



**in Schools**  
United Kingdom

UK TECHNICAL REGULATIONS

**2018/2019**



**Development Class**



## Welcome to FI in Schools™ Development Class!

Welcome to the FI in Schools Development Class, the proving ground of the world's leading STEM competition! Development Class is where we uncover the National and World Champions of the future. Development Class teams will first meet at the UK Regional Finals, competing for a place at our UK National Finals at the home of British motor sport, Silverstone Circuit. At Silverstone, teams battle for the chance to be crowned FI in Schools UK Development Class National Champions and win a place at the spectacular FI in Schools World Finals.

By choosing to enter this class, you're about to go head-to-head with some of the best new teams in the UK, so make sure you read this document carefully. **The teams who understand the rules most clearly will have the best chance to create a winning car!** We want teams to show creativity and risk taking in their designs, as this is how the fastest cars and the most unique ideas are born. Playing safe will never get you to the front of the grid, or the top step of the podium!

*Please use this document alongside the FI in Schools UK Competition Regulations 2018/2019.*



## How to use the Technical Regulations booklet

In this booklet you will find all the technical rules and regulations for designing and making your car. These rules must be followed to avoid penalty points in scrutineering. Pay special attention to any **critical rules, highlighted in yellow**, as breaking these means you cannot be crowned as winners, or progress to the UK National Final at Silverstone Circuit. Some phrases we use are advanced engineering terms, but don't worry – we've added some **explanations in blue** just to make things easier to understand. All minimum and maximum dimensions are also highlighted in **bold blue**, so keep an eye out for these throughout the booklet.

You will see that all the rules have been grouped into different areas of the car, as listed in the contents. We recommend you use this booklet in stages, as and when you need to find out about particular aspects of the car. Challenge yourself to learn the requirements for designing the front wing for example, then test yourself on them before getting creative with pens, modelling materials and CAD.

## The bright red car

The diagrams in this booklet use an example car to show you how to design to certain rules. This car is NOT a winning car and has been created just to show you how to make sure your car is legal. We're sure you can do better, so get creative and show us how much more imaginative you can be with your own designs...

## Rule revisions from the 2017/18 season



Just like in the real world of Formula 1®, at the end of each season we reflect on our rules and make any changes we think are important. If you see the 'NEW!' symbol next to any rule, we've made changes to it for the new 2018/19 season so make sure you read it extra carefully.

## What to do next:

### READ THE RULES!



- Read the technical regulations carefully one section at a time, so your design complies.
- Pay EXTRA SPECIAL attention to any **critical rules, which are highlighted in yellow (see page 8)**.

### Follow the sketching tutorial on the FI in Schools™ website

- Have a go at our IsoSketch® tutorial, which shows you how to sketch the chassis of your FI in Schools car. Then, you can either trace or photocopy this sketch to give you loads of chassis templates to start designing onto!

### Get designing!

- Design the body of your FI in Schools racing car over the chassis sketch you have done. The more concepts your team comes up with, the better! FI® designers all need time to think creatively before sitting down at a computer, so do lots and lots of rough sketches and models to begin with.

### Make sure you have a suitable 3D CAD package

- We recommend you download and install the **FREE** Autodesk Fusion 360 software onto your school computers (this can also be used at home). This is available direct from Autodesk. Your 3D CAD package should be able to output .stl files (these are used to manufacture parts using CAM).

### Download the following CAD files from the official FI in Schools™ website:

- There are **5** Development Class CAD models that can be downloaded to help you build your Development Class car. These are: **FI® model block, body 'no-go-zone', standard wheel, axle** and the **CO<sub>2</sub> cartridge**.

### Get your Development Class Starter kit from [isupply3d.com](http://isupply3d.com)

- The Development Class starter kit contains all the standard components needed to design and make your FI in Schools Development Class car. All Development Class cars must be manufactured using this kit.
- Get manufacturing your car and put everything you've learned into practise!

## ATTEND YOUR NEAREST REGIONAL FINAL, READY TO RACE...

# DEVELOPMENT CLASS: THE RULES

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## ARTICLE D1 – DEFINITIONS (a useful glossary of terms)

FI in Schools™ can sound very technical sometimes, but it's really pretty simple. Here's a glossary of common terms, explaining what everything means:

### D1.1 FI in Schools™ car

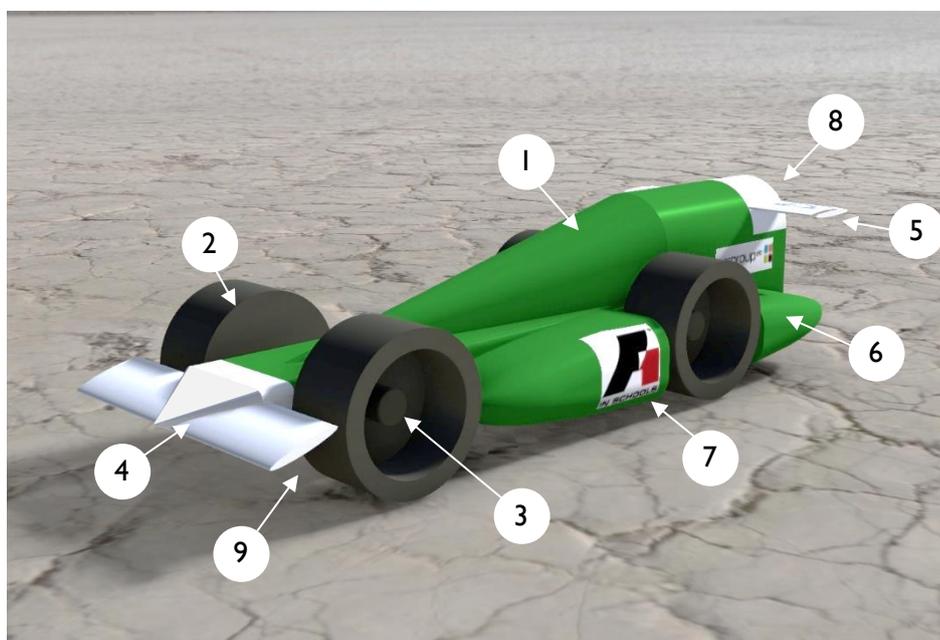
**In simple terms:** All the individual parts that make up an FI in Schools Development Class car.

**In technical terms:** This is also referred to as 'the car'. Designed and manufactured according to these regulations for the purpose of participating in races on the FI in Schools track at the UK Regional and National Finals events, powered only by a single gas cylinder containing 8 grams of pressurised CO<sub>2</sub>. FI 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.

Your FI in Schools car assembly must **only** consist of the following components:

- A body (manufactured from Official FI® Model Block – available from [isupply3d.com](http://isupply3d.com))
- 4 x wheels
- 2 x axles / 2 x axle guide tubes / 4 x washers
- Front wing assembly
- Rear wing assembly
- Surface finishing (e.g. paint) and decals / graphics
- FI in Schools logo decals
- A CO<sub>2</sub> cartridge chamber
- Tether line guides

Adhesives with no dimensional impact (e.g. superglue) are allowed for joining components.



1. Body
2. 4 x Wheels
3. Axles / guide tubes / washers
4. Front wing assembly
5. Rear wing assembly
6. Surface finishing
7. FI in Schools logo decals
8. CO<sub>2</sub> cartridge chamber
9. Tether line guides

### D1.2 Fully assembled car

**In simple terms:** Your completed car, ready to race.

**In technical terms:** An FI in Schools car, without a CO<sub>2</sub> cylinder inserted, presented ready for racing, resting on the track surface, free of any external force other than gravity.

