



# iPhone 12 Pro Max

## Apple Recycler Guide

June 2023

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# About This Guide

Apple Recycler Guides provide guidance for electronics recyclers on how to disassemble products to maximize recovery of resources. The guides provide step-by-step disassembly instructions and information on the material composition to help recyclers direct fractions to the appropriate material recycler.

To conserve important resources, we work to reduce the materials we use and aim to one day source only recycled or renewable materials in our products. A key path to reaching that goal is resource recovery from end-of-life electronics.

Disassembly procedures are intended to be performed only by trained electronics recycling professionals. The recycler is responsible for independently evaluating and ensuring compliance with all applicable environmental, health, and safety laws related to the work. These include but are not limited to laws relating to the management, handling, shipping, and disposal of the outputs of this work as waste and laws in place to ensure the health and safety of all employees who support this work.

For questions or feedback about this guide, email [contactesci@apple.com](mailto:contactesci@apple.com).

# Identification

You can find the model number of the iPhone inside the SIM tray slot.



*Model numbers:*  
A2342, A2410, A2411, A2412

# Components Requiring Selective Treatment

The following substances and components should be removed for selective treatment in accordance with Annex VII of Directive 2012/19/EU.

<b>Substance/Component</b>	<b>Apple Part Name</b>	<b>Removal Instructions</b>
Printed circuit board if the surface is greater than 10 square centimeters	Main logic board	Follow steps 1–11
External electric cables	Power adapter	Follow step 1
Battery	Lithium-ion polymer battery	Follow steps 1–5
Cover glass and organic light-emitting diode (OLED) display if the surface is greater than 100 square centimeters	OLED display	Follow steps 1–4
No further substances or components as listed in Annex VII		

# Safety Considerations

The recycler is responsible for independently evaluating all activities undertaken by its employees to perform or support the work and ensuring compliance with all applicable health and safety laws related to the work. These include but are not limited to laws relating to the health and safety of all employees who perform or support this work. The recycler is also responsible for evaluating the workspace and ensuring that the area in which the work is to be undertaken is designed using ergonomic best practices and meets all ergonomic requirements to ensure the protection of its employees.

## Personal Protective Equipment

Personal protective equipment should be worn during the entire recycling process.



Wear hand protection



Wear a mask



Wear eye protection



Wear foot protection



Wear protective clothing

## Battery Safety

This product uses a lithium-ion polymer battery. Before beginning any disassembly work, ensure that a safe working procedure for handling lithium-ion batteries has been established, which could include discharging the batteries so that they can be more safely managed. The following considerations may also be included:

- Remove anything from your person that could conduct energy, such as jewelry and watches, to avoid electric shock to yourself or the logic board.
- To avoid the potential for thermal runaway and the release of potentially noxious fumes, don't puncture, strike, or crush lithium-ion polymer batteries or devices powered by them.
- Don't throw, drop, or bend the battery.
- Don't expose the battery to excessive heat or sunlight.
- Don't use tools that are sharp or conduct electricity.
- Keep your workspace clear of foreign objects and sharp materials.
- Dispose of batteries according to local environmental laws and guidelines.

## Workspace safety guidelines

- Use heat-resistant gloves and safety glasses.
- Keep a sand dispenser within arm's reach (2 feet or 0.6 m) on one side of the workstation, not above the workstation. The dispenser should be a wide-mouthed, quick-pour metal container with a flip-top lid or tray that contains 8–10 cups (1.9–2.4 L) of clean, dry, untreated sand.
- Keep the battery at least 2 feet (0.6 m) from paper and other combustible materials.
- Work in an area with adequate ventilation.

## Handling a thermal runaway

If you notice any of the following signs, a thermal runaway is likely underway, and you should act immediately:

- The lithium-ion polymer battery or a device containing one begins to smoke or emit sparks or soot.
- The battery pouch suddenly and quickly puffs out.
- You hear hissing or popping sounds.

**Don't** use water or an ABC/CO<sub>2</sub> fire extinguisher on a thermal runaway battery or a device containing one. Water and ABC/CO<sub>2</sub> fire extinguishers will not stop the reaction.

**Do** smother the battery or device immediately with plenty of clean, dry sand, dumped all at once. Timing is critical; the faster you pour all the sand, the faster the thermal runaway will stop.

