robotex International

ROBOMIKU LEGO SUMO AND 3KG LEGO SUMO RULES

COMPETITION COORDINATOR

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Contents

1 Introduction

This document defines the rules for the robots of LEGO Sumo and 3 kg LEGO Sumo. The rules are based on the Baltic Robot Sumo Rules.

2 Robot classes

Only autonomous robots are represented at the LEGO Sumo competition of Robotex in the following classes:

1. LEGO Sumo.
2. 3 kg LEGO Sumo

3 The Competition

3.1 Definition

One operator and up to four assistants may be registered for each robot (maximum of 5 team members in total). However, only the operator is allowed to handle the robot. *

**The team may change the designated operator in accordance with the competition rules.*

All contestants must follow the competition rules, the terms and conditions of winning and participate using only self-made autonomous robots at the Dohyo area designated beforehand. The winner is announced by the referees.

3.2 Format

The competition format is established by the tournament organisers, depending on the number of participants. If the number of participants is high, sub-groups will be used in order to decide who enters the final tournament. The finals are held in the format of *double-elimination* tournament. If the number of participants is low, all contestants will immediately compete in the format of final tournament.

3.3 Sub-classes

- Robotex LEGO Sumo competition takes place in two age groups:
    - **U19** - At the competition day up to 18 y.o. (including 18 y.o.) .
    - **U14** - At the competition day up to 13 y.o. (including 13 y.o.) .
- 3kg LEGO sumo has only one category and it is open to everyone.
- The age group of a team is determined based on the age of the **oldest team member**.
- You must register your team to a correct age category. If during the competition it turns out, that the team is registered to an incorrect age category, the robot of this team will be disqualified from the competition. **NB!** Teams who belong to the younger age group are allowed to compete in the older age group.
- The organizers reserve the right to check the age of the competitors during the competition. In case of violation the robot of the team, who violated the rules will be disqualified.

3.4 Technical Inspection and registration

The robot needs to pass technical inspection before the competition. The robot technical inspection is based on paragraphs “5.” and “7.”. During the inspection, it is checked whether the robot or the operator who is handling the robot meets the paragraphs requirements. **Only one team member with a robot** *(the currently selected robot operator)* **can come to the technical inspection. If necessary, they can have a translator or team instructor with them.** The purpose of this is to guarantee a smooth course of the competition and technical inspection.

4 Dohyo Jyonai

Dohyo Jyonai (the match ring area) consists of the Dohyo (the match circle) and the Yochi (the outer layer area of Dohyo). The rest of the space will be deemed as area Dohyo Jyogai (outside the Dohyo area). The Dohyo (the match circle) is a circle that is covered with a black color coating.

Table 1 Parameters of the Sumo fields

Class	Height	Diameter	Court material
LEGO Sumo	1 - 5 cm	77 cm	wood/plastic/steel
3 kg LEGO Sumo	5 cm	154 cm	steel/wood/plastic

4.1 Starting cross

The starting cross is placed in the middle of the Sumo field and it divides the field into four equal sectors. The robots must always be located in two reciprocal sectors (see Figure 1). The robot must cover the area of Tawara (white line) at least partially. The referee removes the starting cross from the field once the robots have been placed.

The robot cannot be moved after it has been placed on the field.

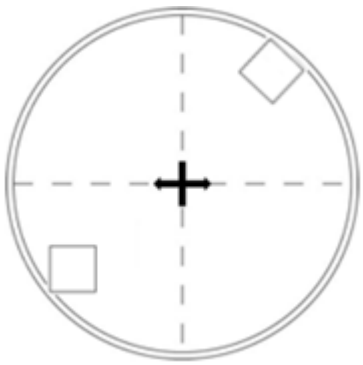

Figure 1 Starting cross

4.2 Tawara (white line).

Tawara is the white line around the Dohyo. Tawara line is a part of the Dohyo.

Table 2 Dimensions of Tawara by competition classes

Class	Width of Tawara
LEGO Sumo	2.5 cm
3 kg LEGO Sumo	5.0 cm

4.3 Yochi

Yochi is an area around the Dohyo with a diameter of at least 100 cm for LEGO and at least 250 cm for 3 kg LEGO competitions. Yochi colour and material can be freely chosen from all colours besides white.

