

SSL Challenge Rule Detail

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1. The Duration of the Match

1.1 Periods of Play

The match lasts two equal periods of 10 minutes, unless otherwise mutually agreed between the referee and the two participating teams. Any agreement to alter the periods of play (for example, to reduce each half to 7 minutes because of a limited schedule) must be made before the start of play and must comply with competition rules.

1.2 Half-Time Interval

Teams are entitled to an interval at half time. The half-time interval must not exceed 5 minutes. Competition rules must state the duration of the half-time interval. The duration of the half-time interval may be altered only with the consent of both teams and the referee.

1.3 Timeouts

Each team is allocated four timeouts at the beginning of the match. A total of 5 minutes is allowed for all timeouts. For example, a team may take three timeouts of one-minute duration and thereafter have only one timeout of up to two minutes duration. Timeouts may only be taken during a game stoppage. The time is monitored and recorded by the assistant referee.

1.4 Allowance for Time Lost

Allowance is made in either period for all time lost through:

- substitution(s)
- assessment of damage to robots
- removal of damaged robots from the field of play for treatment
- wasting time
- any other cause

The allowance for time lost is at the discretion of the referee.

1.5 Extra Time

Competition rules may provide for two further equal periods to be played. The conditions of Law 2 will apply.

1.6 Abandoned Match

See Appendix A.

Decisions of the Small Size League Technical Committee

1. The local organising committee will make every effort to provide both teams access to the competition area at least two hours before the start of the competition. They will also strive to allow at least one hour of setup time before each match. Participants should be aware, however, that conditions may arise where this much time cannot be provided.
2. Within these rules, the term “game stoppage” is used to describe the times when the gameplay is in a stopped state. Gameplay is not considered stopped when any robot is allowed to kick the ball. For example, gameplay is stopped after the “Kickoff” command has been issued, but it is no longer stopped after the corresponding “Ready” command has been issued. Similarly, gameplay is no longer stopped after a “Freekick” has been issued.

2. The Start and Restart of Play

2.1 Preliminaries

If both teams have a common preferred frequency for wireless communications, the local organising committee will allocate that frequency for the first half of the match. If both teams have a common preferred color, the local organising committee will allocate the color for the first half of the match.

A coin is tossed and the team which wins the toss decides which goal it will attack in the first half of the match.

The other team takes the kick-off to start the match.

The team that wins the toss takes the kick-off to start the second half of the match.

In the second half of the match the teams change ends and attack the opposite goals. Teams may agree not to change ends and attack the opposite goals with the consent of the referee.

If both teams have a common preferred frequency for wireless communications, the teams should swap the allocation of that frequency for the second half of the match. Teams may agree not to change the allocation of the preferred frequency with the consent of the referee.

If both teams have a common preferred marker color, the teams should swap marker colors for the second half of the match. Teams may agree not to change the marker colors with the consent of the referee.

2.2 Kick-off

A kick-off is a way of starting or restarting play:

- at the start of the match
- after a goal has been scored
- at the start of the second half of the match
- at the start of each period of extra time, where applicable

A goal may be scored directly from the kick-off.

2.2.1 Procedure

- all robots are in their own half of the field
- the opponents of the team taking the kick-off are at least 500mm from the ball until the ball is in play
- the ball is stationary on the centre mark
- the referee gives a signal
- the ball is in play when is kicked and moves forward
- the kicker does not touch the ball a second time until it has touched another robot

After a team scores a goal, the kick-off is taken by the other team.

2.2.2 Infringements/Sanctions

Any infringement as listed in Law 3 is handled accordingly.

For any other infringement of the kick-off procedure:

- the kick-off is retaken

2.3 Placed Ball

A placed ball is a way of restarting the match after a temporary stoppage which becomes necessary, while the ball is in play, for any reason not mentioned elsewhere in the Laws of the Game.

2.3.1 Procedure

The referee places the ball at the place where it was located when play was stopped, unless play was stopped in an illegal free kick position, as described in Section 7, in which case the referee places the ball in the closest legal free kick position. By Law 3, all robots are required to remain 500mm from the ball while the ball is being placed. Play restarts when the referee gives a signal.

