

# DURACELL®

## LITHIUM COIN FEATURES AND TECHNOLOGY

FOR 2032, 2025, AND 2016  
LITHIUM COIN BATTERIES



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## INTRODUCTION

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Duracell has a tradition of investing in features that can help keep children safe, with a special focus on its lithium coin batteries. Its latest innovation is a bitter coating on the cell that helps to deter accidental ingestions. Duracell's retail packaging is also child-secure, which means it is nearly impossible to open with bare hands.

### What are the technologies that help prevent children from ingesting lithium coin cells? —

Duracell has a collection of innovative safety features connected to their increasingly popular and efficient 2032, 2025, and 2016 lithium coin cells. The safety features are applied to these batteries only, since these are the ones that all have a diameter of 20mm, which is similar to the size of a child's esophagus (food pipe). Each 2032, 2025, and 2016 battery is now equipped with the latest safety innovation: a colorless ring of an extremely bitter substance applied to the backside of the coin cell. This non-toxic bitter substance is designed to compel those who put the battery in their mouth to immediately spit it out. Additionally, a warning icon is engraved on the front of the cell to warn parents to keep lithium coin cells away from children. Furthermore, Duracell's Child Secure Pack features a tough double

blister around the lithium coin cell, that makes it nearly impossible to open with bare hands. In order to retrieve the batteries, the pack must be opened with a pair of scissors. In addition to these, a warning message is featured on the pack to reinforce the message of keeping the batteries out of reach of children.

### Why is Duracell's new safety technology important? —

Duracell's new safety technology is important because it is another line of defence in the unfortunate event of a child getting their hands on a lithium coin cell. The majority of cell ingestions occur due to loose or used batteries that are not inside a device. If a child manages to get access to a lithium coin cell and swallows it, the cell might get stuck in the esophagus. If the battery gets lodged there, a chemical reaction can occur and damage or even burn through the tissue of the esophagus, resulting in very serious consequences. Consequences can become serious. If not detected early enough, internal bleeding might occur, potentially leading to a fatal outcome. In order to help prevent such accidents and help keep children safe, Duracell provides more child-safety features related to its lithium coin cells than other leading brands.

## BITTER COATING

2

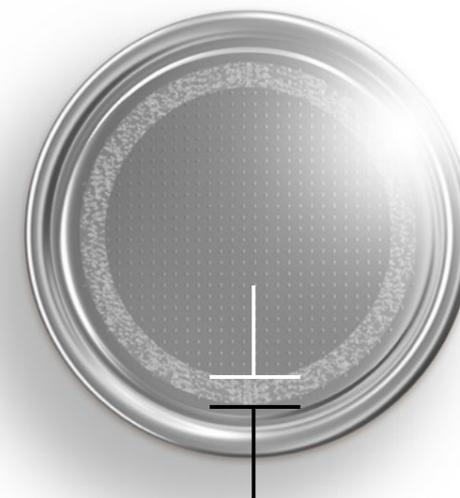
### 1 Which Duracell batteries have the bitter coating? —

2016, 2025, and 2032 size lithium coin cells.

### 2 Does the bitter coating in any way hamper the performance of the battery? —

No, the performance of the battery remains the same. Duracell tested their operation in a wide range of devices, and has successfully verified that the bitter coating does not affect the cells' performance.

As the applied bitterant is non-conductive, Duracell's guidance to device manufacturers is to consider this a contact free zone. Attempting to push through the bitterant might not achieve consistent contact.



avoid 3.2 mm area from the edge of the cell

### 3 What does the bitter coating do? —

The bitter coating discourages the potential swallowing of a lithium coin cell. The cell has a non-toxic, bitter tasting layer on the back side. When this comes in contact with saliva, it is identified as a potential toxin by the brain, prompting an immediate physical reaction.

### 4 What is the bitter coating made of? —

The bitter coating is made of denatonium benzoate, a non-toxic bitter substance that is designed to compel those who put the battery in their mouth to immediately spit it out.