4.4 Lighting conditions

The lighting in the area needs to be as close to real sunlight as possible *(Midday)*, with consistent color and stability. The Dohyo cannot have shadows while the round is running. Lighting is allowed to change between matches, but it needs to be consistent for every round. Each Dohyo at the competition area must be evenly lit.

5 The Robot

5.1 Requirements for the robot

5.1.1 Dimension and weight restrictions

Table 3 Dimension and weight restrictions

Class	Mass	Length*	Width *	Height
LEGO Sumo	1.0 kg	15 cm	15 cm	20 cm
3 kg LEGO Sumo	2.0 – 3.0 kg	20 cm	20 cm	30 cm

* The robot's length and width may expand by a maximum of 10 cm from the required dimensions after the start of the round, but it must remain intact.

* NB! LEGO Sumo robot measure box is 15 x 15 cm with +2 mm tolerance. The measure box for 3 kg LEGO Sumo robots is 20 x 20 cm with +2 mm tolerance.

5.1.2 Autonomous robots – starting the movements

Table 4 Starting the movements

Class	Starting method
LEGO Sumo	5-second timer. The timer can be activated by the operator of the robot by pressing a button or via remote control system.
3 kg LEGO Sumo	

5.1.3 Autonomous robots – stopping the movements

Table 5 Stopping the movements

Class	Stopping method
LEGO Sumo	The operator of the robot stops the robot by pressing a button or via remote control system.
3 kg LEGO Sumo	

5.2 Movements of autonomous robots

The movements of the robot should be designed to detect the movements of the opponent and respond/attack accordingly. If there is any doubt in the autonomy of the robot, the referees have the right to inspect the control logic of the robot.

5.3 Use of remote-control devices with autonomous robots

During the competition (round), the remote-control devices must be placed on a previously designated area. The devices may only be used to stop the robot when the referee gives a corresponding command.

5.4 Prohibited components of the robot

1. Any components that may disturb the operation of the opponent.
   1.1. For example, flashlights or jamming devices such as IR LEDs intended to saturate the opponents IR sensors.
   1.2. For example, plows that can confuse color or light sensors that are designed to detect the Dohyo border. *[Colors that are not allowed for plow parts: ID 1 (Lego White), ID 49 (Lego Very Light Gray), ID 99 (Lego Very Light Bluish Gray) - https://www.bricklink.com/catalogColors.asp]*
2. Any components that may damage or scratch the surface of Dohyo. An exception is when the robots collide.
3. Any components that are designed to damage the opponent.
4. It is forbidden to use any liquids, powders and gas as a weapon against the opponent.
5. It is not allowed to use any inflammable materials in the robot.
6. The robot must not include any throwing devices (for example throwing a net on opponent).
7. The robot must not include ropes of any kind.
8. The robot must not include self-glued parts.
9. The robot must not include any parts, which fix it onto the Dohyo (for example, glues, suction cups, etc.).
10. All components listed in ***Paragraph 17.*** are prohibited in the robot.

If there is any doubt about the components used on the robot, the referees have the right to inspect the robot and components or have the robot undergo a new technical inspection. *(Paragraph 3.4)*

5.5 Additional requirements for LEGO Sumo and 3 kg LEGO Sumo classes

1. The robot must be constructed exclusively of the licensed parts of LEGO® original or HiTechnic®. There is an exception for wires used in the robot, wires must be the licenced parts of LEGO® original, HiTechnic® or Mindsensors.
2. The parts used must be in their original condition and must not be modified.
3. The robot must only use batteries or cells that are recommended by LEGO®.

6 Match principles

1. The match generally contains three rounds and lasts up to three minutes. The team who will be first to earn two Yuko points (effective points) during the time of the match, will be the winner. Match time is measured during rounds, not between them.
2. If only one Yuko point has been earned by the end of the match time, the winner is the team who earned it.
3. If neither team wins any rounds during the match time, the winner will be announced according to the situation of Yusei (dominance), see paragraph 8.3. If Yusei cannot be decided or the number of rounds that has been won is the same for both teams, the match time will be extended by three minutes. If one team earns one or more Yuko points during the extended time, then this team will be the winner.
4. The contestants have a maximum of 30 seconds between the rounds to maintain their robot.

7 Organizing the competition

7.1 Safety requirements

For safety purposes, the referees and contestant must wear gloves and goggles according to the robot class.

