



# Eurobot<sup>open</sup> 2005 "Bowling"



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## FAQ N° 1

### I ERRATUM

Errata in the paint summary table: the clear squares of the chessboard and the bridges are painted in glossy beige finish. (RAL 1001) ; the dark squares of the chessboard are painted in a brownly beige mat finish(RAL 8024).

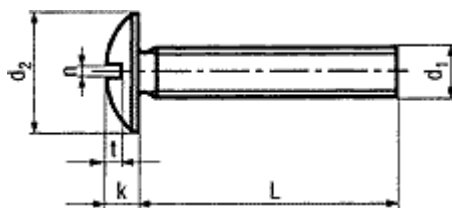
Errata concerning the drawing in the rules: the drawing in chapter 3.6.2 "Group of 4 skittles on its stand represents a stand placed at the intersection of 4 squares of the chessboard. The correct position for each stand is in the centre of a square. Please take note of the position of the stands in the drawing of chapter 3.1.1 " The Playing Area". Moreover, in the key of this drawing it should be written: "possible position for the sets of 4 skittles with or without stands" instead of "Possible position for the stands".

### II. DETAILS CONCERNING THE RULES:

#### II.1. The characteristics of the skittles:

Regarding the screws, the two types below will be used by the Eurobot Organising team:

- "Store Bolt", NFE 25 129 standard in zinc covered steel (passivated blue or yellow), M8x80 :  
: d1=M8 (8mm) ; L=80mm ; d2=17mm ; k=4.4mm ; n=2mm ; t(min)=2.7mm



- "Round-head square-neck carriage bolt", DIN 603 standard (or equivalent ISO 8677), M8x80 :  
d=M8 (8mm) ; dk(max)=20.65mm ; b=22mm ; f(max)=5.6mm ; k(max)=4.88mm ; v(max)=8,58mm



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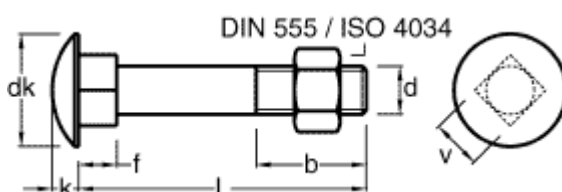


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It is important to respect the diameter of the head, which is :  $19 \pm 2$ mm (from 17 to 21mm).

As far as the wood is concerned, the type of wood is not important, what is important are the dimensions (see Rules) and the mass of the skittle must be within the  $225 \pm 20$ g bracket.

#### II.2. A laid down skittle:

A laid down skittle is a skittle which is no longer standing up. A standing skittle being one that have a vertical main axe, i.e. that is, standing on its three feet (screws) or on its top (free wooden section). A skittle leaning on an edge is considered as being laid down

#### II.3. Carrying the skittles:

The aim of this paragraph is to explain the sentence "Each robot may carry up to two skittles at the same time". Generally speaking, a robot cannot carry or block/cover more than two skittles maximum. This is a mechanical limitation which is checked during the approvals, (see III.5 Defence). A purely protective robot (surrounding or covering more than 2 skittles) is therefore forbidden.

A skittle is considered as being carried when it is lifted, i.e. when it has been taken off the ground or is being directed on the ground by a device developed for this intention (magnet, shovel, surrounding by the robot....)

NB1: A skittle which is simply pushed by a robot while in motion is not considered as being carried. Moreover, in the case where a robot covers a skittle in passing, (and in following its path), this skittle is considered as being covered and not therefore as being carried.

NB2: By handling, we mean moving around in at least one dimension of the space.

NB3: When a robot strikes a pile of skittles, we do not consider that it is carrying more than two skittles.

#### II.4 The skittles counted for points:

Even if a skittle that is directed along the ground is considered as being carried (see definition of carrying), it is counted at the end of the match.



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In fact, at the end of the match, all skittles (standing or lying down) which are made inaccessible by a robot's device are not counted. In this way, a skittle taken by an arm or into the very interior of a robot is not taken into account whatever its position. However, the other skittles on the table are counted even if they are in contact with the robot: they are not necessarily unavailable...  
(See Rules 6.4.1)

### II.5 Robot Defence/Strategy:

By the sentence « a robot must not have a strategy which prevents the opposing robots from having access to the skittles » we mean that:

- A robot must not be created with the aim of blocking the access to one or more bridges.
- A robot must have a functional mechanism for the game even if it doesn't move.
- A robot must not be able to carry more than 2 skittles. (See definition above of carrying, covering/directing/surrounding).
- A robot which « swallows » skittles must be able to reject them (no strategy to clearly prevent access to the skittles).

