

Slovakian Association of Modellers



Sports code

Big Rockets



Valid since 1 January 2019

PART ONE - GENERAL DEFINITIONS

1.1. MODEL ROCKET

A „Rocket model“ is a flying craft, which takes off without the use of aerodynamic buoyancy to overcome the gravity and which is powered by a modelling rocket engine that contains a safety return device which allows a subsequent flight; it is predominantly made of nonmetallic materials.

1.1.1 BASE PARTS OF ROCKET MODEL

Base parts of rocket model are:

Rocket head - Closes body of the model on top and serves to lower aerodynamic resistance of model.

Rocket body - For purposes of this sports code body of the model is defined as spatial geometric object with at least 2 parallel bases and cover. Bases regularly have circular shape with defined diameter by category. In case if base does not have a circular shape it has to have the same surface area as circular base for given category which has to be proven to jury at model verification process.

- Engine cone - Conical part at the bottom of the body of the model with narrowing from the maximum body diameter to diameter of the engine.

- Return device (recovery method) - method for safe return of rocket model to the ground.

- Stabilization system (fins) - for stable flight of the rocket model.

- Engine holder - holds rocket engine inside the rocket and transfers the pull of the engine to rocket body.

1.2. MODEL ROCKET ENGINE

1.2.1. The Rocket Model Engine is a reactive fuel engine, all the flammable chemical components in the fuel are mixed and prepared for use in advance.

1.2.2. HYBRID ROCKET ENGINE

Is an engine, one component of which (fuel – oxidant) is in a liquid and the other in a solid state, all the flammable chemical components in the fuel are mixed and prepared for use in advance.

1.3. MODEL CATEGORIZATION

R1 Single stage Elevation models

R2 Multistage Elevation models

R3 Scale modell

R4 Experimental flight models "Open"

PART TWO - ROCKET MODEL SPECIFICATIONS

A model rocket must meet the following requirements before launching, operating and flying:

2.1. WEIGHT

The total or maximal weight of a model rocket, including the engine or engines, must under any circumstances not exceed 20.000 grams (20kg).

2.2. ENGINE PERFORMANCE

The overall impulse of the functional rocket engines placed in the model and used to its traction must not exceed 2.540 Ns.

2.3. FUNCTION LEVELS

2.3.1. The model must not have more than three (3) function stages. A stage is defined as part of the model, including one or more rocket engines, which is constructed to disengage or in actuality detaches during the flight. The layout of the model is considered to be all that is part of the model in the moments of its first motion on the ramp.

2.4. CONSTRUCTION REQUIREMENTS

2.4.1. The model rocket must be constructed to endure more than one flight and it must contain a medium which decelerates its descent to the ground and thus prevents it from being essentially damaged or endangering subjects or property on the ground. Braking means stands for a recovery system. It is sufficient for instance if the returning component of the model is slowed down by a parachute.

2.4.2. The model rocket must not detach its engine (engines) during its flight unless it/they are not embedded in the body tube which returns to the ground according to the requirements in section 2.4.1. The engines must not be secured to the model by glue and must not be an integral part of the model's structure.

2.4.3. The structure of the model must be made of wood, paper, rubber, plastics or similar materials without vital metallic parts. Total length of model rocket is the sum of lengths of the rocket head, body, and engine cone in flight configuration, stabilisation system / fins are not counted into this sum. From the start until the safe landing of the rocket model can not be compromised and lose or separate and any parts. Unless it is required by category (R3, R4), and even in this cases all separated parts can not be dangerous to any people or property on the ground !

2.4.4. The model must have designed and made surfaces which provide stabilizing and returning aerodynamic forces, necessary to maintain a generally straight and assumed flight course. If safety committees or judges demand the entries of the model's CG position, lifting point of action, total weight, fuel burn-out moment, calculated or measured flight performances the modeller must submit them. It is required to have on every model marked location of CP and CG.

2.4.5. Rocket model can not contain any type of explosive or pyrotechnic payload. As explosive and pyrotechnic material is not considered rocket ejection mechanism load or material for effects in categories R3 and R4 in adequate quantity and do not endanger safety.