Table 6 Safety requirements

Class	Gloves	Goggles
LEGO Sumo	not required	not required
3 kg LEGO Sumo	not required	not required

7.2 Starting the match

The match starts with the referee's signal. The contestants will bow to each other before they enter the area of Dohyo Jyonai.

Before each round and with the signal from the referee, the contestants place their robots simultaneously on the Dohyo. The robots must be placed in reciprocal sectors and at least some part of the robot must stay on the white line *(see Figure 1 Starting cross).* The robots are not allowed to move after they have been placed on the Dohyo.
The round begins with a method that has been described for each robot class.

Table 7 Start method

Class	Starting method
LEGO Sumo	After the signal of the referee, the operators start the 5-second timer in the robot and immediately leave the area of Dohyo Jyonai. The robots may start moving in 5 seconds after they have received the start command.
3 kg LEGO Sumo	

In case the Dohyo area is scratched or becomes dirty, the referees decide whether to continue the match on the same Dohyo or replace it.

7.3 Ending the match

The referee gives a signal to end the match and stop the robots. The stopping method is separately designated for each class.

Table 8 Stopping method

Class	Stopping method
iRobot Sumo	The robot is stopped by the operators of the robot.
LEGO Sumo	
3 kg LEGO Sumo	

The match ends officially after a corresponding signal from the referee. The participants must take their robot from the Dohyo, bow to each other and leave the area of Dohyo Jyonai.

7.4 Torinaoshi (repeat of the round)

The round is repeated in the following situations.

1. Both robots are facing each other, and their movement is hindered, or they do not move at all.
2. Both robots fall out of the Dohyo at the same time.
3. Other situations in which it is not possible to determine who has won or lost.
4. If it is not possible to announce the winner after Torinaoshi, the referee may place the robots himself or herself and continue with the match within the allocated time.

7.5 Handling the robots between the matches

For the time between the matches in the same sub-group, semi-final, grand-final the robots must be placed on a table assigned for it and can only be removed from there for the duration of the match**. It is forbidden to leave the competition area with the robot between the matches until the same group results have been decided and checked**, except for when a corresponding permission has been given (e.g. the robot needs fixing**). During the sub-group tournament, it is not allowed to modify the robot.**

In the event of any draws among the robots in the same group *(which interferes with the decision of the group or the final winner),* rematches will be conducted instantly between the named robots to determine clear winners for the sub-group or finals.

The purpose of this is to guarantee a smooth course of the competition.

NB! If the robot cannot be found from the designated table at the right time or if the team itself is not present, the match will result in a loss.

7.6 Delay of the competition

When competitions start to delay, organizers have the authority to act in accordance with rules to minimize the delays and bring the competition back on schedule.

The competition will continue as smoothly as possible, eliminating any rematches or any moments that could cause delays, and instead using a less time-consuming judging system based on rules. Any objections will not be accepted during the delay, and competition will not be delayed to resolve the objections. If the robot cannot be found in the designated area, the match will result in a loss.

8 Yuko (effective) point, Shinitai and Yusei (dominance)

8.1 Yuko (effective) point

The winner is announced in the following situations.

1. If the opponent has been pushed out of the Dohyo (the robot touches the area outside of the Dohyo).
2. If the opponent falls out of the Dohyo and touches the area outside of the Dohyo.
3. In the situation of “Shinitai”.
4. In the situation of “Yusei (dominance)”.
5. If “Keikoku (warning)” is given twice to the opponent.
6. If there is a case of “Hansoku (violation)”.
7. If the winner is announced without a match, the winner earns two Yuko points (if the winner already has one Yuko point, he or she earns only one more). The existing Yuko point(s) of the opponent who lost remain effective.

8.2 Shinitai

“Shintai” situation means that one or several wheels of the robot roll out of the Dohyo and the robot is unable to return to the Dohyo. In this case, the opponent earns one Yuko point.

8.3 Yusei (dominance)

In a situation of “Yusei” (dominance), the referee may grant a Yuko point to the team according to the strategy, movements and skills of the robot.

9 Hansoku (violation) and penalty

9.1 Keikoku (warning)

A contestant who acts as indicated below gets a “Keikoku” (warning). If the contestant gets two Keikokus (warnings), the opponent earns one Yuko point.