These four points will be checked during the approvals.

A final point ; concerning access to the skittles during the match, the type of strategies which are forbidden are, for example (there are others for sure !!) of the following type : total blocking of the skittles in a corner (skittles which are grouped together in a corner with one robot completely blocking another opposing robot's passage, (the opposing robot must always have an open passage in order to reach the skittles)), skittles put outside the playing area or in the ditch on purpose, or a robot which stays on a bridge throughout the whole match.

NB1: It is, however, allowed to be positioned between the skittles and the opponent, as long as the latter can reach the skittles by another passage.

NB2: A robot which is transporting 2 skittles can keep them all throughout the match but it is not allowed to carry any more whatever the method of transport used.  
(see rules: 6.4.2 and 4.2.1)

### II.6 The approvals:

The approval points do not count for the following qualification rounds.

### III. Changes:

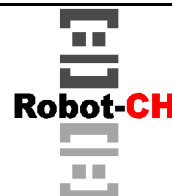
#### III.1 Mass of the balls:

For obvious security reasons, the mass of the balls used by the teams has been reduced to 40g (instead of 100g.). This clearly excludes golf balls, pelota balls and aluminium balls.

#### III.2. Points for skittles turned over with screws upright:



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At the end of the match, 1 point will be granted for skittles found upright with the screws facing up. These points will be added up before the winner has been decided on. (So, 3 skittles screws face up = 1 point, 4 skittles = 2 points ..... etc).

If a skittle is put back on its screws, no point will be granted, these not being discernible from those which were not handled during the match at all.

### IV. Answers to your questions:

#### BALLS AND BOWLS

##### Question 1:

Both of the robots can take up to 8 balls aboard.

" Each team is allowed to take up to 8 balls aboard their robots."

Does this mean 8 balls per robot or 8 balls in total?

Answer 1:

It means 8 balls per team (and not 8 balls per robot)

##### Question 2:

Are this year's GRS balls the same as those used for billiards?

Could you provide us with an address of where we could find the black GRS balls with a diameter of 16cm?

Answer 2:

The bowls which are used are the bowls which are used in eurhythmics, identical to those used in 2002 (air billiard), of the reference TOGU.

##### Question 3:

Is there a speed limit on the balls fired by the robots?

What is considered as dangerous regarding firing? Defined energy? Hard or soft missiles?

Answer 3:

No, it should not be dangerous, that's all.

If you really have a doubt, the best would be to test it on yourself.

##### Question 4:

Can the balls have a hole which is more than 10mm in diameter, for example?

Answer 4:

Yes, as long as the geometrical shape, the weight restrictions and the dimensions have been respected. (See Rules: 4.3)

#### THE SKITTLES

##### Question 5:

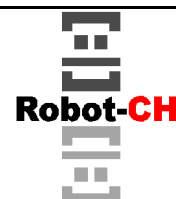
Do the crosses apply to the stands and the skittles or just the skittles on the table?

"Among the random positions, we will make sure that the stands do not end up being placed in the neighbouring boxes". Does "neighbouring" mean simply side by side or also opposed by square's corners ?

Do the stands have to be on the brown squares (see the key of plan 3.1.1)?



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Answer 5:

The crosses apply to the stands and the skittles on the table. These crosses are placed in the brown AND beige squares. More over, neighbouring means side by side (therefore they have joint edges). (See Rules: 3.6.2)

**Question 6:**

How is the draw of the position of the skittles on the stand carried out?

i) one card for the position of the first skittle and one for the second, taking care that there are no skittles in the neighbouring squares?

ii) one card that directly defines the position of the two piles of skittles on the stand?

Is the draw for the pile of skittles without stands carried out after the draw for the skittles on a stand?

It's a bit of a stupid question but with this information we could calculate the probability of positions.

Answer 6:

All possibilities are possible as long as the two squares on either side are not occupied. However, skittles without stands could be on a square side by side with a square with a stand.

**Question 7:**

Are skittles found in the ditch counted?

Answer 7:

The playing area consists of two floors, the ditch and the bridges; therefore any skittles found in the ditch will be counted. However any robot whose strategy is to put skittles in the ditch will not be approved.

**Question 8:**

Is it possible to take a skittle and drop it in the opposing camp (a red skittle in the red camp instead of in the green camp)?

Answer 8:

Yes, that's possible.

**Question 9:**

Can we install magnetised stands, in order to secure the skittles that we take up (I don't think so but you never know)?

Is it possible to put a hoop around the skittles in order to stabilize them and make these more difficult to lie down?