2.4.6. Minimal rocket sizes must not be less than:

Category R1/50	Min. body 50 mm or more	Min. length 1.000 mm or more
Category R1/100	Min.body 100mm or more out of at least 750 mm of the model body	Min. length 1.500 mm or more
Category R2	Min.length 1.750 mm or more	
Category R2 First stage	Min. body diameter 200 mm or more out of at least 500 mm of total model body length	
Category R2 Second stage	Min. body diameter 100 mm or more out of at least 750 mm of total model body length	
Category R2 Tripple stage version	Min. body diameter 100 mm or more	
Category R3	76 mm	Min. length 1.000 mm or more
Category R4	76 mm	Min. length 1.000 mm or more

PART THREE – GENERAL CONTEST RULES

3.1. MODEL COUNT

The acceptable signed up model count is the following:

- Category R1..... three (3)
- Category R2..... three (3)
- Category R3..... two various scale models (2)
- Category R4..... three (3)

3.2. LAUNCH

3.2.1. ORGANIZATION

During every activity related to model rocket launches and flights all the competence and responsibility for the safety and course of actions on the flying site is entrusted to a safety committee who must be older than 18 years. The safety committee may delegate his or her competences to a representative, who meets the above stated requirements but this mandate or temporary delegation of competences does in no way relieve him or her of any responsibilities for the operations taking place on the flying site. Proportionally to the resources and equipment all the contestants in every category will be allowed to acquire engines and prepare their models under the supervision of functionaries.

3.2.2. FLIGHT APPROVEMENT

The flight of every operating model rocket on the flying site must be allowed or rejected explicitly by a safety committee or his rightfully commissioned substitute based on a measured safety judgement of the model in flight.

3.2.3. DISCHARGING DEVICE

A discharging device or mechanism must be used, which prevents the model from moving horizontally until reaching a sufficient flight speed for an adequately safe and predictable flight. The degree of the release must be larger than 60° into the horizon. When the safety committee or his or her authorised substitute concludes the model may be safely and satisfactorily ignited and launched, the contestant unlocks the launchers. The launcher must be at least 25m away from the discharging device (ramp). Every person in the vicinity of the launch must be warned about the upcoming launch before the model rocket's ignition and launch. Before the ignition and launch of the model rocket there must be at least a five (5) second countdown.

3.2.4. WEATHER CONDITIONS

The contest should be cancelled if the wind blows faster than 9 m/s for at least one minute measured 2 meters above the ground or if bad visibility makes correct model monitoring impossible or if atmospheric conditions render the contest dangerous. About interruption/halt of competition can decide only main juror or safety commissioner.

3.2.5. In case a contest category is cancelled, it must be finished as soon as the conditions allow it, all the contestants and team leaders must be accordingly informed.

3.2.6. DANGER

The model rocket must not endanger any aircraft and it must not be used as a weapon against ground or aerial target.

3.3. CONTEST APPROACH

3.3.1. REGISTRATION

Before the first contest flight in any of the competing disciplines at least one of the models must be reviewed and marked by a judge. The following model may be reviewed during the contest.

3.3.2. MODEL MARKING AND IDENTIFICATION

Every registered model must have the contestant's starting number on a visible place of the body, stabilizer or other part of the outer surface.

3.4. VALID FLIGHTS

3.4.1. DEFINITION OF A VALID FLIGHT

A flight is valid after engine ignition, except the case of crashing according to paragraph 3.5.3., in that case the flight is considered invalid.

3.4.2. FLIGHT COUNT

Every contestant in every discipline is granted the opportunity to perform three (3) official flights, if the weather conditions and time allow it.

3.5. DISQUALIFICATION

3.5.1. Judges may at any time disqualify any model which in their opinion does not correspond with the rules of the competition or which is deemed accordingly safe to operate by the safety committee or his or her authorised substitute.

3.5.2. Judges may disqualify any of the contestants if they do not apply and preserve adequate safety principles, written or other, for unsportsmanlike conduct, for disrespecting the orders of a safety committee or his or her authorised substitute or for generally inadequate behaviour.

3.5.3. A crashed model which, according to the decision of judges, was not directly caused by a faulty design, structure or pre-flight model preparation will not be disqualified. A crashed model which is incapable of a consecutive flight may be replaced by another model.

3.5.4. The flight characteristics of a model may be a reason of disqualification for one flight, but it is not a reason for complete disqualification.

3.6. ALTITUDE DATA

3.6.1. Altitude measurement is ensured by an electric measurement device.

3.6.2. The organizer of the contest may demand a specific altimeter (e.g. Estes), in altitude categories the model must be adjusted to the placement of the altimeter according to the requirements of the manufacturer.

PART FOUR – ALTITUDE CONTEST CATEGORY R1/50

4.1. DEFINITION

In the altitude contest the reached altitude of a valid flight is measured, the model rocket is powered by a single **ROS-40 Ns** engine. The sum of the contestant's two best flights are ranking result.

4.2. ALTITUDE DATA

This contest uses section 3.6. Altitude data.

