VONROC®
BUILD YOUR FUTURE

PACKING GUIDELINE

STANDARD, SPECIFICATIONS AND RESPONSIBILITIES FOR MANUFACTURING PARTNERS

Rev. 2505

Revision change log			
Revision No.	**Date**	**By**	**Update**
2503	11-03-2025	TOK	Created file
2504	14-04-2025	TOK	Updated draft based on feedback
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Summary

1. Primary and Export Packaging

- Primary Packaging: Each product must be placed in a sturdy box that limits movement and absorbs shocks. High-quality corrugated cardboard, matched to the product's weight and size, is essential. Designs with built-in closures (e.g., interlocking flaps) are preferred so minimal tape is needed.
- Export Cartons: Smaller or lightweight product boxes are typically combined into a robust export carton for efficient handling. For large or heavy items, omitting an export carton is permissible only if the primary packaging is sufficiently strong and advance approval has been granted. Each carton must remain under 25 kg to comply with safe manual handling guidelines.

2. Drop Test Requirements

All packaging must withstand typical handling drops according to ISTA-2A standards, ensuring no breakage or exposure of contents. Carton integrity and product protection must be preserved even after drops from heights corresponding to package weight ranges.

3. Packaging Materials and Specifications

- Corrugated Cardboard: Preference is given to FSC-certified cardboard. Single-wall or double-wall construction is required based on the weight and dimensions of the product. Double-wall cardboard is essential for heavier products.
- Fillers and Inserts: Moulded paper pulp or other sustainable materials are strongly recommended instead of foam or excessive plastic. The product must remain stable in the box, with no free movement.
- Plastic-Free Alternatives: Whenever the additional cost for a plastic-free alternative remains within a threshold determined by our Product Management team, we expect you to use a plastic-free option. If the cost difference is substantially higher, a cost analysis should be provided along with a proposal for gradually reducing plastic usage.

4. Environmental and FSC Requirements

By 1 January 2027, all paper-based packaging for VONROC products must be FSC-certified. Until that date, we expect suppliers to actively work towards FSC certification or to source FSC-certified materials. If a supplier does not have direct access to FSC-certified materials or printing facilities, VONROC can provide a list of approved FSC-certified vendors to support compliance.

Suppliers are strongly encouraged to use these resources to meet the requirement in time. Suppliers who do not meet FSC requirements after 1 January 2027 will not be eligible to produce packaging for VONROC products, unless a formal exemption is granted for a product where paper-based solutions are demonstrably unfeasible. In addition to FSC certification, the use of recycled content is strongly encouraged, and all packaging must be fully recyclable. Decorative or aesthetic elements must not compromise the strength of the cardboard or hinder recyclability.

5. Lithium-Ion Battery Packaging and Labelling

- Up to 100 Wh: Such batteries can ship under "excepted" dangerous goods provisions, provided UN 38.3 testing is passed and the correct lithium battery mark (UN3480/UN3481) is visible.
- Over 100 Wh: Batteries above 100 Wh require full Class 9 dangerous goods labelling and proper documentation.

- Packaging Precautions: Movement inside the carton must be prevented, and terminals should be protected from short circuits. The appropriate UN marking must appear on the outermost package or overpack.

6. Size and Weight Limits
Packaging dimensions and weight must align with standard carrier limits (e.g., DPD and DHL), for example the weight typically up to 31.5 kg per parcel. Exceeding these constraints may lead to extra charges, damage risks, or carrier refusal.

7. Printing and Labelling Standards
VONROC supplies artwork files that must be followed precisely. Clear, legible printing is required for all text, icons, and barcodes. Essential details—such as product identification, barcodes, and any hazardous goods symbols—must appear on the packaging. Labels should adhere firmly and remain legible throughout transit.

8. Sample Submission and Quality Checks
A complete, final packaging sample (including full printing) must be submitted for approval before mass production. This sample is reviewed for drop-test performance, cardboard quality, and overall compliance. During actual packing, all materials must be verified for quality; each product must be properly secured; and the carton must be sealed and labelled according to specification. Final checks must confirm that no damage is present and that all items and documentation are included. Shipment is approved only after all requirements are met.