1. If the operator or some item of the operator (for example, remote control) ends up in the area of Dohyo Jyonai before the round ending signal of the referee.
2. If the robot moves before the beginning of the round (movement or changing its shape).
3. If the participant violates the requirements for the use of remote control.
4. If the robot is replaced after it is placed on the Dohyo.
5. If the participant does not comply with the safety requirements.
6. In case of any other action that is considered unfair.
7. If the participant does not comply with the handling the robots between the matches rules. (Paragraph 7.5.)

9.2 Hansoku (violation)

In the following situations the opponent or both parties earn one Yuko point.

1. If some parts, with total weight of more than 5 grams fall off from the robot.
2. If the robot does not move.
3. If both robots move, but do not collide.
4. If the robot is on fire or a situation, which resembles that the robot is on fire.
5. If the participant wants to end the round.

9.3 Hansokumake (defeat due to violation)

The participant who violates the following rules, loses the match due to violation.

1. If the contestant fails to show up at the designated Dohyo at the beginning of the match or the participant exceeds the time given for maintenance, see paragraph 6 Match principles.
2. If the contestant sabotages the match. For example, by deliberately breaking or deforming the Dohyo.
3. If the participant violates the requirements provided for "The Robot" in paragraph 5. If the robot does not make autonomous movements.
4. If the participant does not comply with the requirements provided in paragraph 7.1 Safety requirements, even after paragraph 9.1 "Keikoku" (warning).
5. If the participant does not comply with the handling the robots between the matches rules, (Paragraph 7.5) after paragraph 9.1 "Keikoku" (warning).

9.4 Sikkaku (disqualification)

In the following cases, the participant will be disqualified – he or she must leave the competition and is not added to the list of competition results.

1. If the participant's robot does not comply with the requirements provided in Paragraph 5. The robot.
2. If the participant behaves in an undignified manner. For example, swears or offends the opponent or the referees.
3. If the participant deliberately injures the opponent.
4. A delay in the competition is caused by participants, their teams, or family members failing to comply with the rules and competition regulations and raising objections and complaints at every rule-based or referee/organizers decisions to not to accept defeat.

10 Suspending the match

1. If the participant is injured and the match cannot be continued, the participant may demand the suspension of the match.
2. In the event of the previously described situation, the referees make necessary arrangements for the match to be immediately resumed.
3. If the arrangements do not enable the match to continue, the opponent wins the competition without a match.

11 Objections

The decisions of the referees are not subject to appeals. Complaints must be submitted during or immediately after the match. If no settlement is reached with the referee, claims must be submitted immediately to the Robotex Head referee. Any later complaints will not be accepted. In case of any conflicts or disputes, the final word will be said by the referees and/or the organisers. **NB! Rude behaviour is not tolerated and the team who does not respect the referee's / head referee's decisions can be disqualified by the head referee and/or event organisers.**

12 Marking the robots

12.1 Markings on the robot

The robots must be marked with number stickers (robot number). The stickers are provided by the organisers of the competition. The sticker cannot be placed on the plow of the robot, or on any other component, where it may disturb the work of opponents sensors.

13 Changes and cancellations in the rules

Changes and cancellations made to the rules are adopted by the main organizer of the competition according to the regulation of the regulatory committee of the competition.

14 Organizing

14.1 Lighting and infrared noise

The arena has at parts uneven lighting and infrared noise, which may disrupt the work of sensors during the competition. For this reason, the organizers recommend using covers or blinds for sensors, testing the sensors under intense lighting conditions or even under direct sunlight to imitate the lighting conditions of the competition arena.

14.2 Winners one-year break

Winners of 1st place cannot compete in the same category next year– they must take a one-year break from that category. At least 50% of the team must consist of non-winners. If the winners' team has three members, next year they should have at least one new member who was not previously on this team to compete in the same category again instead of taking a year off from it. *This rule is aimed at bringing new people, giving everyone a fair chance and encouraging recurring winners to try new competitions they usually do not participate in and to educate and engage new beginners in the field of robotics.* *****

*** The rule complies only with Robotex International standards and is used for Robotex International competition.**

15 COMPETITION FLOW – Main Flow *

***** The flow complies with Robotex International standards and is used for Robotex International competition. To meet the standards, the organizer or Robotex National organizer can modify the competition flow either on the day of the competition or for each event separately.