**Do** leave the room for 30 minutes if the thermal runaway causes any irritation.

**Do** wait 30 minutes before touching the battery. Wear heat-resistant gloves and safety glasses to remove the battery from the sand, or use a touchless thermometer to measure the battery temperature. Only touch the battery when the event has finished.

**Do** dispose of the damaged battery or device (including any debris removed from the sand) according to local environmental laws and guidelines.

## OLED Safety

Broken OLEDs must be handled properly to ensure the safety of your employees and mitigate any hazards. Package broken OLEDs in an appropriate container to properly manage the hazards associated with the materials and store only with compatible materials. All waste must be properly classified, packaged, and labeled in accordance with all relevant laws and regulations.

## Hazard Warnings



Broken glass hazard



Chemical inhalation hazard

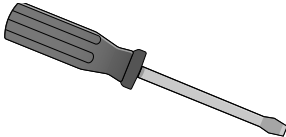


Rechargeable battery hazard

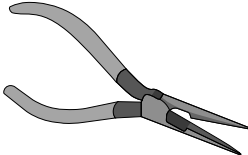


# Recommended Tools

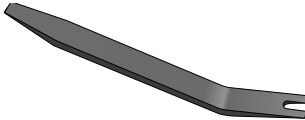
Flat-blade screwdriver



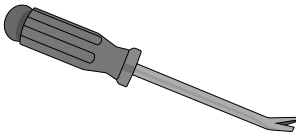
Long-nose pliers



Miniature plastic pry bar



Nail-pulling screwdriver



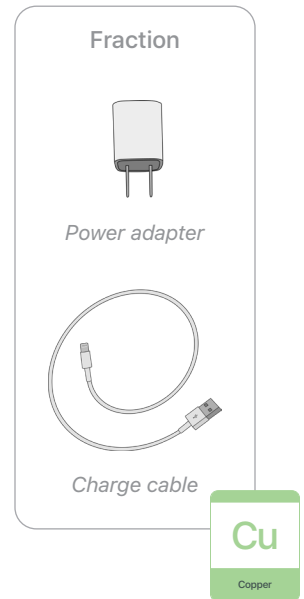
Tweezers



# Disassembly Instructions

## 1. Remove the power adapter and the charge cable.

- » *Ensure that the iPhone is turned off.*
- » *Unplug the power adapter. Disconnect both ends of the charge cable.*



## 2. Remove the display.



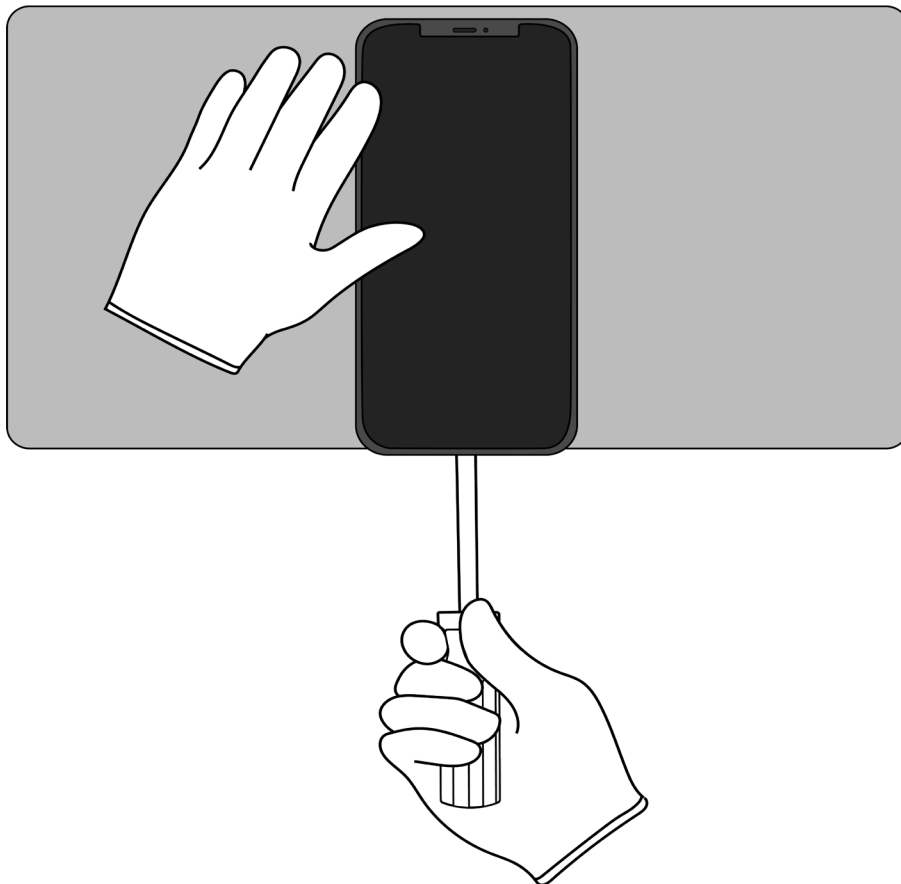
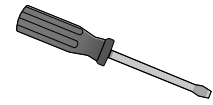
Broken glass hazard