Answer 9:

No, this is forbidden. In fact, the robots must be composed of elements which are dependent of each other (and therefore cannot be placed on the playing floor)

(See Rule: 4.6). A ball is not considered as being part of a robot.

**Question 10:**

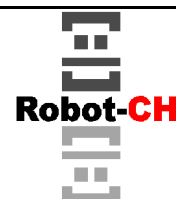
What happens if a skittle falls off the table or falls into the ditch? Are they replaced immediately on the table? If so, in what position?

Answer 10:

A skittle which falls off the table is not put back into play. If it falls onto the playing area (floor, bridges, ditch) it stays there as long as the robots do not come to move it. (See rules: 6.4.1).



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A robot which systematically knocks skittles off the table could be disqualified (see rule: 6.4.3) and will stay disqualified for the following matches until it has been re-approved. (See rules: 7.1).

### Question 11:

A skittle cannot be thrown or carried in order to knock over other skittles. But, when a skittle falls, it will knock over others?

Answer 11:

A skittle must not be used as an extension of a robot. However, during an encounter between a robot and a pile of skittles, it is obvious that skittles will knock over other skittles, so it is therefore authorised.

### Question 12:

Is it authorised to move skittles from their initial position? I don't mean throwing them into the ditch.

Answer 12:

Yes, moving the skittles is authorised, without throwing them, as long as you respect the maximum number of skittles carried.

### Question 13:

Is intentionally putting a skittle on the bridge (which is in the ditch) considered to be forbidden?

Answer 13:

The bridge, being the upper part of the floor, is not part of the ditch. It is therefore completely authorised to place them there no matter wherever they come from.

### Question 14:

Do the strips have to be alveolar (like retro-reflectors on a bicycle) or can they have a mat finish (like a security strip found on road-menders' jackets)?

Answer 14:

For your tests you can use what you like but during the competition only the reflectors described in the rules (See rules 8.2) can be used.

## THE BEACONS

### Question 15:

What is the height of the beacon support of the secondary robot?

Answer 15:

The height of the beacon support is the same for the two robots. We do not differentiate between the principal robot and the secondary, but the two robots are considered to be the same .

### Question 16:

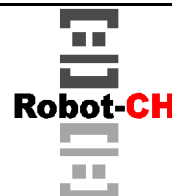
If a robot reaches the ditch without taking the bridge, it could end up having one wheel on the bridge and the other in the ditch (possible with a good road stability and large wheels) but in this case the beacon support is no longer horizontal at 480 mm from the ground ....which is against the rules.

Therefore, does it have to permanently keep the height and stability of its beacon's support?

If the answer is "no, but there are some exceptions": (i.e. exceptions to point 4.9), please could you be as precise as possible concerning the terms and conditions:



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- does this apply to "crossing the ditch", "passing over a stand",
- the position of the support BEFORE the departure.

Answer 16:

It is normal and tolerated that the beacons are not always at the right height or in the right direction. The height of the mast of the beacon is measured on the robot when it is placed on the level of the playing floor. Similarly, regarding the legged robots, it is tolerated that the height of the beacon sways between  $-/+ 5\text{mm}$  (see rules chapter 4.9).

### Question 17:

An error seems to have been made concerning the beacons:

"In all the drawings the beacons are on the same side of the robot, but in the chapter "beacons", it is stated that they are on the opposite side...."

Answer 17:

No, the fixed beacons are on the opposite side of the robot's starting position. The regulation drawings on line on the internet site are correct. Do not mix up the colour of the robot with the colour of the beacons taken on board by the robot, which belong to the opposing team!

### Question 18:

Is it possible to install cameras on the fixed beacons and to transmit uncut images to the robot(s)?

Answer 18:

Yes, any kind of sensor or mechanism can be installed on the beacon, as long as the aim is not to interfere with the opponent. If the beacons prove to be perfectly inefficient, the referees have the right to ask you to withdraw them.

In general, all intelligence in the beacons is allowed and even encouraged as long as it is not there to disturb the opponent. (See rules 5.1. and 5.2.).

### Question 19:

Is the flat surface covered in Velcro obligatory?

If so, can we personally choose after the brand?

Answer 19:

There is a risk of being disqualified if you do not use it. And yes, the team can choose the brand, but this must be able to be changed (green/red) (see rule 6.1)

### Question 20:

Are we allowed to take apart a mast of a beacon taken aboard if the opponent doesn't have a beacon to place on top?

