both a F1 in Schools logo in a prominent location. ➢ Parts that are of the wheel assemblies (eg axle, axle bushes, wheels and etc) can be adhered to the racer body. ➢ Primers, fillers & paint are permissible.		

T6. REPAIR & MAINTENANCE

- No repair or maintenance is to be carried out after the vehicle has been registered without the permission of F1 in Schools staff.
- If any entry becomes damaged during the event, teams will be allowed to use their spare car, as long as the judges have determined that the spare is identical to the original. In the unlikely event that the second car becomes damaged, the entry will be evaluated by the event coordinator, who will make a ruling as to whether or not the team will be allowed to repair the vehicle. This is the only reason a team should be allowed to tamper with their car after registration.
- Wheels that come off during the race may be replaced as determined by the race coordinator.
- Damaged wheels may only be replaced with the permission of the event coordinator.

BLOODHOUND SSC CLASS SPECIFICATION SCORE CARD

Team Name:	**Team No:**
School Name:	
Designed using (CAD):	
Manufactured Using (CNC):	

All measurements are in millimetres / Tolerances:
Dimensions ±0.1mm

No.	Detail	Measurement/Value	
ASSEMBLED CAR DIMENSIONS		Race	Spare
1	Full Assembled Car Length – Min:170mm / Max:290mm		
2	Minimum cross sectional area	NA	NA
3	Full Assembled Car Width		
WHEELS			
3	Minimum of 4 wheels (two at the front, two at the rear)		
4	All 4 wheels must rotate		
5	All 4 wheels should touch the racing surface at all times		
POWER PLANT			
6	Wall thickness around chamber – Min: 3.5mm	NA	NA
7	CO2 Cartridge Chamber Diameter	NA	NA
8	Lowest Point of Chamber to track surface – Min: 22.5mm / Max: 40mm		
9	Depth of chamber – Min: 50mm / Max: 60mm	NA	NA
TETHER LINE GUIDES			
7	Inside diameter of screw eyes **– Min: 3mm / Max: 5mm**	NA	NA
8	Distance Apart – Min: 150mm / Max: 270mm		
ASSEMBLED CAR			
9	Weight of Assembled Car - *Min: 45.0grams*		
10	No add-ons, inserts or voids		
11	Body made from one whole piece of balsa wood		
12	No hidden implants		
13	F1 in schools logo sticker		
	Total Deductions (10 points per infringement per race car)		
	Points Available		
	Grand Total		

For clarification on individual rules please refer to the published rules & regulations.