### DI.3 Body

**In simple terms:** The main part of your car, made from FI® Model Block.

**In technical terms:** The body is a solid uninterrupted piece of FI® Model Block Material existing rear of the front axle centre line and encompassing both the virtual cargo and CO<sub>2</sub> cartridge chamber. For dimensional purposes the body also includes any attached decals and surface finishes. Any FI® Model Block forward of the front axle centre line is not defined as car body.

### DI.4 Official FI® Model Block

**In simple terms:** The material you **must** use to make your car body. (Included in the FI Development Class starter kit, available from [isupply3d.com](http://isupply3d.com))

**In technical terms:** The official FI® Model Block is a rigid, closed cell foam block processed to the dimensional features as shown by diagrams in **Appendix ii** of this document. **IMPORTANT:** all cars entered into the 2016/17 UK season **must** be manufactured from FI® Model Blocks.

A 3D .ipt part of the official model block can be downloaded from <http://www.fiinschools.co.uk/downloads-and-resources/>

### DI.5 ‘No-go-zone’

**In simple terms:** The area you **CANNOT** design inside – the minimum size of your body.

**In technical terms:** The no-go-zone is a defined area within the official FI® Model Block, set by FI in Schools™ to provide a minimum safe working shape for the body of an FI in Schools™ Development Class car.

A 3D .ipt part of the no-go-zone can be downloaded from <http://www.fiinschools.co.uk/downloads-and-resources/>

### DI.6 CO<sub>2</sub> cartridge chamber

**In simple terms:** The hole for the CO<sub>2</sub> gas cartridge

**In technical terms:** The CO<sub>2</sub> cartridge chamber is a cylindrical clear space bounded around its inner circumference and one end by car body only. This is where the CO<sub>2</sub> gas cartridge is placed for racing.

### DI.7 Wheels

**In simple terms:** The standard wheels you **must** use (Included in the FI Development Class starter kit available from [isupply3d.com](http://isupply3d.com))

**In technical terms:** A wheel is a single part, cylindrical in form, with its maximum circumference contacting the track surface, enabling forward motion of the car through rotation. All material existing within the volume of the extreme diameter and width is considered to be part of the wheel. **IMPORTANT:** all Development Class cars entered into the 2016/17 UK season **must** use the standard wheels, which are included in the Development Class startker kit.

A 3D .ipt part of the standard wheel can be downloaded from <http://www.fiinschools.co.uk/downloads-and-resources/>

### DI.8 Axles

**In simple terms:** The standard axles you **must** use (Included in the FI Development Class starter kit available from [isupply3d.com](http://isupply3d.com))

**In technical terms:** Axles are single parts that connect a wheel to any other part of the car. **IMPORTANT:** all Development Class cars entered into the 2016/17 UK season **must** use the standard axles, which are included in the Development Class startker kit. These parts are supplied with 2 (two) washers per axle and must not be substituted with any other parts. Axles may only be modified in length (please refer to D6.1).

A 3D .ipt part of the standard wheel can be downloaded from <http://www.fiinschools.co.uk/downloads-and-resources/>

### DI.9 Tether line guides

**In simple terms:** 2 screw eyes attached to the underside of your car, to keep it on the track. (Included in the official starter kit available from [isupply3d.com](http://isupply3d.com))

**In technical terms:** A tether line guide is a key safety component which completely surrounds the track tether line so as to safely connect the car to the tether line during races. A tether line guide can be a component sourced from a supplier or manufactured wholly or in part by the team.

### DI.10 Front / rear wing assembly

**In simple terms:** Wings mounted on the front and rear of your car, designed to control airflow.

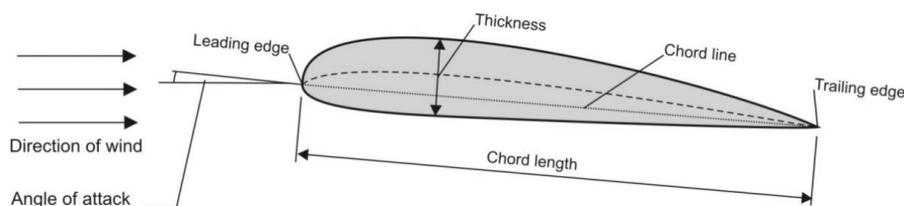
**In technical terms:** A wing on an FI in Schools Development Class car is an aerodynamic feature that permits airflow around ALL of its surfaces including its features of a leading and trailing edge. The measurements used to calculate the dimensions of an FI in Schools car wing are the maximum and minimum span, chord and thickness. The vertical cross-sectional shape of the wing, parallel to the direction of car travel, is referred to as an aerofoil.

Definition of wing terminology:

- A **leading edge** is the edge of the wing that cuts through the air first.
- The **trailing edge** is the edge that the air touches last as it leaves the wing.
- Wing **span** is just like the arm span of a human, or the wing span of a bird or plane. It is the total width of the wing across the body of the car.
- Wing **chord** is the widest point of the wing's cross section, between the leading and trailing edges.
- Wing **thickness** is the deepest point of the wing across it's cross section.

These terms are all shown on the diagram below, make sure you understand what they all mean!

Wing cross-section diagram:



### DI.11 Surface finish and decals

**In simple terms:** A fancy paint job and sponsor stickers.

**In technical terms:** A surface finish on an FI in Schools car is considered to be any applied visible surface covering, of uniform thickness over the profile of a car component. A decal is material adhered to a component or surface finish. To be defined as a decal, 100% of the area of the adhering side must be attached to a surface. Surface finishes and decals are included when measuring the dimensions of any components they feature on.

### DI.12 Hand finishing

**In simple terms:** Filing, sanding and polishing.

**In technical terms:** Hand finishing is defined as use of a hand powered device (e.g. needle files, abrasive paper, lacquer) for removing only the irregularities that may remain on a CNC machined surface of the car body. These irregularities are often referred to as 'scallop marks'.

### DI.13 FI in Schools™ logo decals

**In simple terms:** A white or black FI in Schools™ sticker which must be stuck to each of your cars.

**In technical terms:** This consists of the FI in Schools logo graphic printed on a black or a white adhesive vinyl with a 1mm contrast keyline border, with a horizontal dimension of 30mm and vertical dimension of 15mm. Teams must use a decal to identify Car A and Car B. The official decals are supplied by FI in Schools Ltd at event registration. A team can manufacture and fit their own decals, provided they use the official FI in Schools logo decal artwork which can be downloaded from the FI in Schools website: <http://www.fiinschools.co.uk/downloads-and-resources/>

Decal designs:



### DI.14 Engineering drawings

**In simple terms:** Orthographic and/or isometric drawings of your finished car, showing dimensions.

**In technical terms:** Engineering drawings are freehand or CAD produced drawings which should be such that they could theoretically be used to manufacture the fully assembled car by a third party. Such drawings must include all relevant dimensions, tolerances and material information. FI in Schools engineering drawings must include detail to specifically identify and prove compliance for wing surfaces (refer to D7.2).

Engineering drawings can include: orthographic projection, auxiliary projection, section views, isometric projection, oblique projection, perspective and annotated renderings.

Please note, all final engineering drawings must be produced in CAD to allow for manufacturing using CAM equipment.