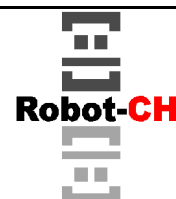
Is "the distance separating it (the beacon support taken aboard) from the edge of a non-deployed robot not being able to be less than 50% than that separating the other edge" a strict rule and an approval condition or not?

Answer 20:

It is not permitted to take apart the mast of a beacon which has been taken on board. The detail of 50% for the position of the mast is checked at the approvals. This is necessary so that the beacon support taken on board is not placed on the edge of the robot, without necessarily eliminating a team whose aid is not perfectly centred. Be careful: a mast on a symmetrical axe is not necessarily centred. (See rule: 4.9).



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## Question 21:

So, we would like to know whether, when using two robots, are these two robots allowed to communicate with each other, as well as using the fixed beacons to form a triangulation so that the robot knows where it is on the floor? Is it possible to use different codes for each beacon on the signal as well as another to communicate between the two robots?

## Answer 21:

The robots are allowed to communicate with each other and different codes can indeed be used for each beacon. (See rules 5.2 and 5.3).

## Question 22:

Are we allowed to connect a beacon to our robot with a wire if the latter is the departure cord?

## Answer 22:

No, this is forbidden (see rules: 5.2 and 5.3).

## INSTALLING THE ROBOTS BEFORE THE DEPARTURE

## Question 23:

Departure in a single move: Is a departure using a wire in each hand considered as a single move?

## Answer 23:

You are obliged to extend them so that the two can be held in one hand.

## Question 24:

Are the robots put in place by the teams after having seen the position of the random bridges and if yes, are we allowed to take this in account?

Are the robots allowed to scan the table before the departure?

## Answer 24:

The robots are placed in the starting area (the target's colour is known), one of which is in contact with the edge of the playing floor (direction and position are not important): from this moment, it is forbidden to touch the robots until the end of the match. Afterwards the items of the game (stands, skittles, and bridges) are put into position by the referees. If the robots need to scan the table before the start, this is tolerated but it is up to each robot to detect that each item is in place and secure. (See rule: 6.2)

## Question 25:

Are the two team members around the table allowed to go and regulate their beacons on the other half of the floor (if they are placed there) as long as the preparation time has not run out? (Need to configure the beacon.)

## Answer 25:

Yes, within a reasonable timeframe; this must not interfere with the opponent's preparation.

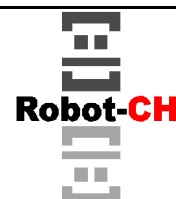
## INTERACTION OF THE ROBOT, BALLS, SKITTLES

## Question 26:

Storage of the skittles:



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taking an example where one team must lay down the green skittles:

1) Can a robot pick up the green skittle and keep it throughout the whole match in order to put it lying down at the last second?

2) Can a robot pick up a red skittle and keep it with him until the end. As the skittle is inside the robot it can't bring in any points? (Therefore the opponent can only score a maximum of 14).

1(ii) the robot can take a skittle and go and put it somewhere where it is difficult to pick up. That seems clear to me with the current regulations. What is the difference between that and point 1 (If it is not accepted)?

2(ii) if a robot tries to take up a skittle, what is the difference between that and point 2?

Answer 26:

The case n° 1 is allowed (but in this case the robot is limited in its activities: it is already at half of its simultaneous skittle carrying capacity (physical limitations see III.3), if not there is a penalty (see non approval).

For case n° 2, if the robot can not eject the skittle, it is not approvable (see III.5). In the opposite case, it is up to the referees to sanction according to their own opinions. (Repeated action during the match for example) either a penalty or a disqualification followed by a re-approval.

The case in n° 1(ii) is clearly a case of authorised intelligent defence.

As regards case n° 2(ii), we consider that this is part of the game .... At the end of the match, a skittle that has been made inaccessible by a robot doesn't count (see III.4).

### Question 27:

Are the robots allowed to shoot balls at the skittles? (i.e. in the air and not just on the table) or do they have to really roll on the ground?

Answer 27:

Yes the robots can shoot balls at the skittles.

### Question 28:

Can the skittles be put back up again anywhere?

Answer 28:

Yes, the skittles can be put back up again anywhere on the table.

### Question 29:

Does a robot have to be on the other side of the ditch when it knocks the skittles over?

Answer 29:

No, the robots can be anywhere they like when they knock the skittles over.

### Question 30:

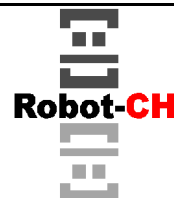
What would happen if a robot knocked over a skittle by direct contact, accidentally or on purpose?