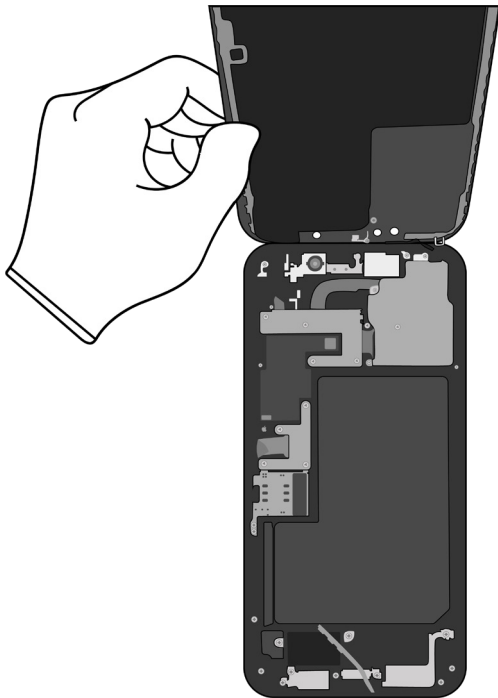
Chemical inhalation hazard

- » *Hold the iPhone at the edge of a counter with the display face up and the Lightning connector toward the counter edge.*
- » *Insert the tool tip into the Lightning connector. Push the handle down to pry the display from the enclosure.*

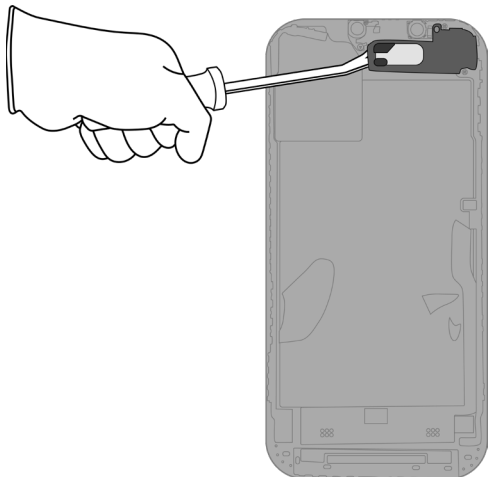
### Tools Used



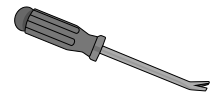
» Remove the display by hand. Set the enclosure aside.



**3.** With the display facing down, pry off the receiver.



Tools Used



Fraction

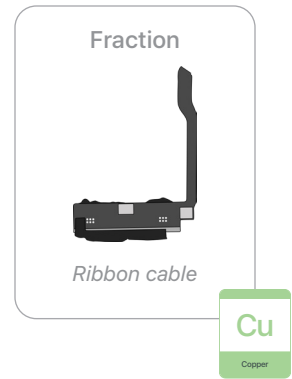
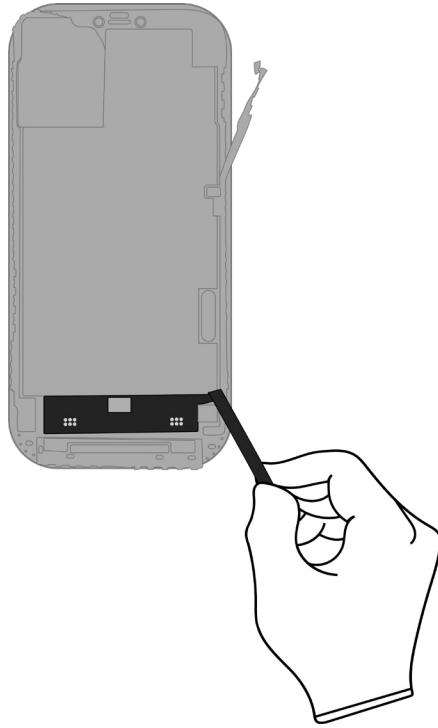


