

# Reparability Score system for smartphones and tablets

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**The European Commission's  
science and knowledge service**  
Joint Research Centre

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- **Please keep your microphone muted and camera switched off when not speaking.**
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  - 1) *Please ask for the floor by writing “FLOOR” on the meeting chat. You can also type questions in the chat box while a presentation is taking place.*
  - 2) *Please wait for the chair to give you the floor. To speak, unmute your microphone.*
  - 3) *After speaking, please mute your line again and lower your hand.*
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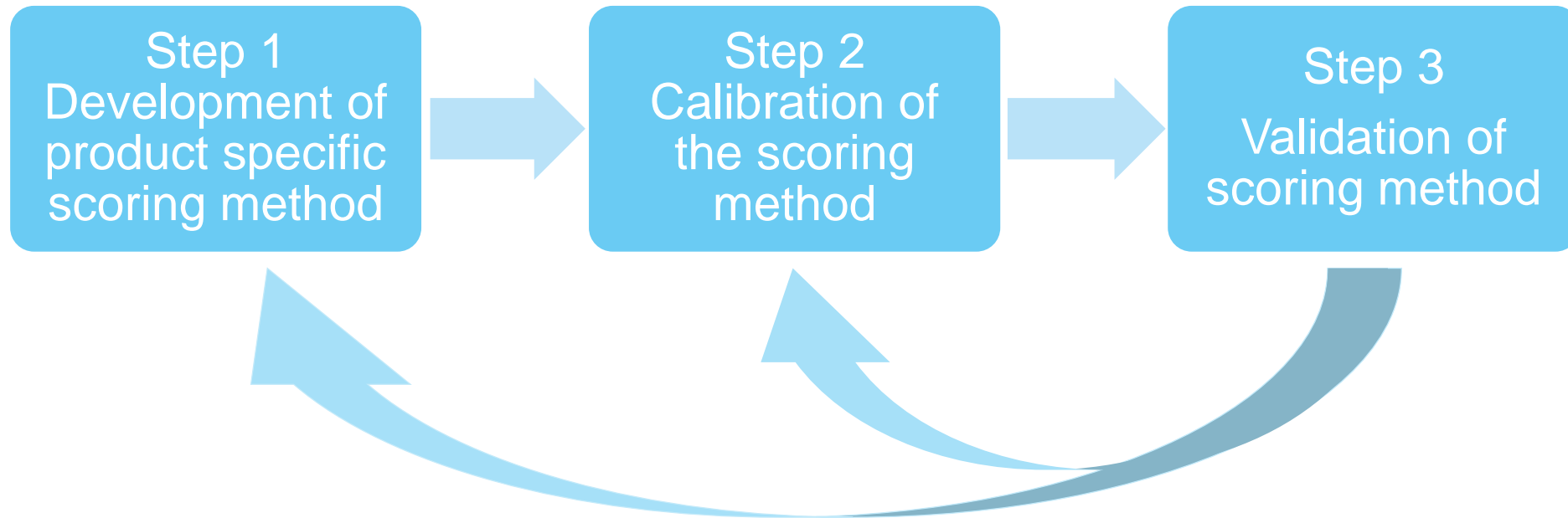
# Agenda

1. Welcome and introduction to the meeting
2. Presentation of Repair Score Method
  - 2.1 General Method and Priority Parts (Presentation and Q&A)
  - 2.2 Repair parameters and Weighting (Presentation)
- Coffee Break --
- 2.2 Repair parameters and Weighting (Q&A)
  - 2.3 Scoring, Aggregation and Guidance (Presentation and Q&A)
3. Closing of the meeting