### 5 Can the Duracell coin cells equipped with the bitter coating still be recycled? —

Yes. The bitter coating has no influence on the recyclability of the cells.

### 6 Can the bitter coating be removed? —

While it is possible to remove the bitter coating with some scrubbing, it is not recommended as it is there to help prevent accidental ingestion.

### 7 Why is the bitter coating only applied to the back of the cell? —

The bitter coating quickly dissolves in saliva and reaches the taste buds regardless of which way the cell enters the mouth. Furthermore, the perimeter of the negative terminal was the best place to apply without affecting the battery contact in devices.

### 8 How and where is the bitter coating applied to the lithium coin cell? —

The bitter coating is applied in our factory to the outside of the finished cell, on the negative terminal (or the back), prior to packaging.

### 9 What is the level of concentration of the bitter coating applied to cell? —

This information is part of Duracell's proprietary technology and cannot be disclosed.

### 10 Can the bitter substance have a negative effect on people's health if swallowed? —

The bitter coating is made of denatonium benzoate, a non-toxic substance which is safe and causes no harm. Current toxicology reports are available upon request.

### 11 Can the bitter substance cause an allergic reaction, or even an anaphylactic shock? —

Based on the toxicology / safety assessment of denatonium benzoate at the anticipated levels of exposure for this use, it is not expected to cause an allergic reaction or an anaphylactic shock. However, we advise you to contact your doctor if you notice anything unusual.

### 12 How do I best neutralize the bad taste of the bitter substance? —

The mouth can be rinsed with water. Additionally, sweets (e.g. chocolate) or mints may be consumed to gradually decrease the bitter taste.

### 13 Why is the bitter coating only applied to lithium coin cells instead of all coin size cells? —

The bitter coating is only applied to the increasingly popular 2032, 2025, and 2016 lithium coin cells as it is these batteries that come with a diameter of 20mm, which is similar to the size of a child's esophagus (food pipe).

### 14 How long will the bitter coating stay bitter? Will its effectiveness decrease over time? —

Duracell has data from the manufacturer supporting effectiveness for 5 years, however, the manufacturer does not expect significant degradation even after five years.

### 15 Is the bitterant flammable? —

No.

### 16 Is the bitterant toxic? —

No.

### 17 If Duracell lithium coin cells are exposed to very cold or hot temperatures, will the bitter coating be negatively affected? —

Our coating has been tested in low temperatures, high temperatures, and high humidity. Under these extreme conditions the appearance of the ring may change, but it remains effective. However, it is recommended not to store the battery under conditions higher than 104 degrees Fahrenheit / 80% relative humidity over long periods of time.

### 18 Will high humidity environment cause the bitterant to transfer easily? —

The bitterant is designed to transfer when it comes in contact with saliva. Hence an environment with high humidity might increase the likelihood of transfer.

### 19 Does the bitterant flake, chip or powder in high temperature climates? —

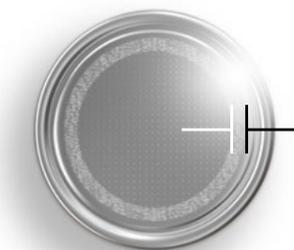
Such incidents were not observed, all temperature tests proved the coating to be stable under high temperature environment conditions.

### 20 Can the bitterant become airborne? If it does, is there a risk of inhalation? —

No, the bitterant coating does not create any dust particles.

### 21 Does the cell conductivity get affected? —

No conductivity issues have been observed during our tests. It is recommended that device manufacturers avoid the 3.2 mm perimeter area while making contacts.



avoid 3.2 mm  
area from  
the edge  
of the cell

Ring Inner diameter: 14.5mm (min=14.0mm)  
Ring Outer diameter: 16.5mm (min=16.0mm)

### 22 What if the device contacts scrape off the bitterant? —

This effect has not been observed in Duracell testing.