Receiver

REE

Rare Earth  
Elements

4. Pull the ribbon cable off the OLED display.

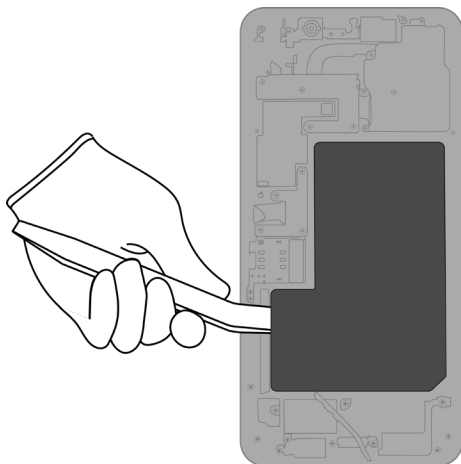


**5.** Inside the enclosure, carefully remove the lithium-ion polymer battery.



Rechargeable battery hazard

- » *Using tweezers, gently peel one of the black battery adhesive tabs away from the battery.*
- » *Twist the tab around the tweezers until white adhesive appears. Continue twisting until the entire adhesive strip is removed.*
- » *Repeat this process for any remaining battery tabs. Continue with the miniature plastic pry bar if needed.*



Tools Used



Fraction

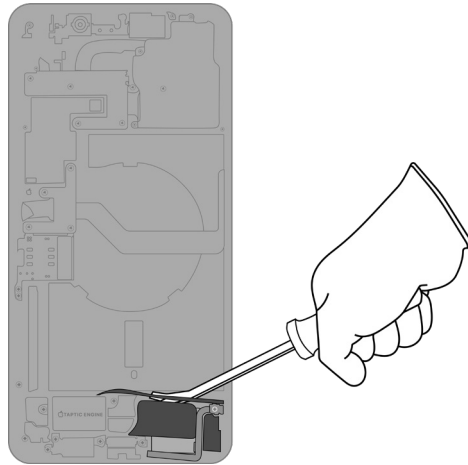


Lithium-ion polymer battery

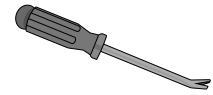
BT

Battery

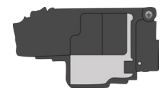
6. Pry off the speaker.