## 2. Presentation of Repair Score Method

### 2.1 General Method and Priority Parts

# Process



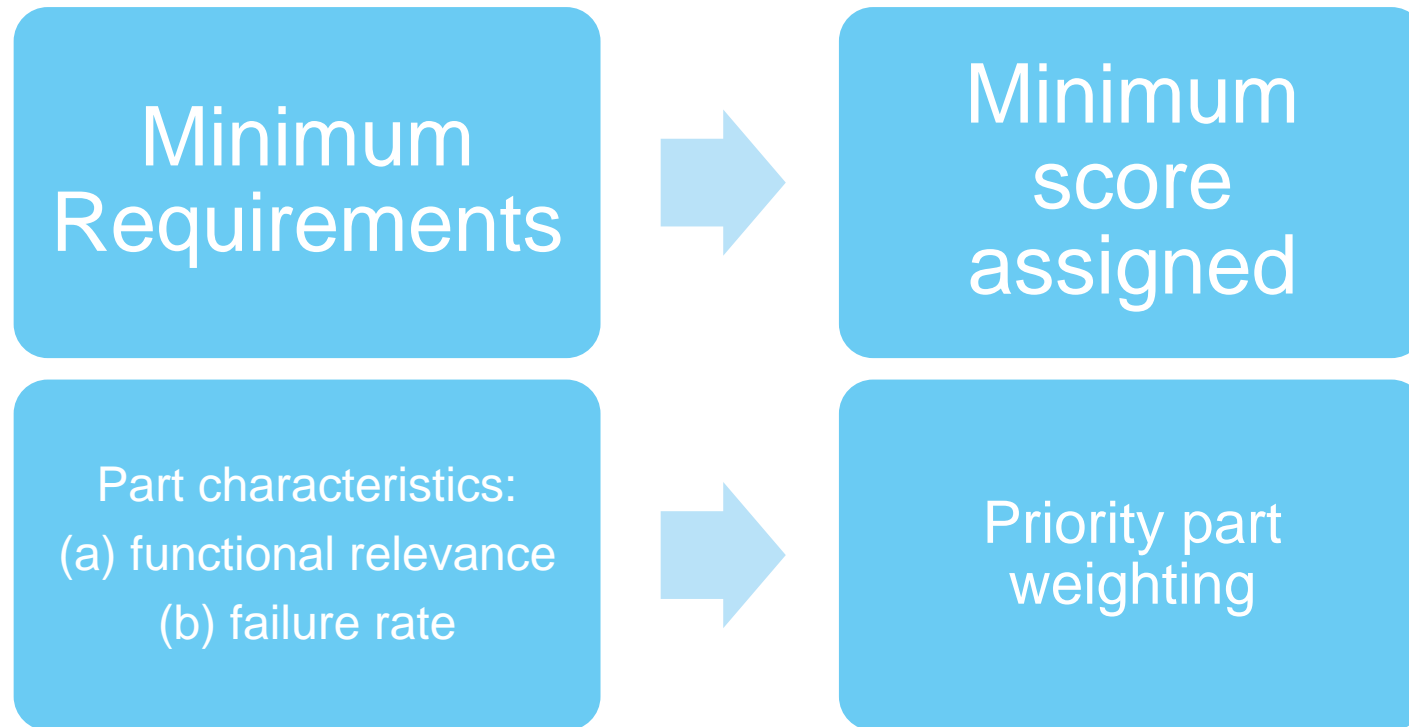
# Development of product specific scoring method

1. Selection of priority parts
2. Selection of scoring parameters
3. Definition of scoring criteria
4. Definition of weighting factors and aggregation
5. Assessment and Verification
6. Calculator

# Priority Parts - Selection

Smartphones	Tablets
Battery	Battery
Display assembly	Display unit
	Front panel digitizer unit
Charger	Charger
Back cover or back cover assembly	Back cover or back cover assembly
Front-facing camera	Front-facing camera
Rear-facing camera	Rear-facing camera
External connectors	External connectors
Buttons	Buttons
Microphone	Microphone
Speaker	Speaker
Hinge assembly	Hinge assembly
Mechanical display folding mechanism	Mechanical display folding mechanism
Mechanical display rolling mechanism	Mechanical display rolling mechanism

# Priority Parts - Scoring





# Priority Parts - Weighting

Relevance value		Failure Likelihood		
		Low	Medium	High
Functional relevance	Low			
	Medium		Front-facing camera Rear-facing camera	Back cover (assembly)
	High	External connectors Buttons Microphone Speaker	Hinge assembly or mechanical display folding mechanism mechanical display rolling mechanism	Battery Display assembly

# Priority Parts - Weighting

Relevance value		Failure Likelihood		
		Low	Medium	High
Functional relevance	Low			
	Medium		Front-facing camera Rear-facing camera	Back cover (assembly)
	High	External connectors Buttons Microphone Speaker	Hinge assembly or mechanical display folding mechanism mechanical display rolling mechanism	Battery Display assembly

- High functional relevance / High failure likelihood (in green) = 30%
- High functional relevance / Medium failure likelihood (in yellow) = 20%
- Medium functional relevance / High failure likelihood (in orange) = 10%
- Other combinations (in blue) = 5%