### DI.15 Renderings

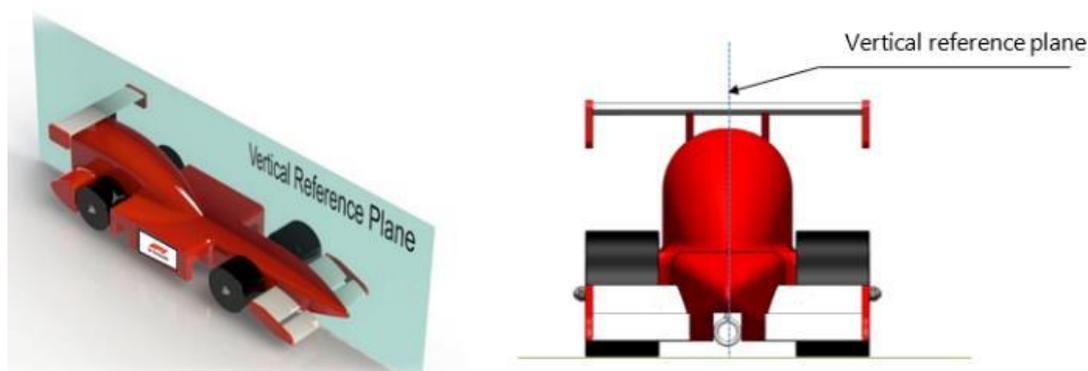
**In simple terms:** Freehand or CAD presentation images of your finished car

**In technical terms:** Renderings are images intended to illustrate the three dimensional form of an object. These can be generated in isometric projection, oblique projection or perspective.

### DI.16 Vertical reference plane

**In simple terms:** An imaginary slice through the centre of your car, used to describe measurements

**In technical terms:** To assist with describing dimensions, it is assumed that a two dimensional invisible plane exists along the length of the CO<sub>2</sub> cartridge chamber centre axis and perpendicular to the track surface. This is known as the vertical reference plane.



### DI.17 Normal

**In simple terms:** At right angles to another object

**In technical terms:** The term 'normal' is used in geometry to describe a line or object that is perpendicular or at 90 degrees to another given object. When referring to the term normal in these regulations it is considered to mean:

- Being at right angles; perpendicular.
- Perpendicular to the direction of a tangent line of a curve or a tangent plane to a surface.

### DI.18 Additional Components

Any component other than those listed in DI.1 will be considered an additional component. Please refer to PI I and also the UK Competition Regulations 2018/19.

## ARTICLE D2 – GENERAL PRINCIPLES (the smallprint!)

### D2.1 Regulations documents

**D2.1.1** FI in Schools Ltd. issues the regulations, their revisions and amendments made.

**D2.1.2** Technical Regulations - this document. The Development Class Technical Regulations document is mainly concerned with those regulations that are directly related to FI in Schools car design and manufacture. Development Class Technical regulation article numbers have a 'D' prefix.

**D2.1.3** Competition Regulations – a document separate to this one which is mainly concerned with regulations and procedures directly related to judging and the competition event. Competition Regulation article numbers have a 'C' prefix.

### D2.2 Interpretation of the regulations

**D2.2.1** The final text of these regulations is in English should any dispute arise over their interpretation. The text of a regulation, diagrams and any related definitions should be considered together for the purpose of interpretation.

**D2.2.2** Text clarification - any questions received that are deemed by FI in Schools Ltd. to be related to regulation text needing clarification will be answered by FI in Schools Ltd. The question received, along with the clarification provided by FI in Schools Ltd., will be published online at the same time.

### D2.3 Amendments to the regulations

Any amendments will be announced and released by FI in Schools Ltd. on the official UK website: [www.flinschools.co.uk](http://www.flinschools.co.uk). Any amended text will be indicated **thus** (using red underlined text).

### D2.4 Safe construction

**D2.4.1** Specification judging - all submitted cars will be inspected closely to ensure that they are engineered and constructed safely for the purpose of racing. If the judges rule an aspect of either race car to be unsafe for racing, the team will be required to carry out repairs / modifications to the car(s). Any such repair work or change of car will result in a penalty of 5 points per unsafe car.

**D2.4.2** During racing – the race officials will routinely inspect cars for safety during scheduled races. If the officials rule a car to be unsafe, a penalty of 5 points will be imposed at the discretion of the Chair of Judges. The team may repair the car as per the Competition Regulations – C10 Car Repairs and Servicing.

### D2.5 Compliance with regulations

Points are deducted for non-compliance with the technical regulations as per the specification judging score card. Both the race cars are scrutineered and points will be deducted for any infringements on either car. These penalties are only imposed once, per infringement, per car. Several regulations have been identified as 'critical technical regulations'.



### D2.6 Critical technical regulations

**D2.6.1** Regulations identified as a critical technical regulation are listed in this article. If a race car is judged as being NON-COMPLIANT with any critical technical regulation they will be INELIGIBLE for the awards of; National Champions, Fastest Car & Best Engineered Car.

**D2.6.2** The critical technical regulations are articles:

**D3.1 / D3.2 / D3.3 / D3.4 / D3.5 / D4.1 / D4.2 / D4.3 / D6.1 / D6.2 / D6.5 / D7.1 / D7.4 / D7.5 / D7.6**

### D2.7 Design ideas and regulation compliance questions

Teams are not permitted to seek a ruling from FI in Schools Ltd. or any competition officials or judges before the event as to whether a design idea complies with these regulations. Rulings will only be made by the judges at the Regional and National Finals events. Design compliance to the regulations forms part of the competition.

As in Formula 1, innovation is encouraged and FI in Schools teams may also find ways of creating design features that push the boundaries of the regulations in order to get an extra competitive edge.

## D2.8 Measurements

**D2.7.1** All dimensions and weights are presented as **Absolute Minimum or Maximum**, unless stated otherwise.

**D2.7.2** Dimensional measures - all car component dimensions are inclusive of any applied paint finish or decal. A series of specially manufactured gauges will be used to broadly verify dimensional compliance (i.e. to give the judges a rough idea of whether your car is legal, before they measure certain areas in more detail). Accurate measuring tools, such as vernier calipers, will then be used to closely inspect any dimensions found to be close to the dimensional limits per the initial gauge inspection.

**IMPORTANT:** Some regulations are assessed with a full 8g race cartridge fully inserted into the cartridge chamber. This is stated in the individual regulations so please read each section carefully.

**D2.7.3** Weight measures – all weight measurements will be made using the FI in Schools Ltd. calibrated electronic competition scales.

### SAMPLE OF COMPLIANCE OF ABSOLUTE DIMENSIONS AND WEIGHTS.

**Weight;** (minimum 50g)

**60.0g;** (pass)

**59.9g;** (fail)

**Dimension;** (minimum 26.0mm)

**26.0mm;** (pass)

**25.9mm;** (fail)

**Dimension;** (maximum 34.0mm)

**34.0mm;** (pass)

**34.1mm;** (fail)



**Important: please also read the FI in Schools™  
UK Competition Regulations 2018-2019.**

# CAR DESIGN

## COMPLIANCE AND PENALTIES

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# ARTICLE 3:

## Fully assembled car



## ARTICLE D3 – FULLY ASSEMBLED CAR



### D3.1 Design, manufacture and construction – [Critical regulations]

**D3.1.1** All FI in Schools cars must be designed and engineered using CAD (Computer Aided Design) software and CAM (Computer Aided Manufacture) technology. CAD software used should provide for 3D part modelling, assembly and 3D realistic rendering. The CAM package should allow students to simulate CNC machining processes so they can show evidence of these in their portfolio. We recommend the use of Denford QuickCAM PRO software.

**D3.1.2** The body of all FI in Schools cars must be manufactured via material removal using a CNC router/milling machine. We recommend all teams use a Denford CNC router. This manufacturing process should occur at your school/college or at a designated manufacturing centre/partner site.