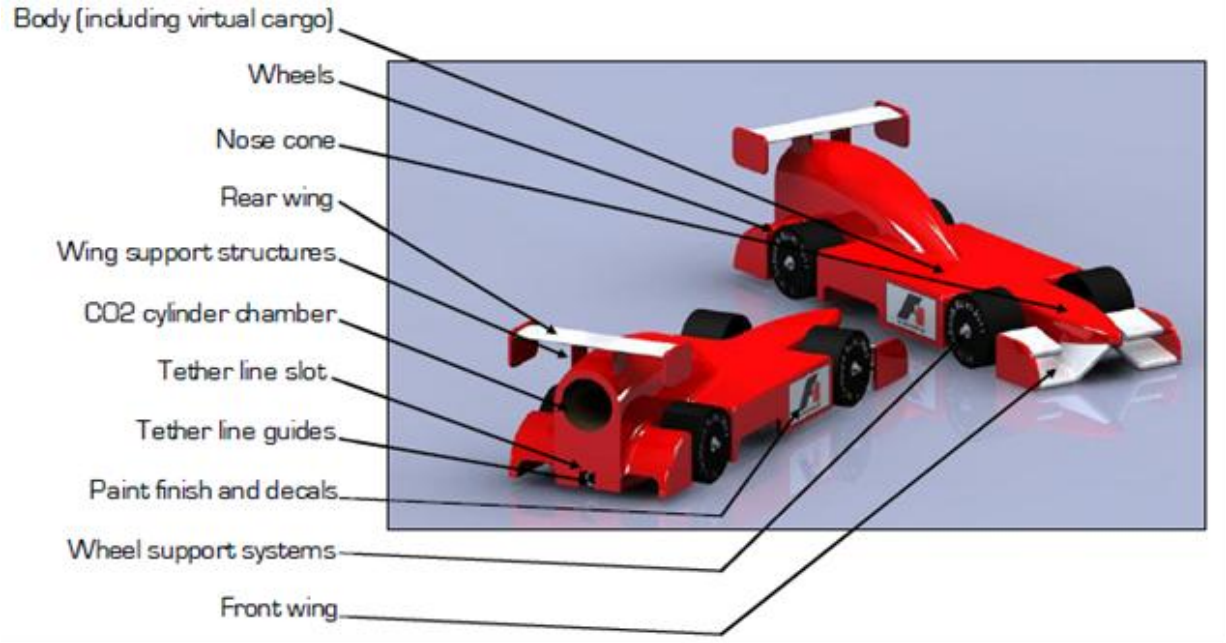
F1 CLASS

F1 in Schools car

This is also referred to as 'the car'. Designed and manufactured according to these regulations for the purpose of participating in races on the F1 in Schools™ track at the World Finals event. Powered only by a single gas cylinder containing 8 grams of pressurised CO2. F1 in Schools cars are designed to travel the 20 metre race distance as quickly as possible, whilst withstanding the forces of launch acceleration, track traversing and physical deceleration after crossing the finishing line.

An F1 in Schools car assembly must only consist of the following components:

- A body (which includes virtual cargo)
- A CO2 cylinder chamber
- A front wing
- A rear wing
- Wing support structures
- A nose cone
- Wheels
- Wheel support systems
- A tether line slot
- Tether line guides
- Paint finish and decals
- Adhesives with no dimensional impact are permissible for joining components



For clarification on individual rules please refer to the published rules & regulations.

F1 CLASS TECHNICAL REGULATIONS

All cars must comply with the following minimum and maximum dimensions (all dimensions stated in millimetres, mm)

Description	Min	Max
T1. BODY DIMENSIONS ➢ Full Body Length (measured between front and rear extremities of body) ➢ Weight ➢ Overall Width ➢ Overall Height ➢ Body to Track Distance	170mm 55g 60mm - 3mm	210mm 85mm 60mm 15mm
T2. WHEELS ➢ All cars must have a minimum of **4 wheels**, two at the front and two at the rear. ➢ All four wheels must rotate freely about their own centre axis to facilitate motion of the car during racing. The scrutineering judge must be able to validate this with reasonably minimal effort. Wheel systems designed to impede free rotation during racing may be deemed as unsafe due to risk of damage to the track surface. ➢ All 4 wheels should touch the racing surface at all times.		
T3. POWER PLANT ➢ Distance from Track Surface	22mm	30mm
T4. TETHER GUIDES ➢ Each car must have **2 tether guides** firmly secured at the front and rear of the car body, running along the car body base centre line. The tether line guide must pass through the two tether guides. ➢ Each tether guide must not make contact with the racing surface. Please ensure you use the recommended tether guides. ➢ It is permissible for use of glue in securing tether guides. ➢ Teams must make sure that the tether guide holes are tightly closed to prevent the string from slipping out of the tether guides. This should be done prior to registration at the event. ➢ Guide separation, the shortest distance between inside edges of the guides, measured parallel to the track surface and vertical reference plane	120mm	190mm
T5. CAR BODY ➢ No add-ons, such as body strengtheners, fenders, plastic canopies, exhausts or airfoils should be attached or enclosed within the car body. Any add-ons will result in disqualification. ➢ The car body should be made from one whole piece of balsa wood. Two or more, like or unlike, pieces of balsa wood or any other material will not be considered one piece. ➢ Designs will be tested and examined for any hidden implants within the car body/wheels. Any implants will result in		

disqualification. ➢ Must include a **team logo** of size greater or equal to **30 mm by 15 mm** on the assembled racer. Team logo must be clearly visible when viewed from the top or the side or the front of the racer. ➢ All cars must clearly display both a F1 in Schools logo in a prominent location. ➢ Parts that are of the wheel assemblies (eg axle, axle bushes, wheels and etc) can be adhered to the racer body. ➢ Primers, fillers & paint are permissible.		