# Priority Parts - Weighting

Level	Weighting	Sublevel	Part – Smartphone	Part – Tablet
LEVEL 1	30%	1a	Display assembly	Display unit*
				Front panel digitizer unit*
	30%	1b	Battery	Battery
LEVEL 2	10%	2	Back cover	Back cover
LEVEL 3	5%	3a	Front camera	Front camera
	5%	3a	Back camera	Back camera
	5%	3b	Connectors	Connectors
	5%	3b	Buttons	Buttons
	5%	3b	Microphones	Microphones
	5%	3b	Speakers	Speakers
LEVEL 4	20%	4a	Hinge assembly or Fold mechanism	Hinge assembly or Fold mechanism
	20%	4b	Roll mechanism	Roll mechanism

# Priority Parts - Weighting

Level	Weighting	Sublevel	Part – Smartphone	Part – Tablet
LEVEL 1	30%	1a	Display assembly	Display unit*
				Front panel digitizer unit*
	30%	1b	Battery	Battery
LEVEL 2	10%	2	Back cover	Back cover
LEVEL 3	5%	3a	Front camera	Front camera
	5%	3a	Back camera	Back camera
	5%	3b	Connectors	Connectors
	5%	3b	Buttons	Buttons
	5%	3b	Microphones	Microphones
	5%	3b	Speakers	Speakers
LEVEL 4	20%	4a	Hinge assembly or Fold mechanism	Hinge assembly or Fold mechanism
	20%	4b	Roll mechanism	Roll mechanism



# General Method and Priority Parts

## Q&A

# 2. Presentation of Repair Score Method

## 2.2 Repair parameters and Weighting

# Scoring parameters - Selection

JRC General Method 2019	Min requirement in draft regulation	JRC Repair Score 2021
Disassembly depth	(none)	<b>Disassembly depth</b>
Fasteners	removable	<b>Fasteners (type)</b>
Tools	commercially available	<b>Tools (type)</b>
Disassembly time	(none)	(via other proxies)
Diagnosis support and interfaces	Via repair info	(not selected)
Type and availability information	Professionals; comprehensive	<b>Info (target group; cost)</b>
Spare parts (target group, duration of availability, delivery time, price)	Professionals; Smartphone: 5 years Tablets: 6 years	<b>Spare parts (target group)</b>
Software and Firmware updates	Security: 5 years Functionality: 3 years	(not selected)
Safety, skills and working environment	Generalist; Workshop environment	(not selected)
Data transfer and deletion	Data user encryption	(not selected)
Password reset and factory settings restoration	Factory settings reset	(not selected)
Commercial guarantees	(none)	(not reparability-specific)

# Disassembly Depth

- **Disassembly:** process whereby a product is taken apart in such a way that it could subsequently be reassembled and made operational.  
Source: EN45554:2020
  - Additional notes from the JRC Repair Score 2019: Disassembly has to be reversible, i.e. to enable re-assembly without causing damages to functional parts of the product. Destructive disassembly (also referred to as "dismantling") does not count towards this parameter.



# Fasteners

- A score is assigned for each priority part according to the level of removability and reusability of the fasteners used in the device assembly

Classification of fasteners types. Source: EN45554:2020	
Reusable	An original fastening system that can be completely re-used, or any elements of the fastening system that cannot be re-used are supplied with the new part for a repair, re-use or upgrade process.
Removable	an original fastening system that is not reusable, but can be removed without causing damage or leaving residue which precludes reassembly (in case of repair or upgrade) or reuse of the removed part (in case of reuse) for the repair, reuse or upgrade process.

# Tools

- No tools: the disassembly is feasible simply by hands
- Basic Tools: the disassembly is feasible with the use of a reference list of basic tools that available in Table A.3 of the standard EN45554:2020.
- Tool provided with the product or with the spare part: the disassembly is feasible with the use of tools provided with the product (at the time of purchase) or provided with the spare part
- Commercially available tools: the disassembly is feasible with the use of other commercially available tools (available for purchase by the general public)

# Spare parts and Repair Info

- Spare parts (considered for whole product)
  - target group of repairers (professional repairers and/or end-users)
- Repair Information (considered for whole product)
  - target group of repairers and on the cost of the repair and maintenance information.