**D3.1.3** The race cars must have identically designed components.



### D3.2 Undefined features – [Critical regulation | Penalty – 6pts]

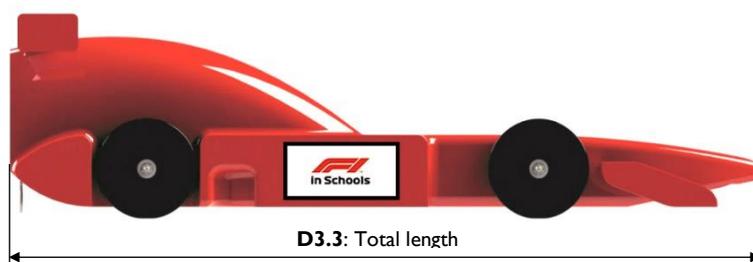
The car assembly must only consist of components listed in ARTICLE D1.1.



### D3.3 Overall length – [Critical regulation | Penalty – 6pts]

Overall length is measured between the front and rear extremities of the assembled car, parallel to the track surface and vertical reference plane. (See diagram below for example)

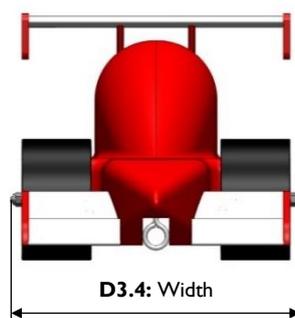
**Absolute Min: 170mm / Absolute Max: 210mm**



### D3.4 Width – [Critical regulations | Penalty – 6pts]

Width is the maximum assembled car width, measured normal to the vertical reference plane, between the outer edges of the widest feature of the car assembly. (See diagram below for example)

**Absolute Max: 90mm**



### D3.5 Total weight – [Critical regulation | Penalty – 6pts]

Total weight is the weight of the car excluding a CO<sub>2</sub> gas cartridge. If ruled underweight, ballast will be added before racing, at 2g for every 1g underweight.

**Absolute Min: 60.0g**

### D3.6 Additional Components - [Penalty – 6pts]

The car assembly must be designed so that no additional components other than CO<sub>2</sub> cartridges are removed, replaced or added to the assembly during scheduled race events. Only the CO<sub>2</sub> cartridge, as positioned by race officials, is permitted to make contact with the launch pods and/or cars prior to and/or during racing. Any car alignment tools must be approved by race officials prior to use. Please refer also to the UK Competition Regulations 2018/19.

# ARTICLE 4:

## Body



## ARTICLE D4 – BODY



### D4.1 Body construction – [Critical regulation | Penalty – 6pts]

**D4.1.1** A single continuous piece of CNC manufactured FI® Model Block material must exist rear of the front axle centre line, encompassing both the virtual cargo and CO<sub>2</sub> cartridge chamber.

**D4.1.2** An official FI in Schools holographic sticker from the official FI® Model Block for each car must be submitted on the project element submission sheet at registration at the Regional and National Finals events.

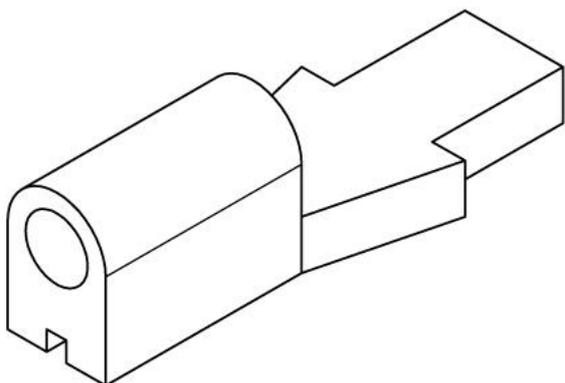


### D4.2 No-go-zone – [Critical regulation | Penalty – 6pts]

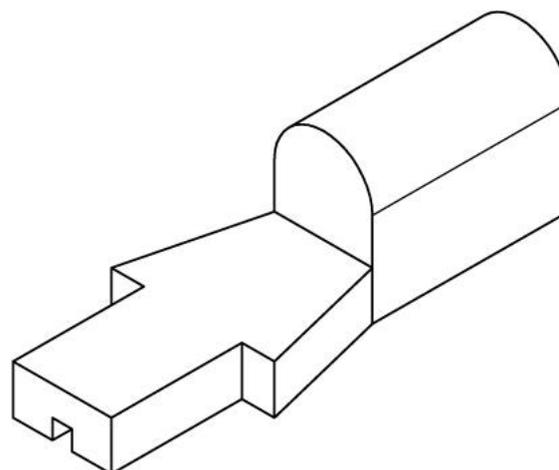
The no-go-zone is a specific area, defined by FI in Schools Ltd that must be preserved in your finished design. As such, no part of the body design is permitted to fall inside the no-go-zone. The only permitted modification to the no-go-zone is the placement of two (2) axle holes. **Please see Appendix iii** for no-go-zone diagram and download the official no-go-zone .ipt part from <http://www.fiinschools.co.uk/downloads-and-resources/>

No-go-zone isometric views:

Rear  
isometric

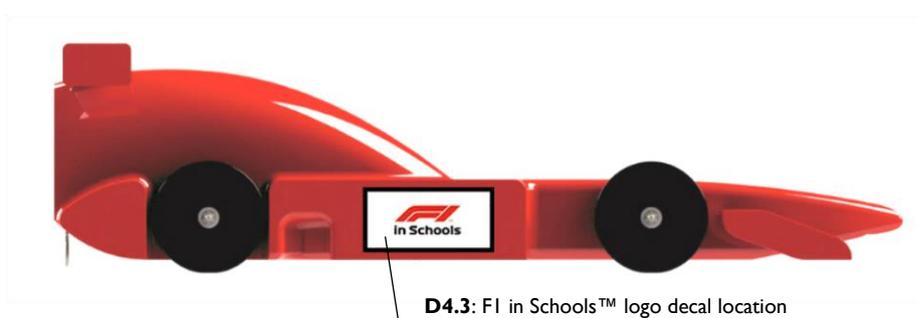


Front  
isometric



### D4.3 FI in Schools™ logo decal location – [Penalty – 6pts]

An FI in Schools logo decal (refer to ARTICLE D1.11) must be wholly adhered to each **side** of the car, positioned between the front and rear wheels and being clearly legible in the respective side view. Teams may manufacture their own decals but must use the artwork supplied by FI in Schools Ltd.



# ARTICLE 5:

## CO<sub>2</sub> cartridge chamber



## ARTICLE D5 - CO<sub>2</sub> CARTRIDGE CHAMBER

### D5.1 Distance from track surface – [Penalty – 2pts]

This is the lowest point of the chamber opening to the track surface, measured normal to the track surface.

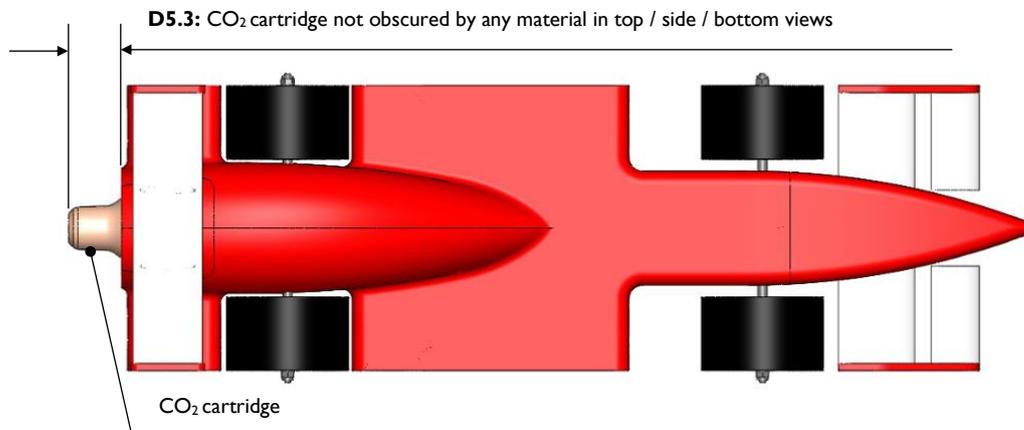
**Absolute Min: 20mm / Absolute Max: 30mm**

### D5.2 Finishing of chamber surrounds – [Penalty – 2pts]

The inside surface must be free of any paint, other surface finish or decals.