Tools Used



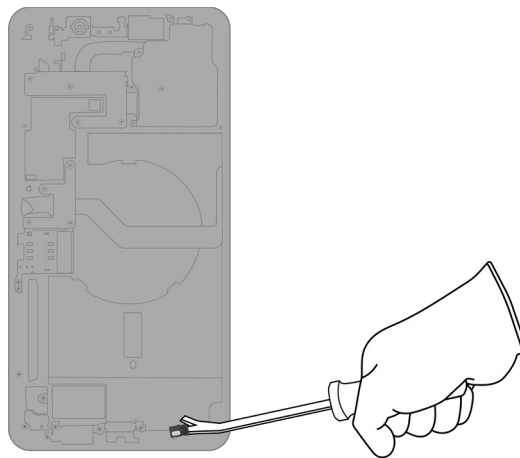
Fraction



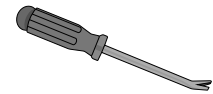
Speaker



7. Pry off the right microphone.



Tools Used



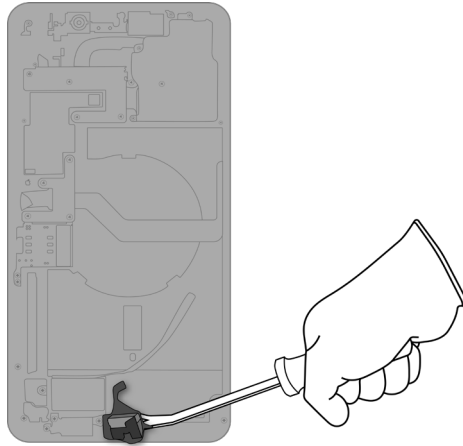
Fraction



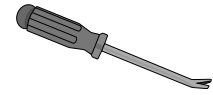
Right microphone



8. Pry off the Lightning connector.



Tools Used



Fraction

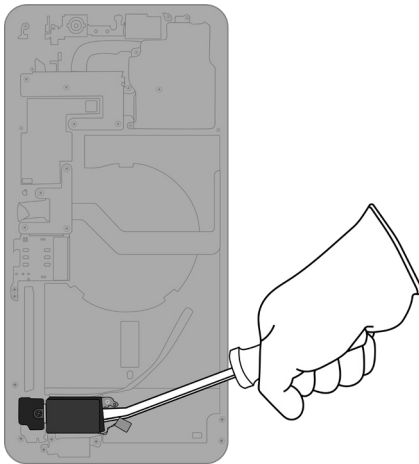


Lightning connector

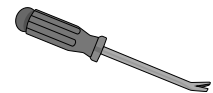
Cu

Copper

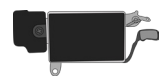
9. Pry off the Taptic Engine.



Tools Used



Fraction



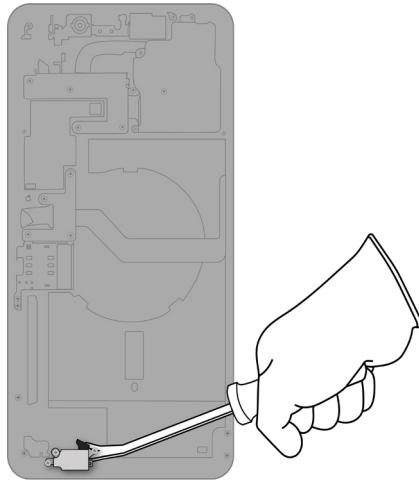
Taptic Engine

REE

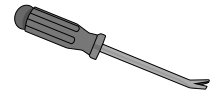
Rare Earth Elements



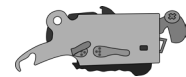
## 10. Pry off the left microphone.



### Tools Used



### Fraction

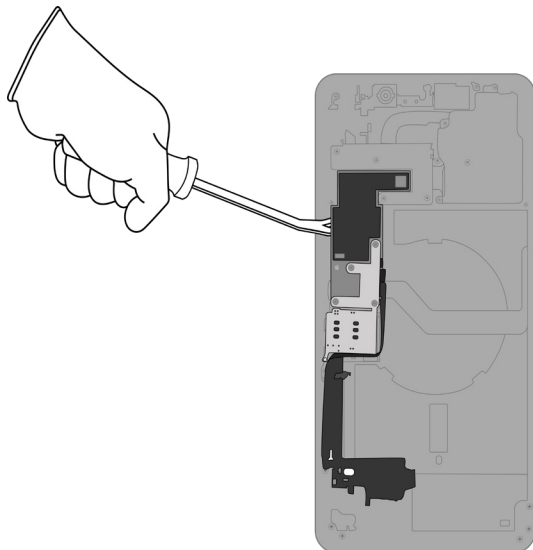


Left microphone

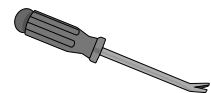
Cu

Copper

## 11. Pry off the main logic board.



### Tools Used



### Fraction

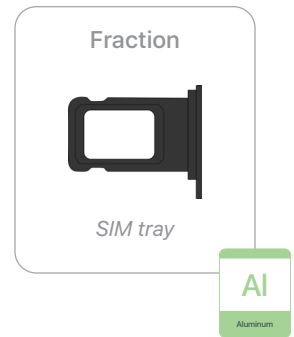
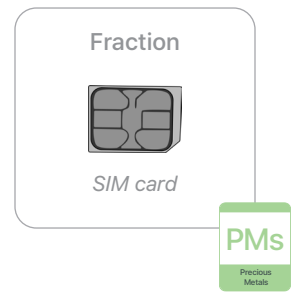
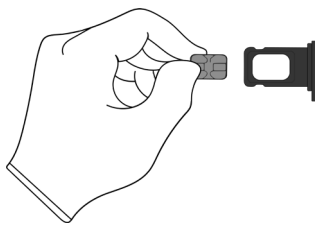
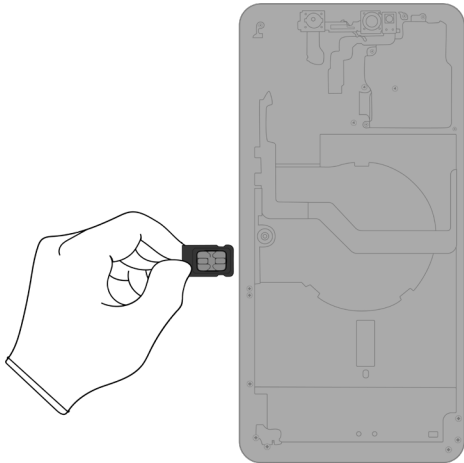