1. TECHNICAL INSPECTION – **The time for technical inspection is stated on the event timetable.** Competitors need to pass technical inspection during that time slot to compete. **Only one team member (With a translator or instructor if in need) can come and complete the technical inspection. To identify your team, it's necessary to know both the name of your team and the name of your robot at the beginning of the technical inspection.** *(If your team name or robot name contains special characters or many numbers or your name can be identical to others' robot names, then write it down on paper and show it at the technical inspection for better flow and understanding)* Your team will have time to make your robot meet the competition requirements if it does not meet the technical requirements first time, but you need to pass and obtain the Robotex robot number sticker on the robot before the technical inspection closes.

2. SUB-GROUP STAGE – First selection process, where registered competitors who passed technical inspection are drawn into sub-groups**. When your group starts, you need to be found near the competition area, you will be called out to enter the competition area.** *(It's important to keep in mind that your group can either delay or start earlier than the timetable has indicated.)* Robots need to collect the most points *(Wins)* in your group, top 1 to top 3 competitors (*The number of robots allowed into the semi-finals from the sub-group stages will be decided by the organizers at the beginning of competition day.)* with most points will pass to the semi-finals.

During matches in the same sub-group the robot cannot leave the competition area until the same group results have been decided and checked. ***(The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.)*** In the event of any draws among the robots in the same group *(which interferes with the decision of the group or the final winner)*, rematches will be conducted between the named robots to determine clear winners for the sub-group. The referee will give permission to leave the area after the results are checked and inserted into the system. (Paragraph 7.5) *(If there are not enough participants in this category, the Sub-Group Stage will be skipped and the competition will start straight from the semi-final stage.)*

3. SEMI-FINAL STAGE- Second selection process, held in tournament format with losers' brackets. At the beginning of the semi-final, your robot will be called out and the robot with the operator will need to enter the competition area. If the organizers decide to conduct another technical inspection for all semi-final robots, they will inform the competitors**. The robot needs to be found in the designated area during the semi-final stage with a single operator.** ***(The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.)*** The robot and operator are allowed to leave the area if they lose 2 matches or if the Referee/Organizer authorizes it. (Paragraph 7.5)

4. GRAND-FINAL STAGE- The final selection process, usually held on the event main stage. At the beginning of the grand-final, your robot will be called out and the robot with the operator will need to enter the competition area. If the organizers decide to conduct another technical inspection for all grand-final robots, they will inform the competitors. **The robot needs to be found in the designated area during the semi-final stage with a single operator.** ***(The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.)*** The robot and operator are allowed to leave the area if Grand-final is finished or if the Referee/Organizer authorizes it. (Paragraph 7.5)