### D5.3 CO<sub>2</sub> cartridge chamber clearance – [Penalty – 6pts]

There must be no obstructions to the cartridge chamber from the rear view. The cartridge chamber must be free and clear of any objects that the judges could deem obstructive to fully inserting a CO<sub>2</sub> cartridge. **Take extra care to ensure that screw eyes (tether line guides) and axles DO NOT pass through the cartridge chamber.**



# ARTICLE 6:

## Wheels



## ARTICLE D6 – WHEELS



### D6.1 Number and location – [Critical regulation | Penalty – 6pts]

The car assembly must use the official FI in Schools Development Class wheels (Fusion OR new style), as supplied in the Development Class starter kit, available from [isupply3d.com](http://isupply3d.com). Please refer to appendices v and vi and download the 3D .ipt parts to use as part of your CAD assembly.

- Four standard (Fusion OR new style) supplied wheels, unmodified
- Two axles guides (straw material), length only can be modified
- Two continuous axles as supplied, length only can be modified
- The axle guide holes may be machined by a hand or a CNC process

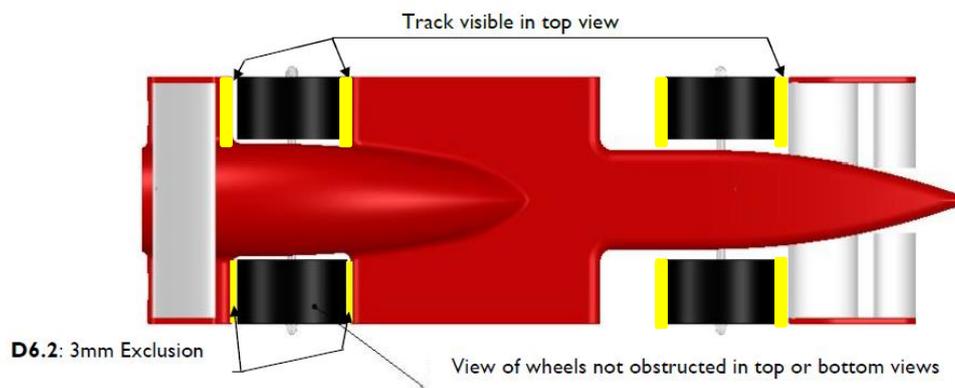
**Note:** 3D printed wheels are strictly NOT permitted. No other modifications to the wheels or axles systems are allowed, all parts must be those supplied in the official Development Class starter kit.



### D6.2 Visibility – [Critical regulation | Penalty – 6pts]

View of all wheels must not be obscured by any component of the car in the car's top, side and bottom elevation views. A 3mm exclusion zone must exist to the front and rear of all wheels in the plan and bottom views.

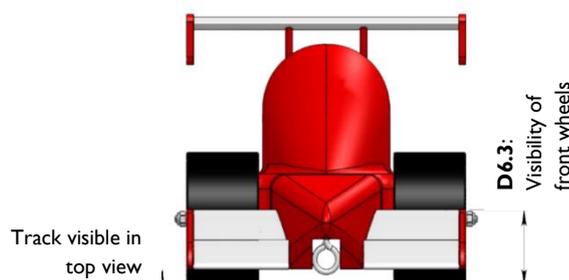
**Absolute Min: 3mm**



### D6.3 Visibility in front view – [Penalty – 6pts]

The visibility of the front wheels in the car's front view may only be obstructed to a height of 20mm from the track surface.

**Absolute Max obstruction: 20mm**



### D6.4 Race track contact – [Penalty – 2pts]

All four (4) wheels must touch the racing surface at the same time across the full width of the wheel.



### D6.5 Rotation – [Critical regulation – Penalty 6pts]

The track contact surface of all four (4) wheels must rotate freely about their own centre axis to facilitate forward motion of the car during racing. The scrutineering judge must be able to validate this with reasonably minimal effort.

# ARTICLE 7:

## Wings



## ARTICLE D7 – WINGS



### D7.1 Description and placement – [Critical regulation | Penalty – 6pts]

The design of the car should resemble an actual FI car through the inclusion of a wing on the nose of the car and a wing at the rear of the car. Each wing must have a leading edge and a trailing edge. Refer to the definitions in D1.10.

### D7.2 Wing identification – [Penalty – 3pts]

The span, chord and thicknesses of both the front and rear wings MUST be identified clearly within the engineering drawings submitted for scrutineering judging.

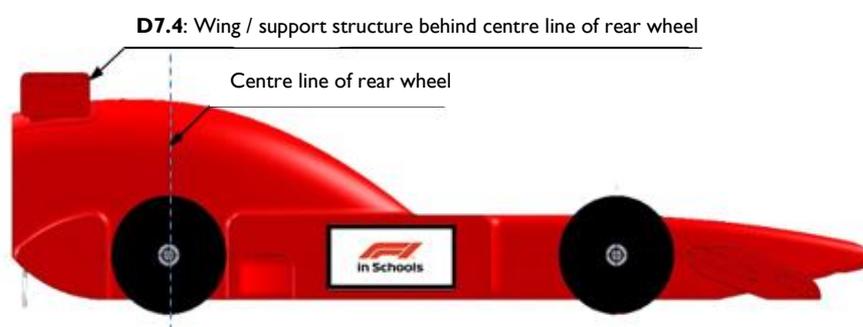
### D7.3 Construction and rigidity – [Penalty – 6pts]

The front wing, rear wing and any support structures may be manufactured directly from the model block, or from any separate materials, including laser cut and 3D printed materials. The wing shape must remain unchanged during races, i.e. wings must be rigid, ruled at the judge's discretion.



### D7.4 Rear wing location – [Critical regulation | Penalty – 6pts]

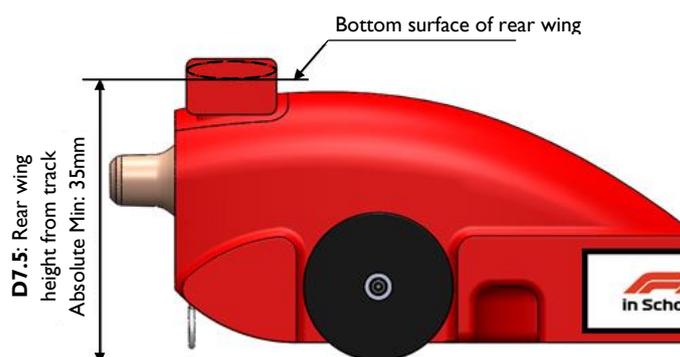
The whole of the rear wing and any support structure must be behind the centre line of the rear wheel when viewed in the side elevation.