# Parameters - Weighting

Parameter	Weighting	Justification
Disassembly Depth	40%	Key parameter for ease of repair and upgrade, not addressed by a minimum requirement.
Fasteners (type)	15%	Key parameter for ease of repair and upgrade, partially addressed by a minimum ecodesign requirement.
Tools (type)	15%	Key parameter for ease of repair and upgrade, partially addressed by a minimum ecodesign requirement.
Spare Parts (target group)	15%	Key parameter for ease of repair and upgrade, partially addressed by a minimum ecodesign requirement.
Repair Information	15%	Key parameter for ease of repair and upgrade, partially addressed by a minimum ecodesign requirement.

# Repair parameters and Weighting

## Q&A

## 2. Presentation of Repair Score Method

### 2.3 Scoring and Aggregation

# Scoring Disassembly Depth

PART LEVEL		Disassembly depth (PER PART)	Weighting factor	Scale					Score
				1 point	2 points	3 points	4 points	5 points	
LEVEL 1	1a	Display assembly (if multiple, consider deepest)	30%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	1b	Battery (if multiple, consider deepest)	30%	$x > 7$ steps	$7 \geq x > 5$ steps	$5 \geq x > 3$ steps	$3 \geq x > 1$ steps	$x = 1$ step	
LEVEL 2	2	back cover or its assembly	10%	$x > 7$ steps	$7 \geq x > 5$ steps	$5 \geq x > 3$ steps	$3 \geq x > 1$ steps	$x = 1$ step	
LEVEL 3	3a	front-facing camera assembly	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	3a	rear-facing camera assembly	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	3b	external connectors	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	3b	buttons	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	3b	microphone	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	3b	speaker(s)	5%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
<b>Level 4: 4a replaces 3b in case of foldable phone; 4b replaces 3b in case of rollable phone</b>									
LEVEL 4	4a	hinge assembly or mechanical display folding mechanism	20%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
	4b	mechanical display rolling mechanism	20%	$x > 15$ steps	$15 \geq x > 10$ steps	$10 \geq x > 5$ steps	$5 \geq x > 2$ steps	$x \leq 2$ steps	
<b>TOTAL DISASSEMBLY DEPTH</b>									

# Scoring Fasteners

PART LEVEL	Fasteners (type) (PER PART)	Weighting factor	Scale					Score	
			1 point	2 points	3 points	4 points	5 points		
LEVEL 1	1a	Display assembly (if multiple, consider worst)	30%	Removable		Reusable		Same reusable	
	1b	Battery (if multiple, consider worst)	30%	Removable		Reusable		Same reusable	
LEVEL 2	2	back cover or its assembly	10%	Removable		Reusable		Same reusable	
LEVEL 3	3a	front-facing camera assembly	5%	Removable		Reusable		Same reusable	
	3a	rear-facing camera assembly	5%	Removable		Reusable		Same reusable	
	3b	external connectors	5%	Removable		Reusable		Same reusable	
	3b	buttons	5%	Removable		Reusable		Same reusable	
	3b	microphone	5%	Removable		Reusable		Same reusable	
	3b	speaker(s)	5%	Removable		Reusable		Same reusable	
Level 4: 4a replaces 3b in case of foldable phone; 4b replaces 3b in case of rollable phone									
LEVEL 4	4a	hinge assembly or mechanical display folding mechanism	20%	Removable		Reusable		Same reusable	
	4b	mechanical display rolling mechanism	20%	Removable		Reusable		Same reusable	
<b>TOTAL FASTENERS</b>									



# Scoring Tools

PART LEVEL		Tools (type) (PER PART)	Weighting factor	Scale					Score
				1 point	2 points	3 points	4 points	5 points	
LEVEL 1	1a	Display assembly (if multiple, consider the worst)	30%	Commercial		Basic / Supplied		No tools	
	1b	Battery (if multiple, consider the worst)	30%	Commercial		Basic / Supplied		No tools	
LEVEL 2	2	back cover or its assembly	10%	Commercial		Basic / Supplied		No tools	
LEVEL 3	3a	front-facing camera assembly	5%	Commercial		Basic / Supplied		No tools	
	3a	rear-facing camera assembly	5%	Commercial		Basic / Supplied		No tools	
	3b	external connectors	5%	Commercial		Basic / Supplied		No tools	
	3b	buttons	5%	Commercial		Basic / Supplied		No tools	
	3b	microphone	5%	Commercial		Basic / Supplied		No tools	
	3b	speaker(s)	5%	Commercial		Basic / Supplied		No tools	
Level 4: 4a to replace 3b in case of foldable phone; 4b to replace 3b in case of rollable phone									
LEVEL 4	4a	hinge assembly or mechanical display folding mechanism	20%	Commercial		Basic / Supplied		No tools	
	4b	mechanical display rolling mechanism	20%	Commercial		Basic / Supplied		No tools	
		<b>TOTAL TOOLS</b>							