**23 What dissolves the bitterant other than water and saliva? —**

The bitterant has not been tested with oils but cleaning solvents such as alcohol may dissolve it.

**24 Is there an MSDS sheet for the bitterant? —**

Yes, please see it below.

**25 Once the bitter coating comes in contact with liquid / saliva, is it rendered useless? Can the coin cell still be used? —**

Following the first 'exposure', some - if not all - of the bitter coating will dissolve. While the lithium coin cell itself may still power a device, it is recommended to discard it and use a new one. This is in order not to compromise on the benefit of the bitter coating helping to protect children from an accidental ingestion.

**26 Why do you offer such technology only now, when many kids have already suffered or even died from coin cell ingestion? —**

Every new technology takes time to develop. From the first concepts it

might easily take 5-10 years to achieve technical readiness and get the qualification to launch. It is of paramount importance to ensure that a technology works flawlessly, delivers its benefit on a large scale and is safe to use. With the increased importance of lithium coin cells in our daily lives and the rapid growth of this category, Duracell has accelerated the development of the bitter coating. That is why today Duracell is the only portable battery producer to use such technology.

**27 Are there any studies that seem to suggest that a bitter coating on a lithium coin cell is ineffective? —**

There will often be two or more opinions / different schools of thought concerning a topic or technology. At Duracell, we have carefully reviewed studies and data concerning the effectiveness of our bitter coating to reduce accidental ingestion. Essentially, there's sufficient scientific data, which proves the positive effect of a bitterant in the aforementioned context:

<https://www.ncbi.nlm.nih.gov/pubmed/8351798>

<https://pubmed.ncbi.nlm.nih.gov/7185601/>

**LITHIUM COIN CELL SAFETY****28 If lithium coin cells are apparently that harmful, should they not simply be banned? —**

Lithium coin cells power many devices that improve lives, including family safety, security, and health. When handled correctly and as intended, lithium coin cells are safe to use. They should be kept out of reach of children and used in devices featuring a battery compartment secured with a screw. Reputable battery manufacturers also offer a child secure pack. However, Duracell is the only company to offer a double blister Child Secure Pack (minding those cases when batteries are accidentally placed and forgotten in the kitchen drawer or on the counter top) and a bitter coating applied to the lithium coin cells (because we know that sometimes the key fob or the remote control does not feature a safety screw for the battery compartment).

**29 Are you planning to develop more, or different features for your lithium coin cells that are intended to help with keeping children safe? —**

Yes, we plan to introduce more and different safety features for our lithium coin cells. However, for competitive reasons these can only be disclosed in due time.

**30 Other than the bitter coating, what is Duracell doing to keep children safe? —**

Besides the latest bitter coating technology, Duracell offers a tough double blister pack that is nearly impossible to open with bare hands. In order to retrieve the batteries, the pack must be opened using a pair of scissors. In addition to that, there is a warning on the front of the pack that communicates to keep batteries out of reach of children, and there is an engraved warning on the cell itself.

**31 If the battery cavity is already secured/child safe, will this solve the problem? —**

No, our research suggests it is often batteries left out after being replaced which are ingested. Even discharged coin cells have enough energy to cause the damage if ingested.



## DURACELL'S ADVICE ON COIN CELL INGESTION 4

### 32 Does Duracell have any advice for parents / guardians to help prevent coin cell battery ingestion?

Yes, since we know that the safety of children is every parent's #1 priority, here are some simple measures to take at home that can prevent accidental ingestion of lithium coin cells by babies or toddlers:

- Store all small batteries out of sight and reach of young children.
- Only remove batteries you need.
- Only choose battery powered devices with battery compartments secured with a screw.
- In lack of such a screw, secure battery compartments with a piece of tape.