T6. REPAIR & MAINTENANCE

- No repair or maintenance is to be carried out after the vehicle has been registered without the permission of F1 in Schools staff.
- If any entry becomes damaged during the event, teams will be allowed to use their spare car, as long as the judges have determined that the spare is identical to the original. In the unlikely event that the second car becomes damaged, the entry will be evaluated by the event coordinator, who will make a ruling as to whether or not the team will be allowed to repair the vehicle. This is the only reason a team should be allowed to tamper with their car after registration.
- Wheels that come off during the race may be replaced as determined by the race coordinator.
- Damaged wheels may only be replaced with the permission of the event coordinator.

F1 CLASS SPECIFICATION SCORE CARD

Team Name:	**Team No:**
School Name:	
Designed using (CAD):	
Manufactured Using (CNC):	

Tolerance when measuring all dimensions is +/- 0.1mm unless otherwise stated.

Tolerance when measuring weight is +/- 0.5grams.

No.	Detail	Measurement/Value	
BODY DIMENSIONS		Race	Spare
1	Full Body Length – Min:170mm / Max:210mm		
2	Minimum cross sectional area		
3	Full Body Width – Min: 60mm / Max:85mm		
4	Overall Height – Max: 60mm		
WHEELS			
5	Minimum of 4 wheels (two at the front, two at the rear)		
6	All 4 wheels must rotate		
7	All 4 wheels should touch the racing surface at all times		
POWER PLANT			
8	Wall thickness around chamber – Min: 3mm	NA	NA
9	CO2 Cartridge Chamber Diameter – Min: 19.5mm +/- 0.5mm		
10	Lowest Point of Chamber to track surface – Min: 22mm / Max: 30mm		
11	Depth of chamber – Min: 50mm / Max: 60mm	NA	NA
TETHER LINE GUIDES			
12	Inside diameter of screw eyes – Min: 3mm / Max: 5mm	NA	NA
13	Distance Apart – Min: 120mm / Max: 190mm		
CAR BODY			
14	Weight of Car – *Min: 55.0grams*		
15	Body to Track Distance – Min: 3mm / Max: 15mm	NA	NA
16	No add-ons, inserts or voids		
17	Body made from one whole piece of balsa wood		
18	No hidden implants		
19	F1 in schools logo sticker		
	Total Deductions (10 points per infringement per race car)		
	Points Available		

Grand Total		

For clarification on individual rules please refer to the published rules & regulations.

PORTFOLIO & PIT DISPLAY SCORE CARD

Team Number: **Team Name:**

10 PAGE FOLIO LIMIT - mark only the first 10 pages including cover page.

PORTFOLIO ONLY ASSESSMENT ITEMS				
Project Management	Little evidence of project management presented.	Simple management and planning used to guide progress. A range of project resources identified.	Comprehensive project management. A range of factors considered; e.g. scope, time, resources and project risks. Plan changes discussed	
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30	
Team Work	Limited team work evident.	Evidence of effective team work with roles defined	Highly structured team with clear roles. All team members had effective and critical contributions. Role interactions recognised	
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30	
Portfolio Clarity & Quality	Difficult to follow with basic presentation standard.	Clear structure, well organised. Good use of ICT's enhancing presentation and impact.	High impact and professional throughout. Consistent and clear organisation. Excellent use of ICT's to enhance presentation	
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30	
			Portfolio Total	/ 90

MARKETING & PIT DISPLAY ASSESSMENT				
Team Identity	Inconsistent, limited or obscure identity	Effective team identity consistent through various project components..	Excellent and highly effective team identity. Team 'brand' consistently applied through all project elements.	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
Pit Display	Repetition of folio elements	Clear and effective presentation and messaging. ICT's used to enhance presentation	Clean, well-organised with high impact. Highly professional with attention to detail. Excellent integration of technology and ICT's	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
			Pit Display & Marketing Total	/ 40