Main logic board

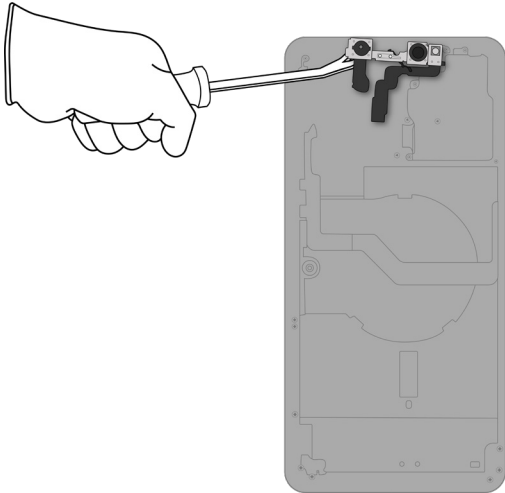
PMs

Precious Metals

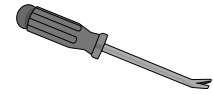
- 12.** Remove the SIM tray. Separate the SIM card from the SIM tray.



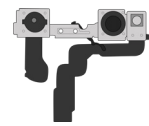
### 13. Pry off the front camera.



#### Tools Used



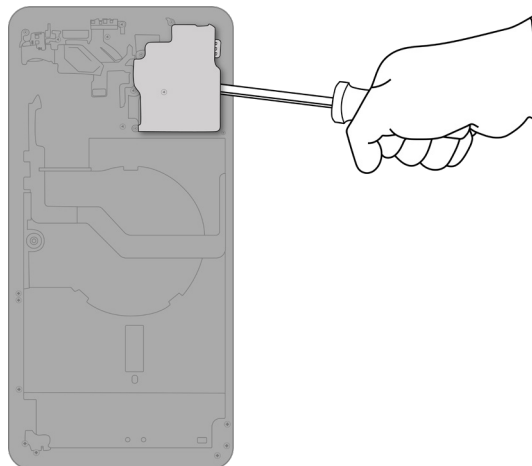
#### Fraction



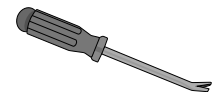
*Front camera*

**PMs**  
Precious Metals

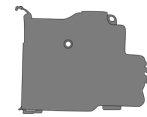
### 14. Pry off the rear camera shield.