### 33 What happens if a battery is swallowed?

A battery can cause serious injury if swallowed or ingested. It is especially true in case of lithium coin cells with a diameter of 20mm as that is similar to the size of a quarter and of a child's esophagus (food pipe). If the battery gets lodged in the esophagus, a chemical reaction can occur and damage or even burn through the tissue of it. For additional information on button / coin cells' safety please visit:

<https://buttonbatterysafety.com/>

### 34 What action should be taken if a child swallows a battery? —

If you suspect a child has swallowed a battery you should immediately seek emergency medical attention. The medical professionals will also need to be informed about the type of battery that was swallowed.

**If you have any questions call the National Battery Ingestion Hotline at 800-498-8666.**

### 35 Can swallowing a battery be fatal?

If a lithium coin cell gets ingested, it can cause serious injury, potentially leading to a fatal outcome. If the battery gets lodged in the esophagus, a chemical reaction can occur and damage or even burn through the tissue of it. If a battery is swallowed, a visit to the emergency room should be immediate. The medical professionals should be informed about the type of battery that was swallowed. **If you have any questions call the National Battery Ingestion Hotline at 800-498-8666.**

For additional information on button / coin cells' safety please visit:

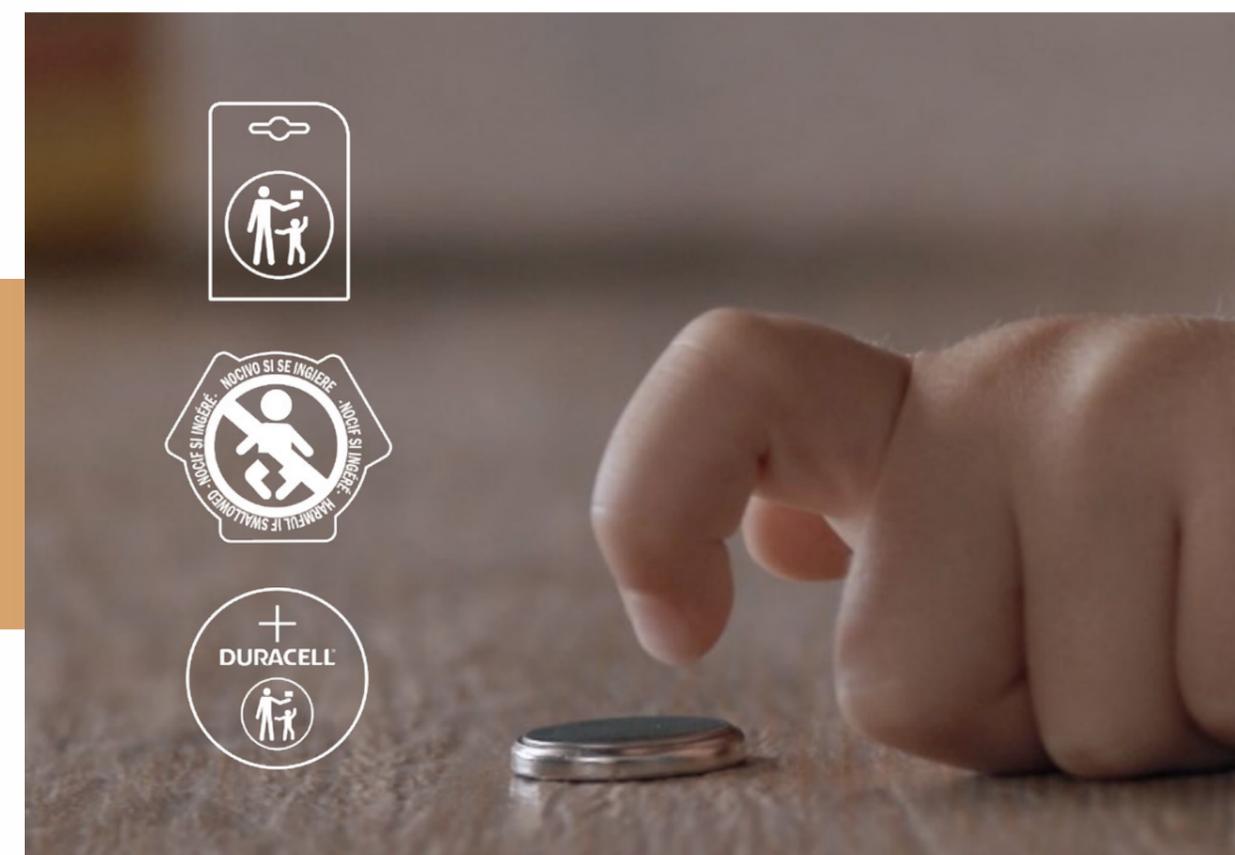
<https://buttonbatterysafety.com/>

### 36 What is the difference between a 'coin' and a 'button cell' battery and do both pose the same risk?

Coin and button cells derive their names from their shape and size. The button cells have the size of a button and an average diameter of 5-10mm. Due to its small size, if ingested, the button cell can pass through the body. Coin cells resemble the shape and size of a coin. Their most common diameter is 20mm, which is similar to the size of a quarter and of a child's esophagus (food pipe). If ingested, there is a high risk that the 20mm coin cell may get stuck and cause potentially serious damage to the surrounding tissue.

### 37 "Can I taste the battery?" —

Do not put the battery in your mouth. It could shock you and while the bitter substance is safe, it is placed on the battery to help prevent accidental ingestions. During a "taste", some - if not all - of the bitter substance will dissolve. While the lithium coin cell itself may still power a device, it is recommended to discard it and use a new one. This is in order not to compromise on the benefit of the bitter coating helping to protect children from an accidental ingestion.



## CELL HANDLING

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**38 Do employees handling the cells need to be protected or follow a hand washing procedure?**