2.3.2 Infringements/Sanctions

The ball is placed again:

- if a robot comes within 500mm of the ball before the referee gives the signal

3. The Ball In and Out of Play

3.1 Ball Out of Play

The ball is out of play when:

- it has wholly crossed the goal boundary or touch boundary whether on the ground or in the air
- play has been stopped by a signal from the referee

When the ball goes out of play, robots should remain 500mm from the ball as the ball is placed until the restart signal is given by the referee.

3.2 Ball In Play

The ball is in play at all other times.

3.3 Infringements/Sanctions

If, at the time the ball enters play, a member of the kicker's team occupies the area closer than 200mm to the opponent's defence area:

- an indirect free kick is awarded to the opposing team, the kick to be taken from the location of the ball when the infringement occurred (see Law 7)

If, after the ball enters play other than due to a forced restart, the kicker touches the ball a second time (without holding the ball) before it has touched another robot:

- an indirect free kick is awarded to the opposing team, the kick to be taken from the place where the infringement occurred (see Law 7)

If, after the ball enters play other than due to a forced restart, the kicker deliberately holds the ball before it has touched another robot:

- a direct free kick is awarded to the opposing team, the kick to be taken from the place where the infringement occurred (see Law 7)

If, after a signal to restart play is given, the ball does not enter play within 10 seconds or lack of progress clearly indicates that the ball will not enter play within 10 seconds:

- the play is stopped by a signal from the referee,
- all robots have to move 500mm from the ball
- a forced restart is indicated, and
- once the referee indicates the forced restart, robots from either team may approach and touch the ball

Decisions of the Small Size League Technical Committee

1. For all restarts where the Laws stipulate that the ball is in play when it is kicked and moves,

the robot must clearly tap or kick the ball to make it move. It is understood that the ball may remain in contact with the robot or be bumped by the robot multiple times over a short distance while the kick is being taken, but under no circumstances should the robot remain in contact or touch the ball after it has traveled 50mm, unless the ball has previously touched another robot. Robots may use dribbling and kicking devices in taking the free kick.

2. The exclusion zone closer than 200mm to the opponent's defence area during restarts is designed to allow defending teams to position a defence against a kick without interference from the opponents. This change was added to help teams defend against corner kicks in which teams use elevated "chip kick" passes directly into the defence area.

4. The Method of Scoring

4.1 Goal Scored

A goal is scored when the whole of the ball passes over the goal line, between the goal walls, below the cross bar, provided that no infringement of the Laws of the Game has been committed in the play immediately preceding this event, by the team scoring the goal.

4.2 Winning Team

The team scoring the greater number of goals during a match is the winner. If both teams score an equal number of goals, or if no goals are scored, the match is drawn.

4.3 Competition Rules

For matches ending in a draw, competition rules may state provisions involving extra time, or other procedures approved by the RoboCup Federation to determine the winner of a match.

5. Offside

The offside rule is not adopted.

6. Fouls and Misconduct

Fouls and misconduct are penalised as follows:

6.1 Direct Free Kick

A direct free kick is awarded to the opposing team if a robot commits any of the following three offences:

- makes substantial contact with an opponent
- holds an opponent
- holds the ball deliberately (except for the goalkeeper within his own defence area)

6.2 Penalty Kick

A penalty kick is awarded if any of the offences listed in Subsection 6.1 is committed by a robot inside his own defence area, irrespective of the position of the ball, provided it is in play.

A penalty kick is also awarded to the opposing team if, while the ball is in play, a defender other than the goalkeeper touches the ball while positioned entirely within the defense area.

6.3 Indirect Free Kicks

An indirect free kick is awarded to the opposing team if a goalkeeper, inside his own defence area, commits any of the following offences:

- takes more than fifteen seconds while holding the ball before releasing it from his possession
- holds the ball again after it has been released from his possession and has not touched any other robot

An indirect free kick is also awarded to the opposing team if a robot:

- contacts the opponent goalkeeper where the point of contact is in the defence area
- dribbles the ball over 1000 mm, measured linearly from the ball location where the dribbling started
- touches the ball such that the top of the ball travels more than 150mm from the ground,

and the ball subsequently enters their opponent's goal, without having either touched a teammate (while below 150mm) or remained in contact with the ground (stopped bouncing).