#### Tools Used



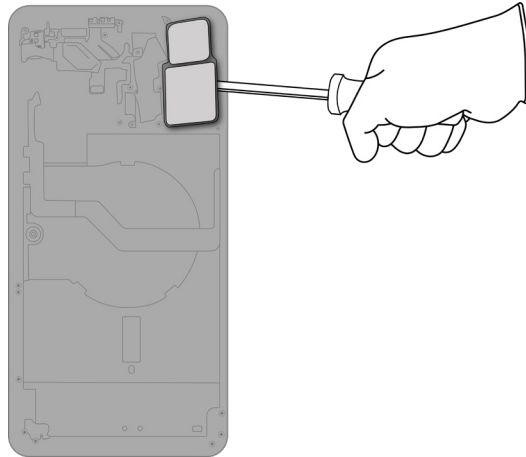
#### Fraction



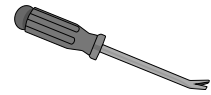
*Rear camera shield*

**Fe**  
Ferrous

## 15. Pry off the rear camera.



### Tools Used



### Fraction

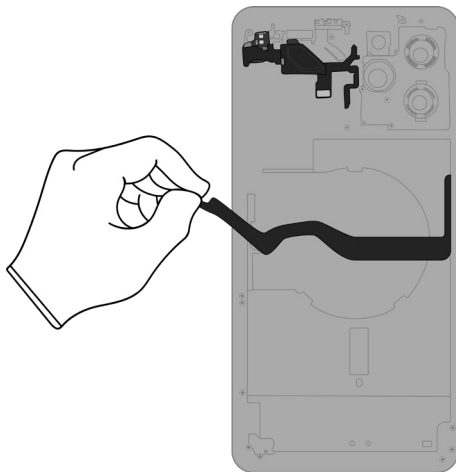


Rear camera

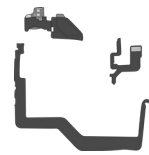
PMs

Precious Metals

## 16. Pull the remaining ribbon cables off the enclosure.



### Fraction

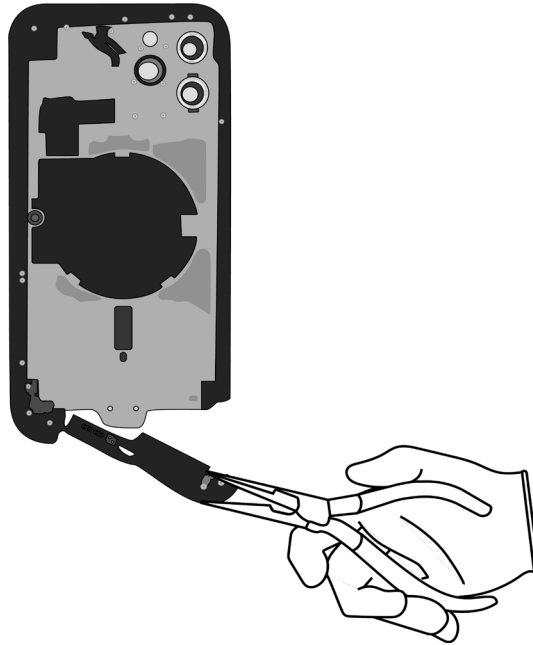


Ribbon cables

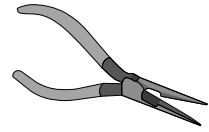
Cu

Copper

**17.** Pull the enclosure band off the support plate.



Tools Used



Fraction

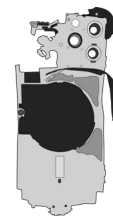


*Enclosure band*

Fe

Ferrous

Fraction










*Support plate*

Cu

Copper

# Material Categorization of Output Fractions

All outputs from this process must be managed, handled, and disposed of in accordance with applicable waste laws and regulations, including but not limited to the Waste Framework Directive and its national enactments in Europe.

Fraction	Downstream Processing
<p data-bbox="435 554 570 579"><b>Aluminum</b></p>  <p data-bbox="461 751 544 777"><i>SIM tray</i></p>	<p data-bbox="964 554 1276 579"><b>Primary Target Material</b></p>  <p data-bbox="1101 646 1133 672">Al</p> <p data-bbox="1101 688 1140 705">Aluminum</p>
<p data-bbox="440 873 565 898"><b>Batteries</b></p>  <p data-bbox="367 1129 638 1155"><i>Lithium-ion polymer battery</i></p>	<p data-bbox="964 873 1276 898"><b>Primary Target Material</b></p>  <p data-bbox="1101 961 1133 987">BT</p> <p data-bbox="1101 1003 1140 1020">Battery</p>
<p data-bbox="448 1251 557 1276"><b>Ferrous</b></p>  <p data-bbox="407 1417 597 1442"><i>Rear camera shield</i></p>  <p data-bbox="423 1764 581 1789"><i>Enclosure band</i></p>	<p data-bbox="964 1251 1276 1276"><b>Primary Target Material</b></p>  <p data-bbox="1101 1339 1133 1365">Fe</p> <p data-bbox="1101 1381 1140 1398">Ferrous</p>

**Fraction**

**Downstream Processing**

**Glass**



*OLED display*

**Primary Target Material**



**Potential Additional Materials**



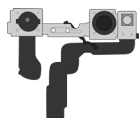
**Logic Boards**



*Main logic board*



*SIM card*



*Front camera*



*Rear camera*

**Primary Target Material**



**Potential Additional Materials**



## Fraction

## Downstream Processing

### Mixed Electronics



Power adapter



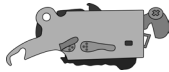
Charge cable



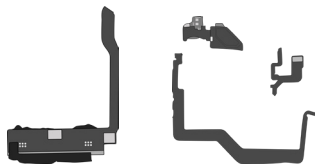
Right microphone



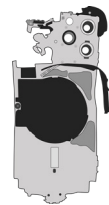
Lightning connector



Left microphone



Ribbon cables



Support plate

### Primary Target Material



### Potential Additional Materials

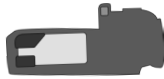




**Fraction**

**Downstream Processing**

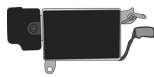
**Rare Earth Magnets**



*Receiver*



*Speaker*



*Taptic Engine*

**Primary Target Material**



**Potential Additional Materials**