16 Appendix 1. Figure of match area

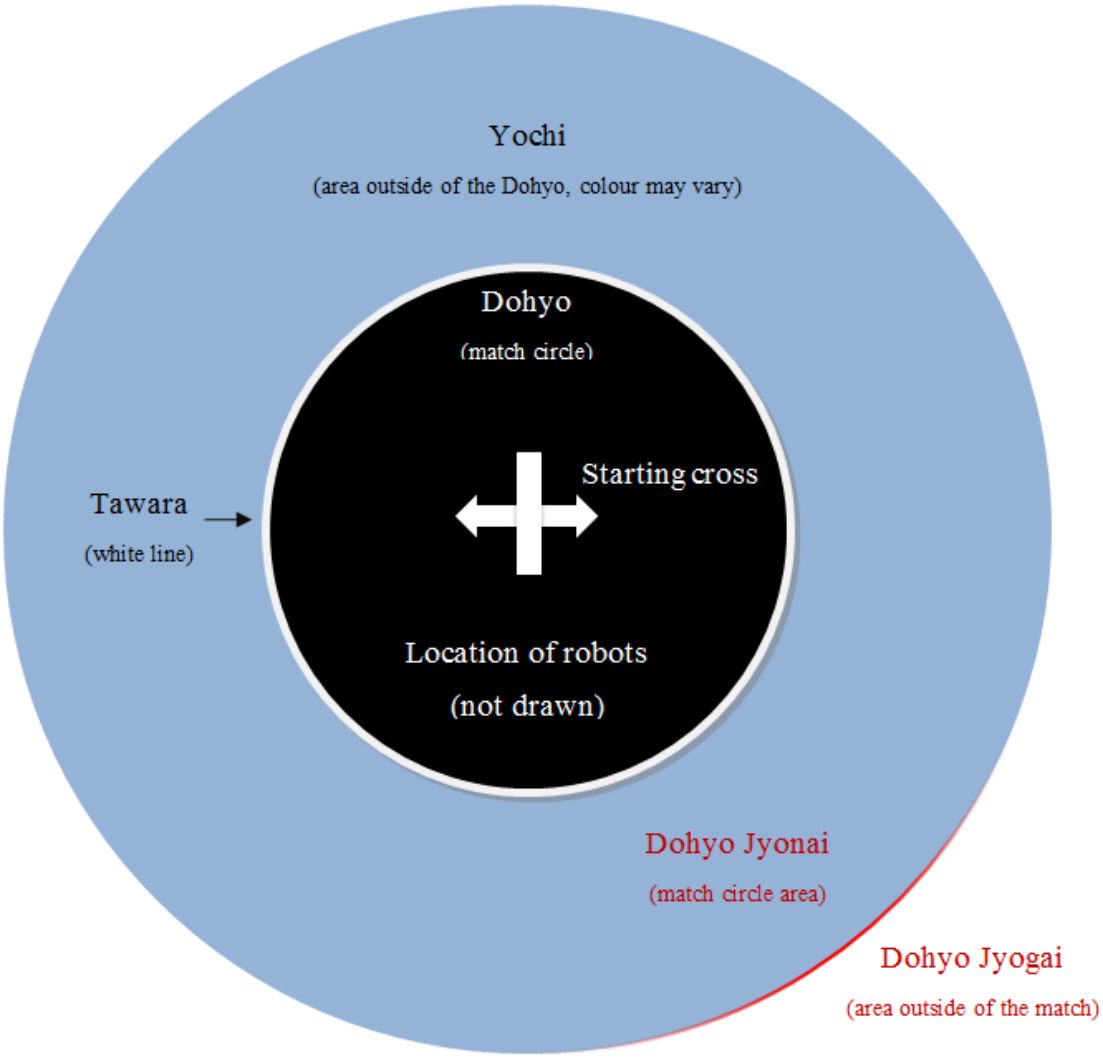

Figure 2 Match area

17 Prohibited parts list

ITEM NO.	NAME	LINK	IMAGE
88013	Technic Large Motor	HERE	
88014	Technic XL Motor	HERE	

18 Revision history

- 14.06.2024 Removed previous rule change history before 2020.
- 14.06.2024 Paragraph 5.1.1. Specified maximum size increase during the competition.
- 14.06.2024 Paragraph 5.4. Part 1. Separated examples to different parts
- 14.06.2024 Paragraph 5.4. Part 1. Added new example about misleading opponent's Color and light sensor.
- 14.06.2024 Paragraph 5.4. Prohibited the use of paper or cardboard parts.
- 14.06.2024 Paragraph 5.4. Prohibited the use of self-glued parts.
- 14.06.2024 Paragraph 5.5. Added description about allowed motors and sensors.
- 14.06.2024 The layout and form of the document have been cleaned up.
- 29.08.2024 Added new paragraph 14. “Organizing”.

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23.09.2025 Paragraph 5.4 Added inspection rights for robot components.

23.09.2025 Paragraph 7.5 Added and specified “Handling the robots between the matches”.

23.09.2025 Added new paragraph 3.4. “Technical Inspection and registration”.

23.09.2025 Added new paragraph 7.6. “Delay of the competition”.

23.09.2025 Added new rule to paragraph 9.4.

23.09.2025 Added new paragraph 4.4. “Lighting conditions”.

23.09.2025 Added new rule to paragraph 9.1 and 9.3.

23.09.2025 Added new paragraph 15. “COMPETITION FLOW – Main Flow *”.

23.09.2025 Added new paragraph 14.2 “Winners one-year break”.

29.09.2025 Removed previous rule change history before 2024.

29.09.2025 Added new paragraph 17. “Prohibited parts list”.

29.09.2025 Added new rule to paragraph 5.4.

29.09.2025 Removed rule under paragraph 5.4. (The robot must not include paper or cardboard parts of any kind.)

29.09.2025 Specified white plow rule, paragraph 5.4.

29.09.2025 Added new materials, paragraph 4.

29.09.2025 Added new sub-class, paragraph 3.3.

29.09.2025 Removed rule 4 under paragraph 5.5.

05.02.2026 Removed sub-class, paragraph 3.3.