- kicks the ball such that it exceeds 8m/s in speed
- tips over, breaks or drops parts on the field in a way that gives its team unfair advantage
- touches the ball such that the ball, without touching any other robot, subsequently crosses the midline and then the opponent's goal line without entering the opponent's goal
- touches the ball while in play, while being located partially or entirely within its opponent's defense area
- commits any other offence, not previously mentioned in Law 6, for which play is stopped to caution or dismiss a robot

6.4 Disciplinary Sanctions

6.4.1 Cautionable Offences

A team is cautioned and shown the yellow card if a robot on that team commits any of the following offences:

1. is guilty of unsporting behaviour
2. is guilty of serious and violent contact
3. persistently infringes the Laws of the Game
4. delays the restart of play
5. fails to respect the required distance when play is restarted with a goal kick, corner kick or free kick
6. modifies or damages the field or ball
7. deliberately enters or travels within the referee walking area
8. is a robot other than the goalkeeper, and touches the ball while in play, while being located partially but not entirely within its own defense area
9. repeatedly travels faster than 1.5m/s while the ball is out of play, no restart of play has been called, and the game is in neither a time-out, half-time, nor similar break in

gameplay such as the interval before extra time or a penalty shootout

Upon receipt of a yellow card, the number of robots allowed on the field for the penalised team decreases by one. If, after this decrease, the team has more robots than permitted on the field, a robot must immediately be removed from the field before play resumes.

After two minutes of play (as measured by the assistant referee using the official game time), the yellow card expires and the number of robots allowed increases by one. The team is then permitted to place an additional robot on the field; as with all robot handling activities, this must be done with the referee's permission at a stoppage in play.

The specific choice of robot to remove from and return to the field is made by the penalised team, and interchanges are permitted while one or more yellow cards are in force as long as the number of robots permitted on the field is not exceeded.

6.4.2 Sending-Off Offences

A team is shown a red card if one of the robots or the team is guilty of severe unsporting behaviour.

Each red card decreases the number of robots allowed on the field for the penalised team for the remainder of the game. As with yellow cards, if a robot must be removed from the field, this is done immediately before play resumes. Furthermore, as with yellow cards, receipt of a red card does not affect a team's ability to interchange robots as long as the number of robots permitted on the field is not exceeded.

Decisions of the Small Size League Technical Committee

1. Substantial contact is contact sufficient to dislodge the robot from its current orientation, position, or motion in the case where it is moving. When both robots are moving at similar speeds, and the cause of contact is not obvious, the referee will allow play to continue. This law is designed to protect robots which are slow moving or stationary at the time of the contact, and as such should be detected by obstacle avoidance systems.
2. Cautions for serious and violent contact are a way to discourage teams from ignoring the spirit of the no-contact principle. Examples of cautionable offences include uncontrolled

motion, poor obstacle avoidance, pushing, or rapid spinning while adjacent to an opponent. In a typical scenario, the referee would warn the team and expect that they would modify their system to reduce the violence of their play. If the referee was still unsatisfied a caution would be issued. It is recommended that the assistant referee be responsible for observing the robots and notifying the main referee when a yellow card should be issued for violent contact. The duty of the referee to allow the game to continue if the violation benefits the non-violating team applies here; for example, if the yellow team causes a violent collision with a blue robot, the referee allows the game to continue in order that the blue team be granted a point if it scores a goal, but should the yellow team score, no goal would be awarded.

3. A robot that is placed on the field but is clearly not capable of movement will be sanctioned for unsporting behaviour.
4. A robot is holding a ball if it takes full control of the ball by removing all of its degrees of freedom; typically, fixing a ball to the body or surrounding a ball using the body to prevent access by others. 80% of the area of the ball when viewed from above should be outside the convex hull around the robot. Another robot must be able to remove the ball from a robot with the ball. This limitation applies as well to all dribbling and kicking devices, even if such infringement is momentary.
5. A robot begins dribbling when it makes contact with the ball and stops dribbling when there is an observable separation between the ball and the robot.