### D7.5 Rear wing height – [Critical regulation | Penalty – 6pts]

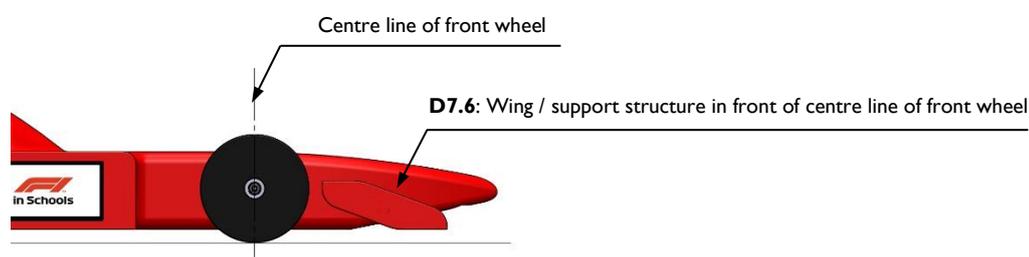
The bottom surface of the rear wing must be higher than 35mm when measured from and normal to the track surface.

**Absolute Min: 35mm**



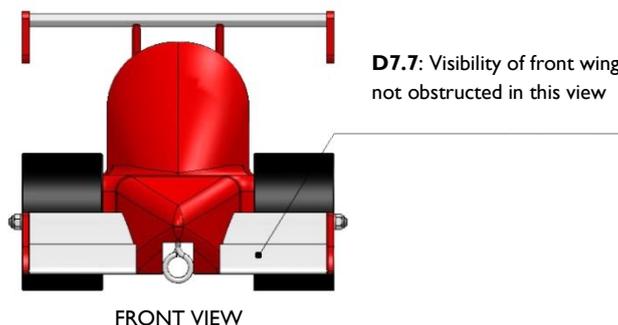
### D7.6 Front wing location – [Critical regulation | Penalty – 6pts]

The whole of the front wing and any support structure must be in front of the centre line of the front wheel when viewed in the side elevation.



### D7.7 Visibility of front wing – [Penalty – 3pts]

Visibility of the front wing must not be obstructed by any other component when viewed in the front elevation.



### D7.8 Front and rear wing span – [Penalty – 6pts each]

The wing span is measured on the top or bottom surface of the wing, whichever is shortest, parallel to the track surface and normal to the vertical reference plane.

**D7.8.1** Front wing span – **Absolute Min: 60mm**

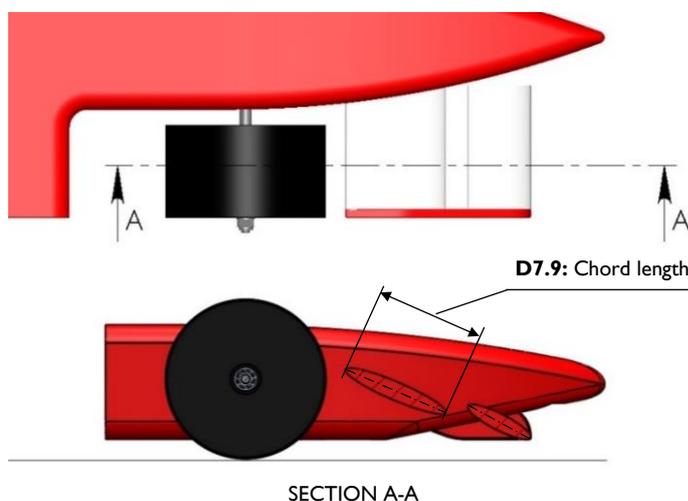
**D7.8.2** Rear wing span – **Absolute Min: 60mm**

### D7.9 Front and rear wing chord – [Penalty – 2pts each]

The wing chord minimum and maximum dimensions must exist throughout the wing span. Chord is measured parallel to the vertical reference plane.

**D7.9.1** Front wing chord – **Absolute Min: 15mm / Absolute Max: 30mm**

**D7.9.2** Rear wing chord – **Absolute Min: 15mm / Absolute Max: 30mm**

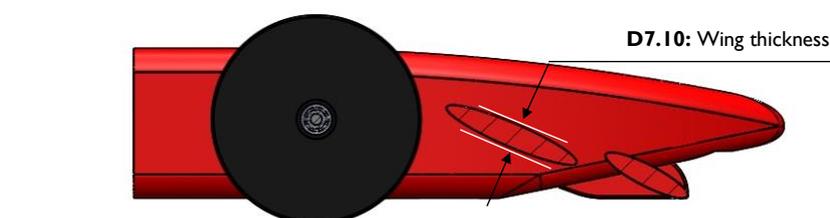


### D7.10 Front and rear wing thickness – [Penalty – 2pts each]

The wing thickness minimum dimension must exist throughout the wing's minimum span, measured perpendicular (at 90° to) to the chord line.

**D7.10.1** Front wing thickness – **Absolute Min: 5mm / Absolute Max: 15mm**

**D7.10.2** Rear wing thickness – **Absolute Min: 5mm / Absolute Max: 15mm**



# ARTICLE 8:

## Tether Line Guides



## ARTICLE D8 – TETHER LINE GUIDES



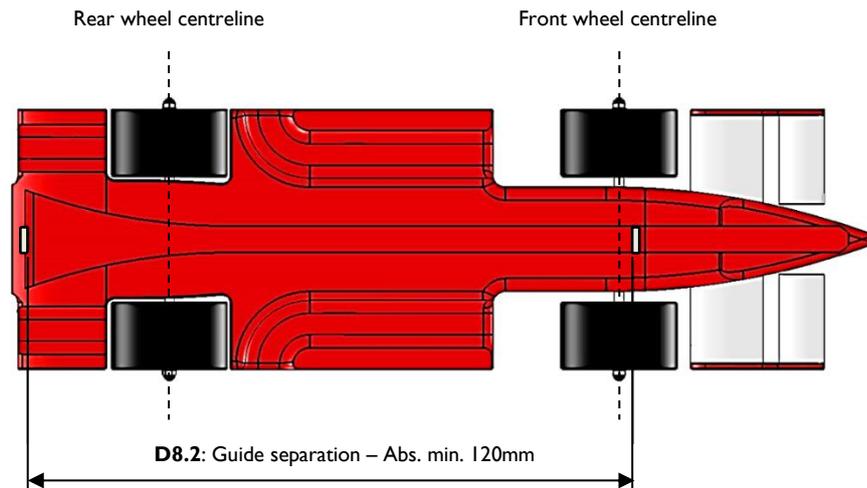
### D8.1 Location – [Critical regulation | Penalty – 6pts]

Each car must have two (2) firmly secured tether line guides, one on or in front of the front axle centreline and one on or behind the rear axle centreline of the car. The track tether line must pass through both tether line guides during racing.

### D8.2 Guide separation – [Penalty – 2pts]

The guide separation is the shortest distance between the inside edges of the guides, measured parallel to the track surface and vertical reference plane.

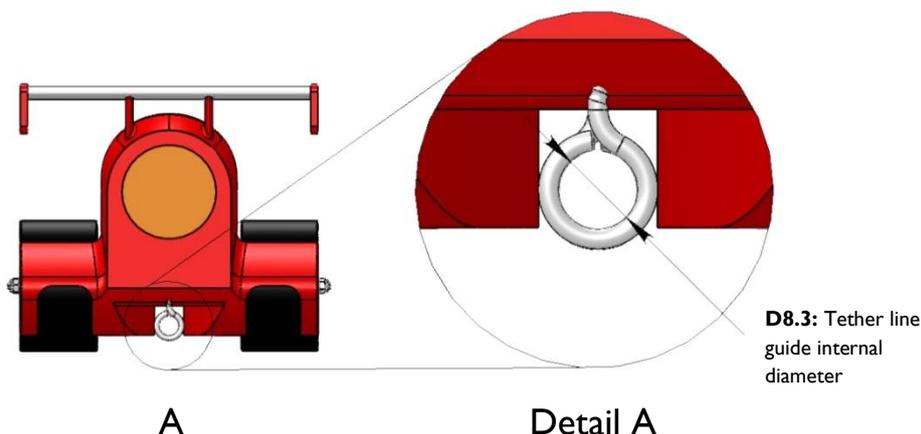
**Absolute Min: 120mm**



### D8.3 Internal diameter – [Penalty – 2pts]

The internal measurement of the opening within the guide which the tether line passes through.