1. Introduction

This Packaging Guideline outlines the standards and procedures for all VONROC products. It establishes a structured and standardized approach to ensure that every package not only protects the product during transit and storage but also supports operational efficiency and customer satisfaction. In recent evaluations, packaging quality has varied significantly across our product range, leading to inefficient and costly remedial measures. These guidelines are intended for both our internal teams and external manufacturing partners.

Every supplier is obliged to review and adopt these packaging specifications in consideration of their specific products, weight, volume, and safety regulations. Deviations from the parameters stated here must be approved by VONROC prior to production. VONROC supplies a Product Specification File (PSF), which must be followed at all times. If any specifications in the PSF differ from those in this Packaging Guide, the specifications stated in the PSF will be considered leading. In case of any questions, uncertainties, or clarifications, please contact VONROC before proceeding with packaging production.

1.1 Abbreviations

Abbreviation	Full Term	Description / Relevance to VONROC Packaging
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road	EU regulations governing road transport of hazardous goods, including lithium-ion batteries.
CMYK	Cyan, Magenta, Yellow, Key (Black)	Standard four-colour process used in printing.
DTP	Desktop Publishing	VONROC team responsible for packaging artwork design and approval.
EU PPWD	European Union Packaging and Packaging Waste Directive	EU regulations on packaging design, recyclability, and waste prevention.
FEFCO	Fédération Européenne des Fabricants de Carton Ondulé (European Federation of Corrugated Board Manufacturers)	International code system for corrugated box designs.
FSC	Forest Stewardship Council	Certification for responsibly sourced paper/cardboard materials.
IATA	International Air Transport Association	Global air transport regulations including packaging and labelling.
IMDG	International Maritime Dangerous Goods Code	Rules for sea transport of dangerous goods.
ISTA	International Safe Transit Association	Organization defining standardized packaging test protocols (e.g., ISTA-2A).
MSDS	Material Safety Data Sheet	Safety documentation for chemical or battery-containing products.
PIR	Product Inspection Report	Report from QC teams after shipment inspections.
PM	Product Management	Team responsible for the full product portfolio and lifecycle; packaging is part of this scope.
PSF	Product Specification File	Master file with detailed specs per SKU, leading over this guideline.
PSI	Post-Shipment Inspection	QC check of products and packaging after shipping.
QA	Quality Assurance	Ensures overall product quality; packaging is part of this scope.
QC	Quality Control	Performs quality inspections on products; packaging is part of this scope.
RFQ	Request for Quotation	Formal request sent to suppliers, includes packaging specs.
SKU	Stock Keeping Unit	Unique product identifier used across PSF and logistics.
UN38.3	United Nations Manual of Tests and Criteria, Section 38.3	Battery safety test standard for safe transportation.

2. Purpose and scope

2.1 Purpose

Standardization:
Define clear, measurable packaging specifications for all product lines.

Quality Improvement:
Enhance box strength, durability, and functionality to reduce damage and returns.

Environmental Responsibility:
Encourage the use of recycled materials and sustainable filling options (e.g., moulded paper pulp inlay over polystyrene foam).

Testing Protocols:
Integrate practical testing methods (e.g., ISTA-2A drop tests) to validate packaging performance, with selective use of ISTA6-Amazon standards where necessary.

2.2 Scope

Internal Application:
Applicable to all departments involved in production, assembly, packaging, logistics, and quality control.

External Application:
Used as a guideline for all manufacturing partners and suppliers producing packaging for VONROC.

Product Range:
Covers all VONROC products, irrespective of category, with special attention to items requiring additional care (e.g., patio heaters with vulnerable heating element, or dehumidifiers with sensitive compressor pump). With the exception of spare parts, a separate chapter dedicated to this topic will be added to this packaging guideline at a later stage.

3. Packaging standards and specifications

3.1 Primary packaging

Every individual product must be packaged in a primary package designed to minimize movement and provide protection against shocks and vibrations during handling, transport, and storage.

Material Requirements:

- Use corrugated cardboard with clearly defined specifications:
    - Products ≤5 kg: Single-wall cardboard, E- or B-flute, 125–150 gsm liner weight.
    - Products 5–15 kg: Single-wall cardboard, B/C-flute combination, 150–200 gsm liner weight.
    - Products >15 kg: Double-wall cardboard, BC- or EB-flute, 200+ gsm liner weight.

