RoboCupJunior Soccer Rules 2025

Soccer League Committee 2025:		Soccer League Committee 2024:	
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This document contains specifications for the passive ball (Open League, orange golf ball), the large infrared ball (LightWeight and Entry League).

1 Technical Specification for pulsed Soccer Ball

1.1 Preamble

1.1.1 Answering to the request for a soccer ball for RCJ tournaments that would be more robust to interfering lights, less energy consuming and mechanically more resistant, the Soccer League Committee defined the following technical specifications with the special collaboration from EK Japan and HiTechnic.

1.1.2 Producers of these balls must apply for a certification process upon which they can exhibit the RCJ-compliant label and their balls used in RCJ tournaments.

1.1.3 Balls with these specifications can be detected using specific sensors but also common IR remote control receivers (TSOP1140, TSOP31140, GP1UX511QS, etc. - on-off detection with a possible gross indication of distance).

1.2 Switch to golf-ball sized pulsed ball in 2026

1.2.1 Starting in 2026, Lightweight Soccer will be moving to a new IR Ball. The key difference with this ball is the size change from 74mm to 42mm diameter, which is the same size as the Open League's passive ball. More information will be released during the 2025 season by the Committee. This ball is Open-Source, so anyone can produce one from the files & instructions on the GitHub Page here: https://github.com/-robocup-junior/ir-golf-ball .

1.2.2 Entry Leagues will continue to use the large infrared ball. [1]

1.3 Specifications

1.3.A IR light

1.3.A.1 The ball emits infra-red (IR) light of wavelengths in the range 920nm - 960nm, pulsed at a square-wave carrier frequency of 40 kHz. The ball should have enough ultra-bright, wide-angle LEDs to minimize unevenness of the IR output.

[1] Entry Leagues frequently use Lego, FischerTechnik, Vex or other robotics kits with which handling a small ball is more difficult, especially for beginners.

1.3.B Diameter

1.3.B.1 The diameter of the ball is required to be 74mm. A well-balanced ball shall be used.

1.3.C Drop Test

1.3.C.1 The ball must be able to resist normal gameplay. As an indication of its durability, it should be able to survive, undamaged, a free-fall from 1.5 meters onto a hardwood table or floor.

1.3.D Modulation

1.3.D.1 The 40 kHz carrier output of the ball shall be modulated with a trapezoidal (stepped) waveform of frequency 1.2 kHz. Each 833-microsecond cycle of the modulation waveform shall comprise 8 carrier pulses at full intensity, followed (in turn) by 4 carrier pulses at 1/4 of full intensity, four pulses at 1/16 of full intensity and four pulses at 1/64 of full intensity, followed by a space (i.e. zero intensity) of about 346 microseconds. The peak current level in the LEDs shall be within the range 45-55mA. The radiant intensity shall be more than 20mW/sr per LED.

1.3.E Battery Life

1.3.E.1 If the ball has an embedded rechargeable battery, when new and fully charged it should last for more than 3 hours of continuous use before the brightness of the LEDs drops to 90% of the initial value. If the ball uses replaceable batteries, a set of new high-quality alkaline batteries should last for more than 8 hours of continuous use before the brightness of the LEDs drops to 90% of the initial value.

1.3.F Coloration

1.3.F.1 The ball must not have any marks or discoloration that can be confused with goals, or the field itself.

1.4 Official suppliers for pulsed balls

1.4.1 Currently, there is one ball that has been approved by the Soccer League Committee:

- RoboCup Junior Soccer ball operating in MODE A (pulsed) made by EK Japan/Elekit (https://elekit.co.jp/-en/product/RCJ-05R)

1.4.2 Note that this ball was previously called RCJ-05. While you may not be able to find a ball with this name anymore, any IR ball produced by EK Japan/Elekit is considered to be approved by the Soccer League Committee.

A Technical Specification for passive Soccer Ball

1.1 Preamble

1.1.1 In order to push the state of the art in the Soccer competition forward, while also trying to bridge the gap between the Junior and Major leagues, the Soccer League Committee chose a standard orange golf ball

as the ”passive” ball. This is the same choice as the Small Size League makes [2] and since these balls are standardized, they should be cheap and easy to get anywhere around the globe.

1.2 Specifications

1.2.A Diameter

1.2.A.1 The diameter of the ball is required to be 42mm +- 1mm.

1.2.B Drop Test

1.2.B.1 The ball must be able to resist normal gameplay. As an indication of its durability, it should be able to survive, undamaged, a free-fall from 1.5 meters onto a hardwood table or floor.

1.2.C Coloration

1.2.C.1 The ball shall be of orange color. Since the definition of the orange color in general is not easy, any color that a human would deem to be orange and is substantially different from the other colors used on the field is acceptable. While tournament organizers may supply matte balls to improve camera vision, teams must still be prepared to play with the balls supplied by tournament organizers.

1.2.D Surface

1.2.D.1 Engravings and printed labels on the ball’s surface are tolerated. The the ball should not have a soft-touch finish. Teams must be prepared to play with balls as supplied by tournament organizers.

1.2.E Weight

1.2.E.1 The weight of the ball should be 46 grams (+- 1 gram).

[2] See the SSL rules at https://robocup-ssl.github.io/ssl-rules/sslrules.html#_ball