4.3. FLIGHT COUNT

Every competing model must perform a steady, roughly vertical flight or a flight according to beforehand listed data. The contestant has three (3) flights, provided the time and weather allow it.

ALTITUDE CONTEST CATEGORY R1/100

4.4. DEFINITION

In the altitude contest the reached altitude of a valid flight is measured, the model rocket is powered by a single **ROS-40 Ns** engine. The sum of the contestant's two best flights are ranking result.

4.5. ALTITUDE DATA

This contest uses section 3.6. Altitude data.

4.6. FLIGHT COUNT

Every competing model must perform a steady, roughly vertical flight or a flight according to beforehand listed data. The contestant has three (3) flights, provided the time and weather allow it.

PART FIVE - ALTITUDE CONTEST CATEGORY R2

5.1. DEFINITION

This discipline is available only to multistage models (min. twostage version). The model rocket is powered by several engines with a total impulse of **200 Ns** maximum. The winning model of the altitude contest will be the one reaching the highest measured altitude. The sum of the contestant's two best flights are ranking result. Rocket model can be powered only by maximum of 5 ROS-40 Ms engines. Distribution of engines to each stage of the rocket can be whatever.

5.2. ALTITUDE DATA

This contest uses section 3.6. Altitude data.

5.3. FLIGHT COUNT

Every competing model must perform a steady, roughly vertical flight or a flight according to beforehand listed data. The contestant has three (3) flights, provided the time and weather allow it.

PART SIX – MAQUETTE CONTEST CATEGORY R3

6.1. DEFINITION

The maquette contest is an individual flying model rocket discipline, that are authentic models of existing or historically directed missiles, rocket or cosmic vehicles. The ranking is the sum of scale qualities and flight, of two various types of scale models the contestant's better scored model is considered.

6.2. MULTISTAGE MODEL

If the competing model is a multistage rocket maquette, it can be constructed so that one or more of its upper stages are not functional. The upper stage of a multifunctional rocket cannot be signed up to compete and launched without its functional lower stages if the judges are not provided with corresponding data which approves the structure of the upper stages was designed to fly individually or that it flew separately as an independent rocket. For instance all Aerobee rockets must have functional launching engines (boosters).

6.3. PROTOTYPE SELECTION

The contestant must build a prototype of a specific model of a single serial number, unless the prototype was made in mass production so there is no existing individual rocket which could be selected to be scale processed. Even so, the contestant must do everything in the extent of possible to build a single, specific prototype.

6.4. TEMPLATE SEMBLANCE VERIFICATION

The contestant must provide supporting evidence of the authenticity of his or her model about parameters, shapes, colours and a color scheme. The minimal acceptable data consists of the length and diameter of the prototype and one photograph. Further data is naturally required. The parameter entry must be confirmed by a credible source such as magazines, books, technical documents or factory parameter charts, etc. Photographs from any sources are acceptable. All the data must refer to a specific rocket which is the prototype to the signed up model.

6.5. BUILDING KIT

Flight maquette building kits may be used during maquette construction and are allowed only if they are supplemented by documents other than those coming with the kit or ones provided by the manufacturer of the kit. The contestant is obliged to verify the scale quality of the building kit, is obliged to provide satisfying evidence of the authenticity of his or her building kit.

6.6. STABILIZERS

Rocket maquettes, missiles or cosmic vehicles, which are not aerodynamically stabilized by stabilizers may be equipped by transparent plastic elements in order to keep the model stabilized during its flight at the minimal loss of scale qualities.

6.7. MODEL STATUS DURING EVALUATION

Scale processing will be evaluated on models ready for flight without model rocket engines. Every transparent stabilizer, leash and other flight component must be attached to the model during evaluation.

6.8. PROCESS OF EVALUATION AND THE EVALUATION COMMISSION

Model evaluation is realized by three (3) judges from the distance of 1 metre. It consists of two phases (static and flight) prior to criteria listed below and its result is the model's point evaluation, registered in a score chart. The evaluation is executed individually by every judge and according to the point system of the supporting documentation provided by the

contestant. Judges measure the model under the supervision of the contestant. During the evaluation, the contestant rotates the model by 90° in accordance with the instructions of the judges and answers their questions.

6.9. MODEL ADMISSION

The organizer marks spots where the contestant places the competing model and its supporting documentation. Further manipulation of the model is conducted only by the contestant under the supervision of a qualified judge.

6.10. FLIGHT COUNT

Every competing model must perform a steady, roughly vertical flight or a flight according to beforehand listed data. The contestant has three (3) flights, provided the time and weather allow it..