The restriction on dribbling distance was added to prevent a robot with a mechanically superior dribbler having unchallenged control of the ball. The distance restriction still allows dribblers to be used to aim and receive passes, turn around with the ball, and stop with the ball. Dribblers can still be used to dribble large distances with the ball as long as the robot periodically loses possession, such as kicking the ball ahead of it as human soccer players often do. The technical committee expects the distance rule to be self-enforced, i.e., teams will ensure their software complies beforehand and may be asked to demonstrate this prior to a competition. Referees, though, will still call fouls for violations and may give a caution (yellow card) for situations of repeated violations.
6. The limitation to kicking speed was added to prevent a robot with a mechanically superior

kicker from having too great of an advantage over opponents, or kicking the ball at speed unsafe for spectators. It is also believed that this will help encourage team play over single robot ability, in a similar way to the restrictions on dribbling.

7. The current rule about scoring after chip kicks is defined in this section (subsection Indirect Free Kicks) only. During past competitions, some confusions occurred after robots Chipped the ball and thereby caused own goals. For this reason, a strict interpretation of this rule is provided here:

- If a robot chips the ball (no matter at which height it travels) at a team mate and the ball subsequently enters the own goal, the opponent team scores.
- If a robot chips the ball at an opponent and the ball subsequently enters the own Goal while staying below 150mm all the time after touching the opponent robot, the opponent team also scores.
- If a robot chips the ball at an opponent and the ball subsequently enters the own goal after having been above 150mm for some time (and not being in constant touch with the ground afterwards) after touching the opponent robot, the opponent team does not score.

8. The offence on deliberately entering the referee walking area was added to discourage teams from driving through this area to gain tactical advantages. It is understood that on occasion a robot can enter the area if it is out of control or if it has been pushed into this area. Such cases should not be considered offences. However, the final decision as to what constitutes a deliberate violation is left to the referee.

9. If a tipped over or broken robot does not constitute danger to other robots or humans, neither gives its team unfair advantage, the referee shall allow the game to continue until another game stoppage condition occurs. The final decision as to what constitutes danger or unfair advantage is left to the referee.

10. The robot speed limit described in Subsection 6.4 applies only to cases where the Referee Box is reporting the STOP command during normal play or a penalty shootout. The Intention of this rule is to avoid collisions caused by large numbers of robots moving long distances and to avoid robots accidentally interfering with the referee controlling the ball.

7. Free Kicks

7.1 Types of Free Kicks

Free kicks are either direct or indirect.

For both direct and indirect free kicks, the ball must be stationary when the kick is taken and the kicker does not touch the ball a second time until it has touched another robot.

7.2 The Direct Free Kick

- if a direct free kick is kicked directly into the opponents' goal, a goal is awarded to the kicking team
- if a direct free kick is kicked directly into the team's own goal, a corner kick is awarded to the opposing team

7.3 The Indirect Free Kick

A goal can be scored only if the ball subsequently touches another robot before it enters the goal.

- if an indirect free kick is kicked directly into the opponents' goal, a goal kick is awarded to the opposing team.
- if an indirect free kick is kicked directly into the team's own goal, a corner kick is awarded to the opposing team.

7.4 Free Kick Procedure

If the free kick is awarded to a team inside or within 200mm of its own defence area, the free kick is taken from a point 600mm from the goal line and 100mm from the touch line closest to where the infringement occurred.

If the free kick is awarded to the attacking team within 700mm of the opposing defence area, the ball is moved to the closest point 700mm from the defence area.

Otherwise, the free kick is taken from the place where the infringement occurred.

All opponent robots are at least 500mm from the ball.

The ball is in play when it is kicked and moves.

7.5 Infringements/Sanctions

If, when a free kick is taken, an opponent is closer to the ball than the required distance:

- the kick is retaken

Any infringement as listed in Law 3 is handled accordingly.

For any other infringement of this Law:

- the kick is retaken

8. The Penalty Kick

A penalty kick is awarded against a team which commits one of the offences for which a direct free kick is awarded, inside its own defence area and while the ball is in play.

A goal may be scored directly from a penalty kick.

Additional time is allowed for a penalty kick to be taken at the end of each half or at the end of periods of extra time.