It may be possible that the bitterant can build up on fingers over time, which may cause this to transfer to other batteries. If employees notice any build up on skin, please wash it with soap & warm water immediately. It is also suggested for the employees to use gloves for handling along with washing their hands with soap & warm water after each shift.

**39 If the bitter substance accidentally comes into contact with the fingers or the skin, do they need to be washed immediately?**

The bitterant is a water-soluble substance, which is effective when it comes into contact with the mouth's saliva. Its transfer to hands would depend on the humidity level of the environment and the level of moisture that is present on the operator's hands (e.g. sweat, recently applied lotion / moisturiser, residue after hand wash). We do not expect the bitterant ring to get completely removed during normal handling. However, it is possible that some of the bitter substance may transfer to the fingers or skin. Duracell recommends

washing hands with soap and warm water after touching the coin cell, thus eliminating any traces of the bitter substance.

**40 Is there an eye washing procedure to follow if the bitterant comes in contact with eye?**

The manufacturer of Bitrex® recommends rinsing cautiously with water for several minutes. If present and easy to do, remove contact lenses. Continue rinsing. If eye irritation persists, get medical advice / attention.

**41 What happens if the bitterant gets inhaled?**

Go to fresh air and rest in a position comfortable for breathing. Call a poison center or doctor / physician if you feel unwell.

**42 Should people handling the cells wear masks, gloves and eye protection?**

Gloves are recommended to avoid moisture transfer between fingers and cells.

**43 Are any other body parts sensitive to the bitterant?**

None specified. Please see the Safety Datasheet below:

**44 Would a wet finger "smear" the bitterant out of the well-defined application zone into the centre?**

Under normal operating conditions, bitterant ring is rigid and is not easily smeared.

**45 Will the bitterant transfer to handling equipment like a pick and place machine?**

This is not expected under normal temperature and humidity conditions

**46 Can the bitterant transfer to working surfaces if batteries are placed there often or consistently over time. Is there a procedure for cleaning work surfaces?**

This is not expected under normal operating conditions. In case it happens, rubbing alcohol on the surface should effectively remove any residue.

**47 Does the bitterant pick up debris?**

This is not expected to happen during normal handling and under normal operating conditions.

**48 Will the bitterant transfer to clothing and stain it? How should the clothing be cleaned?**

This it not expected to happen under normal operating conditions.



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