Answer 30:

Both are allowed. Nevertheless this move enters in the deployed perimeter which you have to check. Moreover, a robot mustn't carry more than two skittles at the same time.



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## Question 31:

It a robot grabs the big black bowl and carries it in front like a "bumper" and knocks the skittles over, is this allowed?

Answer 31:

Yes, this is allowed.

## DIMENSIONS OF THE ROBOT

### Question 32:

In chapter 4.6 of the rules, it is stated that, » Throughout the whole match, the total of the robot's deployed P1 perimeter + the robot's P2 perimeter must be less than 2m".

Is it possible to have a configuration of the following type?

Non-deployed:

P Robot 1 = 80cm

P Robot 2 = 50cm

The first 30 seconds of the match:

P robot 1 = 150cm

P robot 2 = 50 cm

The last minute of the match:

P robot 1 = 80cm

P robot 2 = 120cm

In conclusion, whatever the time, P1 +P2 less than 2m, even if the max (P1) + max (P2) =270cm. Would this be a problem?

Answer 32:

This is forbidden. The calculation is made with the two deployed robots at the same time at maximum capacity.

### Question 33:

Is it possible to start off with a small robot underneath the main robot, while once stacked they do not go over the regulated height?

Can we put a small robot inside a big one?

Answer 33:

Why not, as long as they respect the regulated dimensions and that both robots respect all the restrictions, including the one regarding the masts.

The departure perimeter is, therefore, in this case that of the bigger robot.

(See rule: 4.6)

### Question 34:

Bumpers are "advisable" but however, the rules demand a certain height..... Please choose between:



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- It is advised to have a centre of 70mm height, but this is not an approval point.
- It is obligatory.... Please be more precise about the full dimensions.

Answer 34:

If there is a bumper, it is advised to be at a height of 70mm. However, this will not be a point for approval.

### THE TABLE

#### **Question 35:**

"They are forbidden to use the edge of the table in order to make this crossing". I would like to know why this is not allowed. And why is this rule detrimental for the game?

The sentence " They are forbidden to use the edge of the table in order to make this crossing [the ditch]" does this mean:

- that we can not touch the edge while crossing?
- that we can touch it... but not intentionally....?
- that we cannot lean on the top or the outside of the edge, but we can run alongside it?

Answer 35:

A robot cannot lean on the top or the outside of the edge in order to reach the ditch, but can run alongside it or use it to reposition itself. We believe that hanging on to the edge makes the positioning and crossing the ditch far too easy. Nevertheless, the robots are not obliged to use the bridges!

#### **Question 36:**

Is there a wall, a protection net around the playing floor? And is the surrounding area in the same colour across the board?

Answer 36:

No, there is neither a net nor the same colour in the surrounding area.

### REAPPROVALS

#### **Question 37:**

Is the match replayed when the robot has been re-approved? Or are some other measures taken?

Answer 37:

Penalties or a scratch may be given for the current match, but it is not replayed.

Nevertheless, according to referees' decision, a robot must be re-approved before being able to play the next match. (The robot has to be re-approved as soon as the match is finished)

(See rules :7.1)

### MISCELLANEOUS

#### **Question 38:**

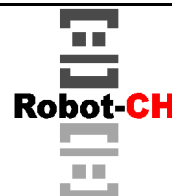
High intensity lighting dangerous for eyes?

Answer 38:

The lighting must not dazzle eyes. The lighting should not be too strong. If possible look into the technical specifications of the light source.



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**Question 39:**

For what reasons could match strategies be judged as bad fair-play? The fact that interference and vibrations are forbidden, I can understand, but what about game strategies?

Answer 39:

This falls under the referees' own judgement.....

It is up to each team to decide on its own choice of strategy. Good fair-play means accepting the game as it is described in the rules, and not getting around them using strange tricks and preventing the opposing team from participating by make their robots non functional.

P.S:

EXPLANATION REGARDING YOUR SUGGESTION NOT ACCEPTED

A]

An idea to change the competition table in order to avoid robots of the "big wheels which go straight on" type:

All that needs to be done is to set the edge of the table at a height of 36mm, which is the same size as the depth of the ditch. Robots which force their way over the ditch should, if it doesn't control itself a little, go over the edge of the pitch straightaway.

Answer:

NO: it is too risky for the robots. They risk being destroyed.

(See rules 4.2.1)

B]

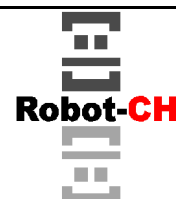
With the aim of avoiding having "bulldozer" robots, why not invert a set of skittles?

Answer:

Impossible: this small detail would mean significant game changes in reality.



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