**Absolute Min: 3.5mm / Absolute Max: 6mm**



# APPENDIX

<b>Appendix i:</b>	<b>Launch Pod/Finish Gate</b>	<b>26</b>
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## APPENDIX – OTHER INFORMATION / ILLUSTRATIONS

### Appendix i. Launch Pod and Finish Gate

The launch pods are designed to sit centrally within each lane of the track

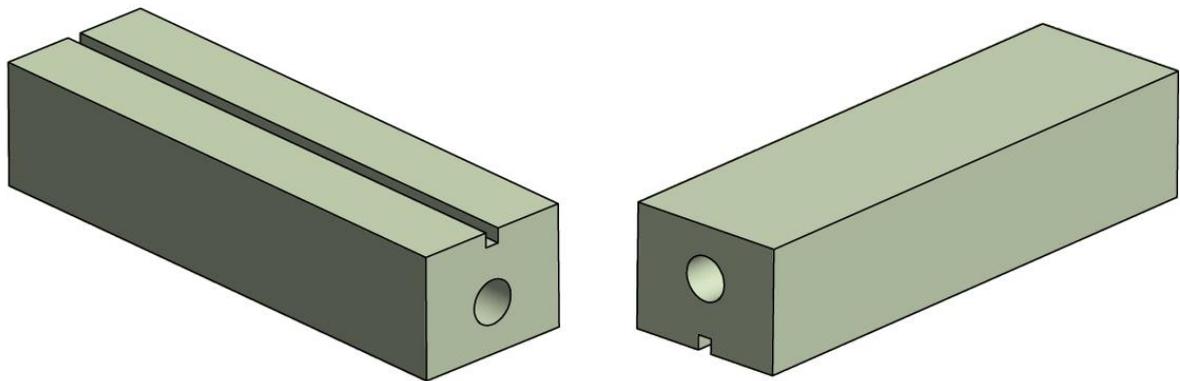
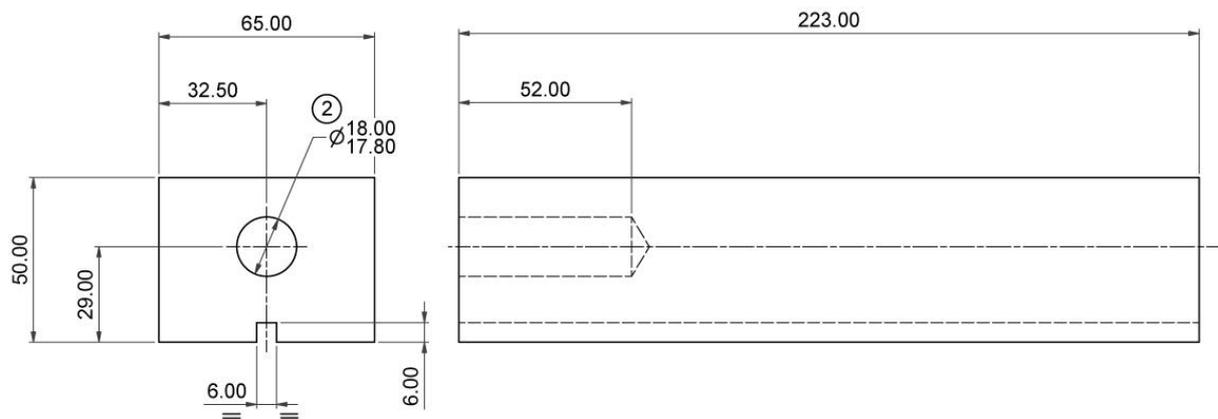
The distance from the emitter centre line to the race track surface on both lanes is ~7mm

### Appendix ii. Official FI® Model Block Dimensions

Below: orthographic projection of FI® Model Block. All dimensions shown in millimetres



This component is available to download FREE as a .ipt 3D part from the FI in Schools website. For this part and more, please visit <http://www.flinschools.co.uk/downloads-and-resources/>



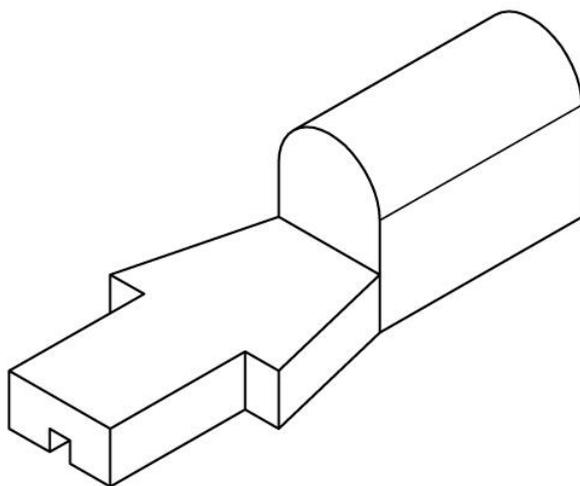
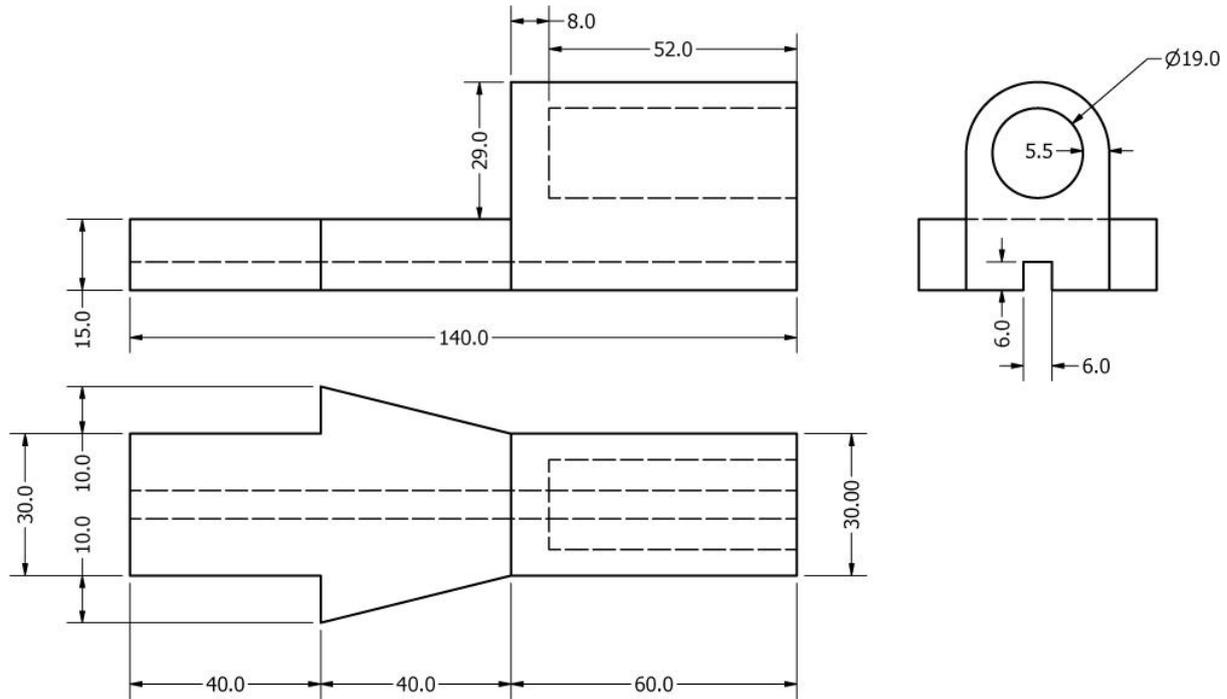
Tolerance on cartridge hole: 18.5mm ± 1mm