PORTFOLIO & PIT DISPLAY SCORE CARD

F1 CAR DESIGN PROCESS – PRESENTED IN PORTFOLIO OR DISPLAY				
Ideas	Little evidence of project management presented.	Simple management and planning used to guide progress. A range of project resources identified.	Comprehensive project management. A range of factors considered; e.g. scope, time, resources and project risks. Plan changes discussed	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Development	Limited team work evident.	Evidence of effective team work with roles defined	Highly structured team with clear roles. All team members had effective and critical contributions. Role interactions recognised	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Testing	Difficult to follow with basic presentation standard.	Clear structure, well organised. Good use of ICT's enhancing presentation and impact.	High impact and professional throughout. Consistent and clear organisation. Excellent use of ICT's to enhance presentation	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Evaluation	Inconsistent, limited or obscure identity	Effective team identity consistent through various project components.	Excellent and highly effective team identity. Team 'brand' consistently applied through all project elements.	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
			F1 Car Design Process Total	/ 60

Portfolio + Pit Display & Marketing + F1 Car Design Process = Portfolio and Display Total = / 190

VERBAL PRESENTATION SCORE CARD

Team Number: **Team Name:**

PRESENTATION TECHNIQUE				
Visual Aids	Little use of aids.	Some aids used effectively	Highly professional aids effectively improve communication	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Team Contribution	Minimal team participation	Good contributions from most team members	Excellent team work with all members participating effectively	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Dynamic/Energy	Artificial and/or low energy	Speakers generally enthusiastic with lively delivery	Passionate with effective and appropriate levels of liveliness	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Engagement	Minimal engagement	Some audience connection at times	Audience fully engaged and excited throughout presentation	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
			Technique Total	/ 60

COMPOSITION OF THE PRESENTATION				
Concept Clarification	Several concepts lacked clarification	Clear and appropriate concept explanations	Everything presented was understood through excellent explanations	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
Use of Time	Too fast or ran out of time	Good timing. Balanced topic depth and pace	Ran on time or under. Excellent balance of depth for each topic	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
Presentation Structure	No structure presented	A basic structure / outline provided and could be followed by audience	Clear presentation outline / overview. Excellent connections between topics and easy for audience to follow	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
			Composition Total	/ 60

VERBAL PRESENTATION SCORE CARD

SUBJECT MATTER / PRESENTATION CONTENT / TOPICS				
Innovation	Little innovation presented	Innovations described and justified	Originality. Clever innovations with high positive project impact	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
F1 in Schools Learning Experience	No real reflections discussed	Good explanation of some learning outcomes	A range of personal, life-long learning and career skills acquired and identified as project outcomes for a range of team members	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
			Subject Matter Total	/ 40

Technique + Composition + Subject Matter = Verbal Presentation Total = / 160

ENGINEERING SCORE CARD

Team Number: **Team Name:**

COMPUTER AIDED DESIGN AND ANALYSIS				
Application of CAD-CAM	Basic application. Final design in CAD only	Appropriate use of CAD in product development stages. Good understanding of CAM evident	Advanced use of CAD and CAM technologies throughout. Final CAD identical to the physical model car produced	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Organisation	Generally unorganised	Satisfactory organisation of data and models	Data & parts highly ordered & linked. Full CAD product assembly	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
Orthographic & Rendering	Basic drawing & rendering	Good technical drawing and realistic rendering	High detail & includes spec dimensions. Photorealistic render	
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15	
			CAD & Analysis Total	/ 15

MANUFACTURING				
Quality of Finish and Assembly	Reasonable finish with some inconsistencies	Good overall finish quality and assembly with attention to detail	Showcase' finish quality on all components. Exceptional attention to detail across all assembly and finishing. Two cars are identical.	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
Manufacturing discussed in portfolio	Little manufacturing details	Manufacturing processes and some issues	Detailed assessment of all manufacturing, stages, materials & issues	
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20	
			Manufacturing Total	/ 40

CAD & Analysis + Manufacturing = Engineering Judging Total = / 55