8.1 Position of the Ball and the Robots

The ball:

- is placed on the penalty mark

The robot taking the penalty kick:

- is properly identified

The defending goalkeeper:

- remains between the goalposts, touches its goal line, and faces outward of the goal, until the ball has been kicked; it is allowed to move before the ball has been kicked, as long as its motion does not break any of these constraints

The robots other than the kicker are located:

- inside the field of play
- behind a line parallel to the goal line and 400mm behind the penalty mark

8.2 The Referee

- does not signal for a penalty kick to be taken until the robots have taken up position in accordance with the Law
- decides when a penalty kick has been completed

8.3 Procedure

- the robot taking the penalty kicks the ball forward
- it does not play the ball a second time until it has touched another robot
- the ball is in play when it is kicked and moves forward

When a penalty kick is taken during the normal course of play, or time has been extended at halftime or full time to allow a penalty kick to be taken or retaken, a goal is awarded if, before passing between the goalposts and under the crossbar:

- the ball touches either or both of the goalposts and/or the crossbar, and/or the goalkeeper

8.4 Infringements/Sanctions

If the referee gives the signal for a penalty kick to be taken and, before the ball is in play, one of the following situations occurs:

The robot taking the penalty kick infringes the Laws of the Game:

- the referee allows the kick to proceed
- if the ball enters the goal, the kick is retaken
- if the ball does not enter the goal, the kick is not retaken

The goalkeeper infringes the Laws of the Game:

- the referee allows the kick to proceed
- if the ball enters the goal, a goal is awarded
- if the ball does not enter the goal, the kick is retaken

A team-mate of the robot taking the kick enters the area 400mm behind the penalty mark:

- the referee allows the kick to proceed

- if the ball enters the goal, the kick is retaken
- if the ball does not enter the goal, the kick is not retaken
- if the ball rebounds from the goalkeeper, the crossbar or the goal post and is touched by this robot, the referee stops play and restarts the match with an indirect free kick to the defending team

A team-mate of the goalkeeper enters the area 400mm behind the penalty mark:

- the referee allows the kick to proceed
- if the ball enters the goal, a goal is awarded
- if the ball does not enter the goal, the kick is retaken

A robot of both the defending team and the attacking team infringe the Laws of the Game:

- the kick is retaken

If, after the penalty kick has been taken:

Any infringement as listed in Law 3 is handled accordingly.

The ball is touched by an outside agent as it moves forward:

- the kick is retaken

The ball rebounds into the field of play from the goalkeeper, the crossbar or the goalposts, and is then touched by an outside agent:

- the referee stops play
- play is restarted with a dropped ball at the place where it touched the outside agent (see Law 7)

9. The Throw-In

A throw-in is a method of restarting play.

A throw-in is awarded to the opponents of the robot who last touched the ball when the whole of the ball crosses the touch line, either on the ground or in the air.

The procedure, infringements and rules of the throw-in are identical to those of an indirect free kick (Law 7) taken from the point 100 mm perpendicular to the touch boundary where the ball crossed the touch boundary.

10. The Goal Kick

A goal kick is a method of restarting play.

A goal kick is awarded to the defending team when the whole of the ball, having last touched a robot of the attacking team, passes over the defending team's goal line, either on the ground or in the air, and a goal is not scored in accordance with Law 4.

The procedure, infringements and rules of the goal kick are identical to those of a direct free kick (Law 7) taken from a point 500 mm from the goal line and 100 mm from the touch line closest to where the ball exited the field.

11. The Corner Kick

A corner kick is a method of restarting play.

A corner kick is awarded to the attacking team when the whole of the ball, having last touched a robot of the defending team, passes over the defending team's goal line, either on the ground or in the air, and a goal is not scored in accordance with Law 4.

The procedure, infringements and rules of the corner kick are identical to those of a direct free kick (Law 7) taken from a point 100 mm from the goal line and 100 mm from the touch line closest to where the ball exited the field.

A The Competition Rules

This appendix describes additional procedures for Small Size League matches.

A.1 Extra Time

If the game is drawn after the end of the second period and the game needs to end with a clear winner, extra time will be played (as stated in laws 1 and 4). Before the first half of extra time, there will be an interval that must not exceed 5 minutes.

A.1.1 Periods of Play in Extra Time

The extra time lasts two equal periods of 5 minutes, unless otherwise mutually agreed

between the referee and the two participating teams. Any agreement to alter the periods of extra time (for example, to reduce each half to 3 minutes because of a limited schedule) must be made before the start of play and must comply with competition rules.