6.11. SCALE QUALITY SCORING

Points for quality scaling will be awarded to every signed up model according to the following system:

6.11.1. Technical documents maximum 10 points.

Because the maquette is a replica of an existing rocket, the technical documents must confirm this fact. The mechanical drawing, pictures, sketches and photographs must show every detail on the model.

The contestant who provides the following technical data may gain 10 points:

- an authentic, authorized three-dimensional mechanical drawing of the model template with at least five parameters, as well as data that defines colours and symbols of the model from these viewpoints;
- at least one color photograph of the whole model template with clearly visible details of coloring and symbols;
- at least three photographs of details and compositions;

6.11.2. Template match – scale quality: maximum 15 points.

For the model to be considered a maquette, the parameters of its body, total length must not differ from the parameters of the model template in the selected scale more than 10% otherwise the model is disqualified. In this section of evaluation the diameter of the body, length of the body and total length are taken into account – maximum 15 points.

6.11.3. Craftsmanship quality: maximum 25 points.

Points are granted for precision, careful treatment and quality of the surface layout. For quality craftsmanship which on the other hand diminishes the model's credibility – for example a high-gloss surface instead of a required matt or rough surface, points will be taken away.

6.11.4. Degree of difficulty: maximum 10 points.

The degree of model construction difficulty is evaluated. The model's symmetry, amount of external components, complexity of the color scheme, degree of detailed elaborateness and degree of difficulty, modification to flight are all evaluated factors.

6.11.5. Flight characteristics: maximum 40 points.

Evaluates launch, flight stability, functions of subsequent stages (if there are any) and recovery. The contestants must specify which functions their models perform during their flight (for example the separation of stages, radio course of the flight course, payload ejection, etc.)

6.11.6. If the model performs at least one valid flight, the awarded points during both static and flight evaluation will be summed up. The flight evaluation points are applied only once (higher score).

6.11.7. If the model was disqualified in three valid flights, only static evaluation points will be used in the final ranking of the contestant.

PART SEVEN – EXPERIMENTAL FLIGHT MODELS “OPEN“ ROCKET CONTEST - CATEGORY R4

7.1 DEFINITION

The “OPEN“ rocket contest models are models of non-existent rockets in reality, meaning models of one's own design (e.g. experimental, futuristic, sci-fi, ...). The aim of this contest is to reach the highest possible score. The contest will be won by the contestant, whose model gets the highest score. The ranking is created by the sum of points for design, technological advancement of the model and its flight, out of three models the one with the highest score will be taken into consideration.

7.2. SCORING IN THE „OPEN“ ROCKET CONTEST

7.2.1. Flight characteristics: maximum 30 points.

The launch, flight stability, performed script and recovery are evaluated. Contestants must present the script of the flight in advance (for example the separation of stages, radio course of the flight course, payload ejection, etc.) on the registration card.

7.2.2. Model desing: maximum 10 points

Evaluates the overall design of the model rocket (for example the processing, shape of the model, color scheme, etc.).

7.2.3. Technological advancement: maximum 60 points

The technological advancement and difficulty of the model is evaluated (for example the amount of engines, type of rocket fuel, recovery system, use of electronics, payload, splitting of the rocket, booster separation, etc.)

7.3. PROCESS OF EVALUATION AND THE EVALUATION COMMISSION

Before the flight the contestant must provide the model's supporting documentation (construction drawing, not necessarily in scale) which depicts its construction and main parameters. Both CP and CG must be marked in the documentation and on the model.

The registration card must contain a short script of the flight.

The evaluation is executed by three (3) independent judges, who register the result to a score chart.

7.4. MODEL ADMISSION

The organizer marks spots where the contestant places the competing model and its supporting documentation. Further manipulation of the model is conducted only by the contestant under the supervision of a qualified judge.

7.5. FLIGHT COUNT

Every competing model must perform a steady, roughly vertical flight or a flight according to beforehand submitted script. The contestant has three (3) flights, provided the time and weather allow it.

7.5.1. If the model was disqualified in three valid flights, only points for design, technical advancement will be used in the final ranking of the contestant.