# Scoring Spare Parts

- Scores are based on the availability of spare parts (levels) to professional repairers and end-users

	WF	Scale				
		1 point	2 points		4 points	5 points
<b>Spare part (target group)</b>	15%	Level 1a to endusers All other to prof	Level 1a, 1b to end users; All other to prof		Level 1a, 1b and 2 to endusers; All other to prof	All levels to endusers

# Scoring Repair Information

- The rating of this parameter is based on the target group of repairers and on the cost of the repair and maintenance information.

	Weighting factor	Scale				
		1 point		3 points		5 points
Repair Information	15%	Prof; reasonable price		Prof; no cost		Endusers; no cost

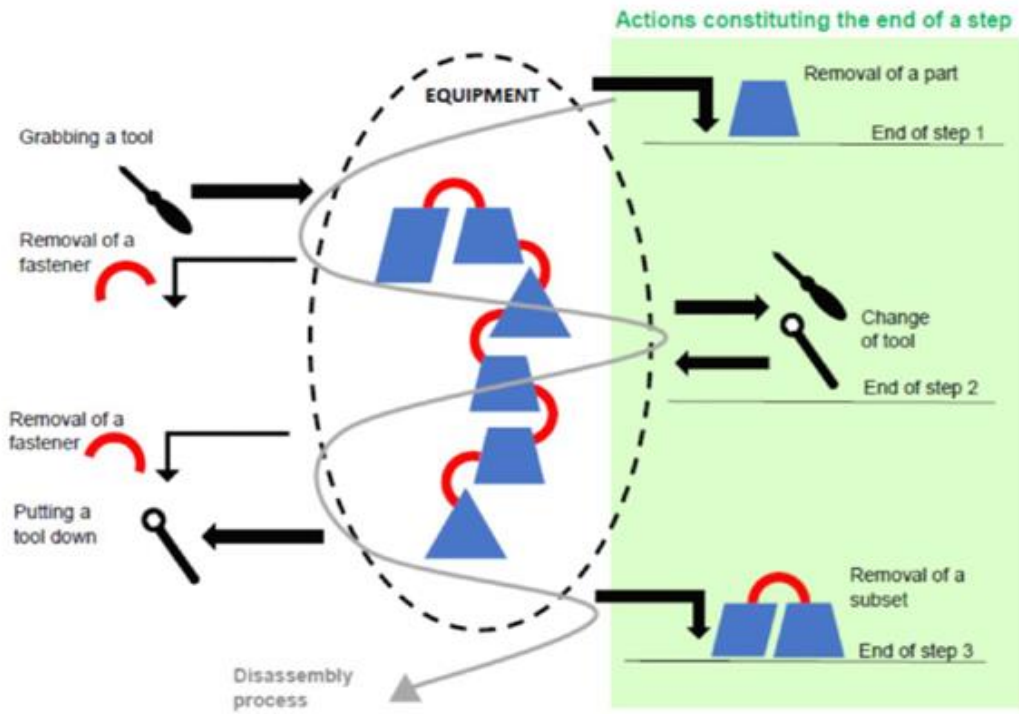
# Aggregation

Parameter	Score for priority part i [1-5]	Weight for priority part i [%]	Parameter Score [1-5]	Parameter Weight [%]	Final Score [1-5]
#1 Disassembly depth	$S_{1,i}$	$\omega_{1,i}$	$S_1 = \sum_{i=1}^N S_{1,i} \cdot \omega_i$	$W_1$	<b>Overall Reparability Index</b>  $R = \sum_{j=1}^5 S_j \cdot W_j$
#2 Fasteners (type)	$S_{2,i}$	$\omega_{2,i}$	$S_2 = \sum_{i=1}^N S_{2,i} \cdot \omega_i$	$W_2$	
#3 Tools (type)	$S_{3,i}$	$\omega_{3,i}$	$S_3 = \sum_{i=1}^N S_{3,i} \cdot \omega_i$	$W_3$	
#4 Spare parts (target group)	...	...	$S_4$	$W_4$	
#5 Repair Information	...	...	$S_5$	$W_5$	

Where:

**R** is the overall reparability score ; **S** is the score (per spare part or parameter) ;  **$\omega$**  is the priority part weight ; **W** is the parameter weight ; **i** is a specific priority part ; **N** is the N of priority parts; **J** is a specific parameter