A.1.2 Extra Time Half-Time Interval

Teams are entitled to an interval at half-time. The half-time interval must not exceed 2 minutes. The duration of the half-time interval may be altered only with the consent of both teams and the referee.

A.1.3 Timeouts

Each team is allocated two timeouts at the beginning of extra time. A total of 5 minutes is allowed for all timeouts. The number of timeouts and the time not used in regular game are not added.

Timeouts in extra time follow the same rules as in regular game (stated in Law 1).

A.2 Penalty Shoot-Out

If the game is drawn after the end of the second period of extra time, kicks from the penalty mark will be taken to decide which team wins the game.

A.2.1 Preparation

Before the first penalty is kicked, there will be an interval that must not exceed 2 minutes. This time is suggested to be used by the teams in dialogue with the referee and his assistants to check whether the goalkeeper's position is correct (on the line) and all other rules for penalty can be fulfilled as stated in Law 7. The referee determines (e.g., by flipping a coin) which team defends which goal as well as which team has to take the first penalty kick.

A.2.2 Procedure

During the kicks from the penalty mark, a maximum of 2 robots per team is on the field in

order to avoid interference. The kicks from the penalty mark are taken alternately by the teams until each team has kicked 5 penalties. If a decision is reached for one team, the kicks are stopped by the referee. For all penalties, the rules of Law 7 apply. A second kick (e.g., if the ball bounces back from the goalkeeper or a goalpost) or a bounce back from the kicker will not score; as soon as the kicker touches the ball after he released it the first time the penalty is over. During the kicks from the penalty mark no timeout is possible. Robots may be exchanged between the kicks. As switching sides would cost too much time and would force the teams to touch their systems both goals are used.

If after 10 kicks no decision is reached, each team takes another penalty in the same order as before.

This procedure (one penalty each team) is continued until a decision is reached.

A.3 Abandoned Match

If one of the teams abandons the match, before or during its course, the opponent will be awarded winner for all purposes. However, solely for the purpose of goal difference counting, the winner team can, at its decision, continue to play by itself, and the goals scored will continue to be computed.

If the two teams abandon the match, before or during its course, both teams are considered to have lost the match. Abandoned matches cannot result in ties.

The competition records will indicate the team(s) that abandoned the match.

A team that refuses to make a good faith effort to participate in a scheduled game will be disqualified from the competition.

A.4 Early Termination of Match at Score of 10

When the score difference reaches 10 goals in a round-robin (not tournament) game, the match is automatically terminated and the team with more goals declared the winner.

A.5 Round-Robin Ranking Criteria

During the round-robin phase of the competition, the ranking of each team in each group

will be determined by the following criteria, in order:

- greatest number of points obtained in all group matches
- goal difference in all group matches
- greatest number of goals scored in all group matches

A.5.1 Tiebreaking

If two or more teams are equal on the basis of the above criteria, the tiebreaking procedure to determine their rankings will be determined by the following criteria, in order:

- greatest number of points obtained in the group matches between the teams concerned
- goal difference resulting from the group matches between the teams concerned
- greater number of goals scored in all group matches between the teams concerned
- drawing of lots by the Organising Committee

12. B Appendix B - Vision Experts

During competitions, vision experts are in charge of the shared vision systems on each field. The assignment and timing of their service period is allocated by competition organisers. This must be done in a way that each shared vision system always has at least one vision expert assigned.

B.1 Duties

The Vision Expert:

- checks shared vision system hardware and reports any kind of hardware problems to TC members / local organisers
- does the SSL-Vision calibration procedure whenever needed or when teams request, during setup times
- does the SSL-Vision calibration or maintenance during a match when referee requests
- before each match, checks that both teams can receive the SSL-Vision packets properly
- before each match, checks that both teams use proper standard patterns, that their robot heights are calibrated accurately, and that their received localization data is correct

- monitors shared vision system status during the match and reports any kind of problems to the referee instantly
- receives complaints from teams about shared vision system during the match and, if needed, asks the referee to halt the game to give time to diagnose and fix the problem
- notifies the referee if there is a non-resolvable complaint from a team regarding the vision system; in this case, the referee has the final authority to rule in any manner within his powers and duties, including the ability to warn and/or sanction a team for unsporting behavior if the team's requests are unfounded and continue to obstruct the game (see Subsection 6.4).