  These specifications are minimum standards. Products with high fragility, large dimensions, or special requirements may require additional reinforcements or triple-wall cardboard.
- All packaging specifications per product SKU are detailed in the PSF. Suppliers must strictly follow these requirements.
- Additional reinforcements (corner protection, inserts) are mandatory for fragile or high-value products.

Closure Mechanisms:

- Boxes must be self-locking wherever possible, using interlocking flaps, sealing stickers, or similar features to secure the product without additional tape.
- Tape usage is discouraged. If a supplier deems tape absolutely necessary for product safety, VONROC approval is required in advance.
- In approved cases, only paper-based tape (or reinforced paper type) is permitted.

Environmental Considerations:

- Prioritize FSC-certified and recycled cardboard materials whenever available.
- Use sustainable filling materials such as moulded paper pulp inlays instead of polystyrene foam or non-recyclable plastics.
- Decorative elements must not reduce box strength or compromise recyclability.

3.2 Export packaging

In most cases, multiple smaller or lightweight primary packages are consolidated into a single export carton to reduce the risk of damage and prevent individual boxes from becoming misplaced during transit. By grouping these items, suppliers can:

- Improve Handling Efficiency: Fewer, larger cartons are easier to stack and palletize, facilitating smoother container loading and warehouse storage.
- Minimize Damage: Consolidation reduces free movement of small boxes within a shipment, lowering the likelihood of carton abrasions or compression damage.
- Streamline Labelling & Tracking: Fewer shipping labels and handling instructions are needed, simplifying both outbound logistics and inbound checks at the warehouse.

For some large or heavy products (e.g., table saws, lawnmowers), it may be acceptable to forgo an additional export carton if the primary packaging is sufficiently sturdy to withstand sea-container transport and subsequent storage on a pallet in our warehouse. In such instances, this primary packaging must fulfil all marking, handling, and protective criteria normally assigned to an export carton. Any decision to omit an export carton must be confirmed with VONROC beforehand.

Export Carton Requirements:

- The export carton must be robust enough to withstand handling and transit stresses while maintaining an even weight distribution.
- Due to ARBO (occupational health) guidelines, export cartons must not exceed 25 kg in weight to ensure safe manual handling.

Environmental Considerations:

- Utilize FSC-certified and recycled materials.
- Tape usage is permitted only when necessary. Paper-based tape (including reinforced paper tape) is the required standard. The use of plastic tapes (such as PP or PVC) is not allowed, unless explicitly approved by VONROC.
- Design the carton for ease of recycling and proper end-of-life separation.

3.3 Environmental Considerations and Compliance

This section defines the environmental and sustainability standards for all VONROC packaging. These standards ensure packaging is robust, reliable, sustainable, and compliant with EU regulations, while supporting VONROC's internal sustainability goals.

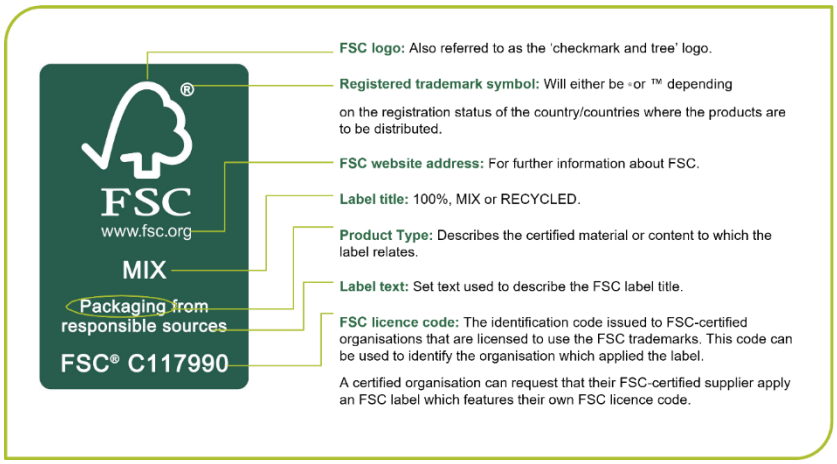
Scope:

These requirements apply to all paper- and cardboard-based components, including:

- Primary and export cartons
- Inserts, dividers, and protective elements
- Product manuals, leaflets, and printed materials
- Labels and stickers

Sustainable Materials:

- FSC Certification: By 1 January 2027, all paper- and cardboard-based packaging must be FSC-certified. Suppliers unable to immediately comply must notify VONROC and submit a transition plan with clear milestones to achieve certification. To support suppliers, VONROC will provide a list of approved FSC-certified printers, carton vendors, and material suppliers. After January 2027, non-FSC packaging will not be approved unless VONROC issues a formal exemption for cases where FSC-certified materials are demonstrably unavailable or technically unfeasible.
- Recycled Content: Recycled materials must be prioritized for all packaging components.
- Eco-Friendly Fillers: Use sustainable options (e.g., moulded paper pulp inlays) rather than polystyrene foam or other non-recyclable plastics.