# Guidance on Disassembly Depth (Annex)

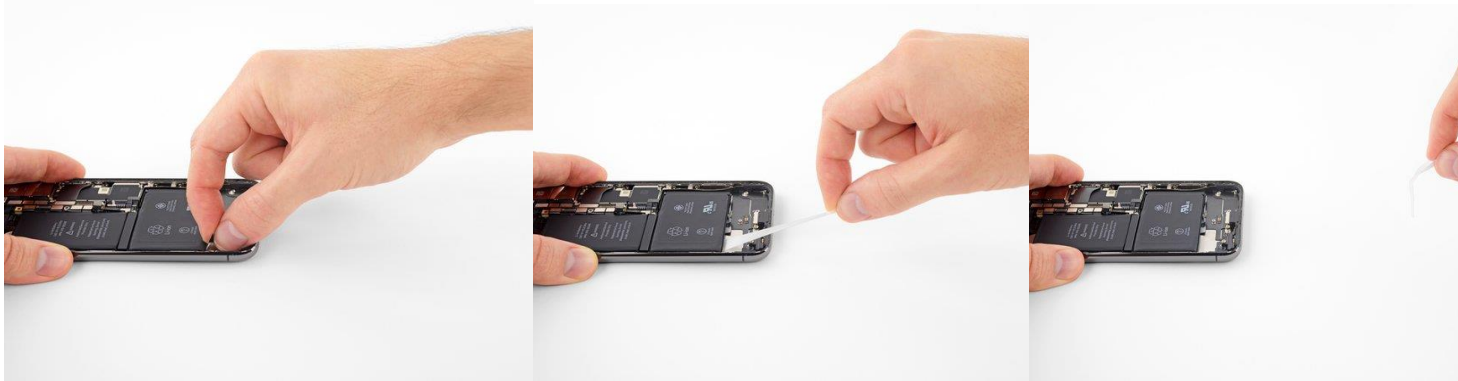


[Source: French Score Manual]



[Source: iFixit.com]

# Guidance on Fasteners and Tools (Annex)



[Source: iFixit.com]

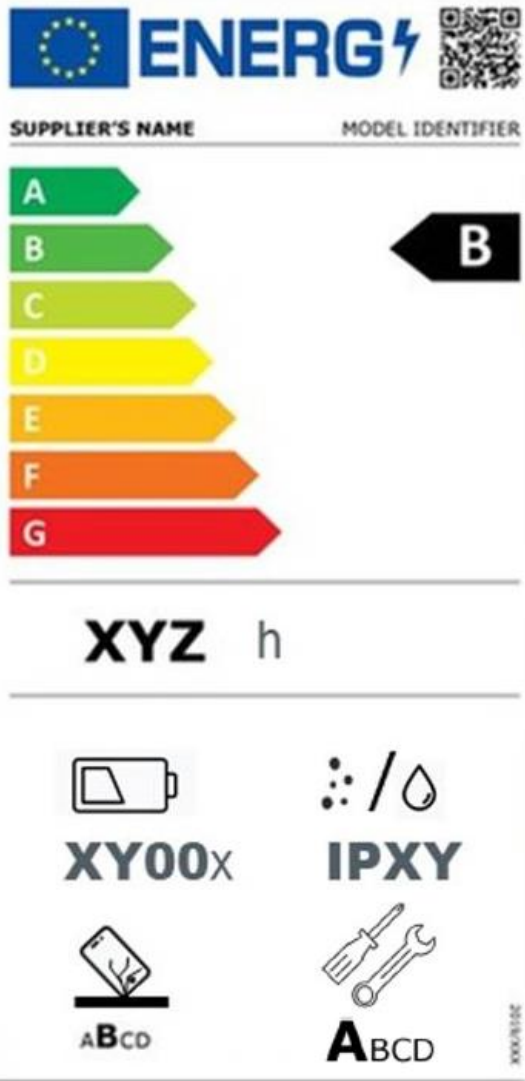


[Source: iFixit.com]

# Scoring and Aggregation

## Q&A

# Way forward: Introducing reparability scoring on the energy label or under ecodesign



## ← On the energy label

- Black and white logo as supplementary information.
- Visible at point of sale

## Under ecodesign →

- Information requirement on the product itself
- Complementary obligation to display at point of sale via upcoming Empowering Consumers Initiative