### Appendix iii. Development Class ‘no-go-zone’

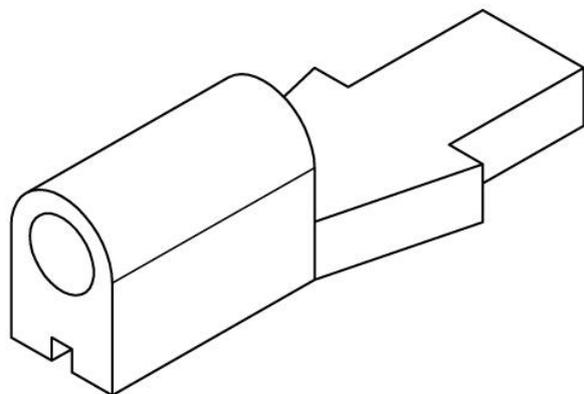


The Scrutineers will measure your car body to check the minimum dimensions of the no-go-zone are present, as one continuous piece of model block. We would strongly recommend starting your 3D CAD model using the official FI in Schools no-go-zone 3D part. This component is available to download FREE as a .ipt 3D part from the FI in Schools website. For this part and more, please visit <http://www.fiinschools.co.uk/downloads-and-resources/>

Orthographic projection



**Front view**



**Rear view**

## Appendix iv. Development Class standard wheel

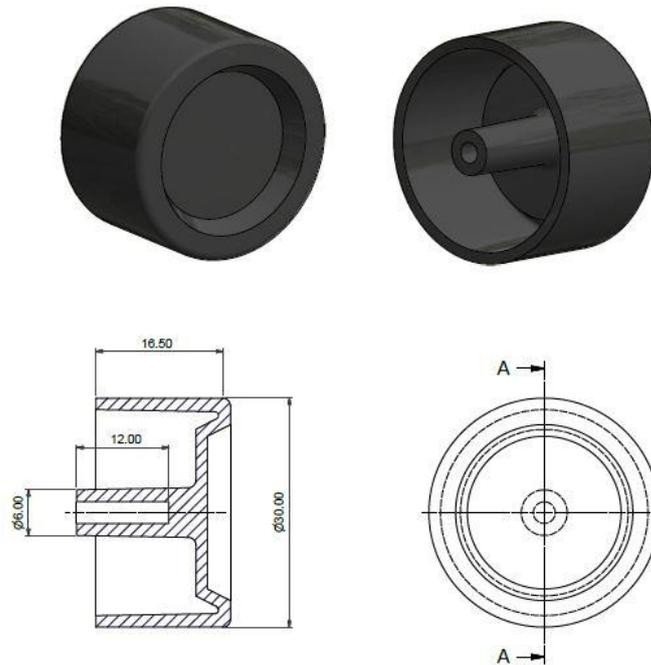


This component is available to download FREE as a .ipt 3D part from the FI in Schools website. For this part and more, please visit <http://www.fiinschools.co.uk/downloads-and-resources/>

**Please note:** Teams may use the new style wheel (as supplied) or the older 'Fusion' style wheels for the 2018 season. Please see below orthographic drawings for both the Fusion and new style wheels:

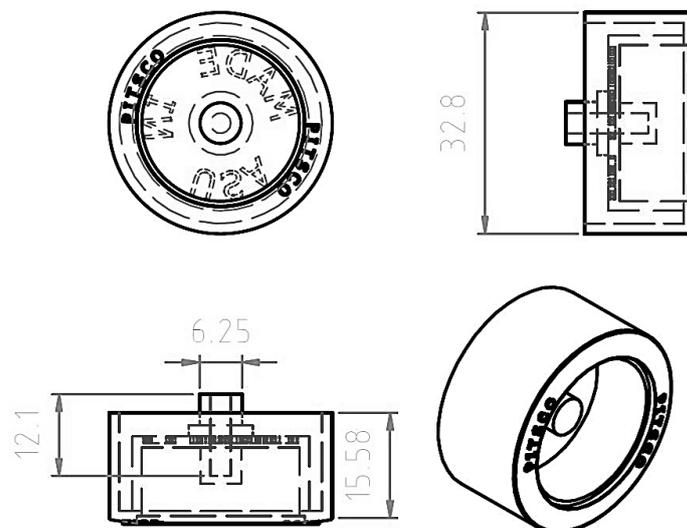
**New style wheel:**

**Individual wheel weight: 3.5-3.8g**



**Pitsco 'Fusion' wheel:**

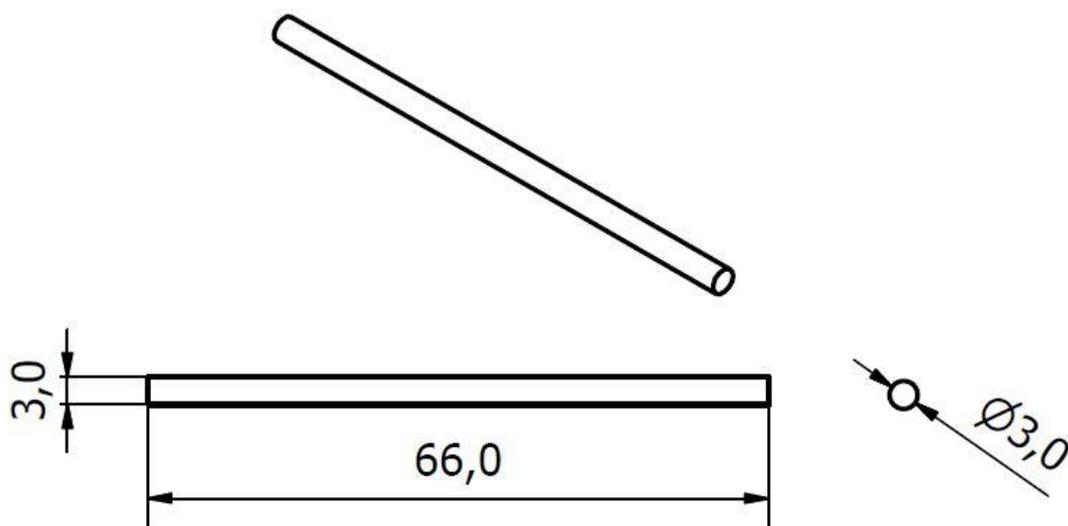
**Individual wheel weight: 5.5g**



## Appendix v. Development Class standard axle



This component is available to download FREE as a .ipt 3D part from the FI in Schools website. For this part and more, please visit <http://www.fiinschools.co.uk/downloads-and-resources/>



**Individual axle weight: 4g**

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**Important: please also read the FI in Schools™  
UK Competition Regulations 2018/2019.**

**Good luck, see  
you at the track!**

If you need any help at all, just get in touch with us:

**FI in Schools™ STEM Challenge**  
Engineering in Motion

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W: [www.flinschools.co.uk](http://www.flinschools.co.uk)