ANNEX.1

CONTEST CARD

Contest Number		Competitor Name		
Class R1/50		Country		
Take overed model				
1 st Mark	2 st Mark		3 nd Mark	
Round	1	2	3	
Attained altitude				
Judge signature				

CONTEST CARD

Contest Number		Competitor Name		
Class R1/100		Country		
Take overed model				
1 st Mark	2 st Mark		3 nd Mark	
Round	1	2	3	
Attained altitude				
Judge signature				

CONTEST CARD

Contest Number	Competitor Name		
Class R2	Country		
Take overed model			
1 st Mark	2 st Mark		3 nd Mark
Round	1	2	3
Attained altitude			
the number of stages			
Judge signature			

ANNEX .2

REGISTRATION CARD

Class	R3	Contest number	
Competitor name			
Country			
Prototype name			
Prototype serial No		Scale	1:
Operating stages		Number of engines	
	Signature		

Total results

Static points	
Flight characteristic	
Total	

Disqualifications

- 6.1. The prototype is not a missile, rocket or space vehicle
- 6.2. Entry has no lower stage (multi stage vehicles only)
- 6.4 No length and or diameter data supplied for prototype
- 6.7. Entry not submitted in flight configuration

Scale Judge No.1

Scale Judge No.2

Scale Judge No.3

Scale adherence

$\% \text{Deviation} = \frac{\text{Difference} \times 100}{\text{Scale dimension}} = \frac{(B-C) \times 100}{B}$ One dimension = maximum of 5 points	1% Deviation	5 points
	1 – 1,99%	4 points
	2 – 3,99%	3 points
	4 – 5,99%	2 points
	6 – 9,99%	1 point
	10% and more	minus 15 points

Scale adherence	Prototype dimension		Scale dimension	Measured dimension	Difference	Deviation %	Points
	A						
	inches	mm	B	C	B - C		
Body diameter							
Body length							
Overall length							
Total points					Max. 15		

Technical data

Sub – category		Points	Judges		
			1	2	3
PROTOTYPE DRAWING	Authentic, authorised drawings	0 – 1			
	Data which define colour and markings on it	0 – 1			
PROTOTYPE PHOTOGRAPHS	At least one colour photograph of the prototype with clearly visible details	0 – 1			
	At least three photographs of details and assemblies 3 fotografie 1 bod 3 photographs 1 point 6 fotografii 2 body 6 photographs 2 points 9 fotografii 4 body 9 photographs 4 points 12 fotografii 5 bodov 12 photographs 5 points Viac ako 12 fotografii 7 bodov 12 and more 7 points	0 – 7			
Total points		max 10			

Degree of difficulty

Sub – category		Points	Judges		
			1	2	3
DEGREE OF DIFFICULTY	Configuration	0 – 5			
	External components	0 – 3			
	Flyability	0 – 2			
Total points		max. 10			

Workmanship

Sub – category		Points	Judges		
			1	2	3
CONSTRUCTION	Nose cone and transitions	0 – 5			
	Body segmentation model (trunk diameters, taper, transitions)	0 – 5			
	Detaily - Details jednoduché detaily 1 bod zložitě detaily 3 body velký počet detailov 10 bodov Simple details 1 point Intricate detils 3 points A large number of details 10 points	0 – 10			
FINISH	Nose cone & transitions	0 – 2			
	Body	0 – 3			
Total points		max 25			

Flight characteristics

Sub – category		Points	Fly	Judges		
				1	2	3
LAUNCH	Each misfire or hang-fire Zapálenie jedného motora One ignition engines 1 bod 1 point	0-5	1			
			2			
			3			
	Realism of launch Efekt pri štarte Effect at the start 1 bod 1 point	0-5	1			
			2			
			3			
FLYIGHT	Flight Približne kolmý, priamy a pravidelný let Approximately normal, direct and regular flight	0-5	1			
			2			
			3			
	Special effects Made for each effect 1 point	0-10	1			
			2			
			3			
	Staging Second stage Third stage 2 points 5 points	0-5	1			
			2			
			3			
ENGINES	Clusters One engine 1 point	0-5	1			
			2			
			3			
RECOVERY	Recovery device deployment One recovery device Autorotation, streamer 1 point 0 point	0-5	1			
			2			
			3			
Total points		max 40				
Remarks (crash of engine, disqualification reasons)						

ANNEX 3

REGISTRATION CARD

Class R4	Contest number		
Competitor name			
Country			
Model name		Number of engines	

Degree of difficulty

Evaluates the overall design of the model rocket (for example the processing, shape of the model, color scheme, external componets, etc.).	Judges		
	1	2	3
Total points	max. 10		

Flight characteristics

The launch, flight stability, performed script and recovery are evaluated. Contestants must present the script of the flight in advance (for example the separation of stages, radio course of the flight course, payload ejection, etc.) on the registration card.	Fly	Judges		
		1	2	3
	1			
	2			
	3			
Total points	max. 30			

Technical sophistication

The technological advancement and difficulty of the model is evaluated (for example the amount of engines, type of rocket fuel, recovery system, use of electronics, payload, splitting of the rocket, booster separation, etc.)	Fly	Judges		
		1	2	3
	1			
	2			
	3			
Total points	max. 60			