Compliance with EU Standards:

- Fully comply with the EU Packaging and Packaging Waste Directive, focusing on waste prevention, reduction, and recyclability.
- Design packaging for easy disassembly and recycling, including clear recycling instructions for end-users.
- Consider the carbon footprint and energy efficiency of materials and production processes when selecting packaging solutions.

Quality vs. Environmental Trade-Offs:

- Aesthetic elements (premium printing, finishes) must not compromise structural integrity or recyclability.
- Packaging must balance durability, functionality, and environmental performance.
- Deviations are allowed when paper- or cardboard-based packaging is technically or economically unfeasible, such as:
    - Small replacement components (e.g., a plastic bag for a spare chainsaw chain).
    - Fragile components requiring polystyrene or specialized protection (e.g., heating elements).
- All deviations must be pre-approved by VONROC.

Future-Proofing:

- This guideline will be updated in line with new EU regulations and sustainability best practices.
- Suppliers are expected to stay informed about legislative changes and proactively adjust their materials and processes.

3.4 Drop test standards

The following drop test parameters have been adopted to ensure the integrity and durability of all packaging used for VONROC products during transit. These values are based on the ISTA-2A protocol and have been adapted to meet our operational requirements, including safe manual handling guidelines. The table below indicates the maximum drop heights (2A test) that packaging must withstand, depending on its weight. This standard applies uniformly to all packaging types, whether primary or export.

Carton weight (kg)		Drop height (mm)
>	<	**2A test**
0	10	970
10	19	870
19	28	660
28	45	510
45	68	310

Note: These values serve as a guideline. Actual drop test parameters may be adjusted based on product fragility and packaging design. Testing must ensure that the carton maintains integrity and protects the products under typical handling and transit conditions.

Process & Responsibilities

- Specification: Drop test requirements are formally shared during the RFQ stage and after order defined in the PSF.
- Testing: Suppliers must conduct ISTA-2A drop tests (or an equivalent method approved by VONROC) on all new or modified packaging before mass production.
- Sample Approval: A fully packaged sample must be submitted to VONROC, along with a test report or video evidence proving compliance.
- Ongoing Monitoring: VONROC's Quality Assurance (QA) team may perform random verification drop tests on production batches to ensure ongoing compliance.
- Documentation: All test results must be archived and linked for traceability.

3.5 Packaging Material Specifications and Standards

To ensure that our packaging not only withstands the rigors of transport but also meets sustainability and quality requirements, the following material specifications have been developed. These standards are categorized by the dimensions and intended use of the packaging. The guidelines below specify the type of corrugated cardboard, minimum thickness (or performance parameters like Edge Crush Test (ECT) values), and sustainability requirements that must be met.

General Guidelines:

- Material Type:
  All packaging must be produced from high-quality corrugated cardboard. Preference is given to materials that are FSC-certified and incorporate recycled content wherever possible.

- Sustainability:
  Packaging materials should meet FSC standards and be sourced to minimize environmental impact. When possible, design for recyclability and easy separation of materials.

- Performance Testing:
  While the ISTA protocols (e.g., ISTA-2A) will be used for performance verification via drop tests, the material specifications themselves are based on industry standards such as FEFCO guidelines and ISO standards.

Notes on below scheme: This table represents baseline expectations only. Even lightweight or compact products may require double- or triple-wall cardboard if fragility, stacking, or handling risks justify it. Final material specifications, wall thickness, and protective features are defined per product in the PSF.

Category	Typical dimensions (L*W*H)	Recommended material	Minimum ECT / thickness	Comments
Small	Up to approximately 300 x 300 x 300 mm	Single-wall corrugated cardboard	Minimum ECT 32 (~3 mm thickness)	Suitable for lightweight products; minimal void space is required.
Medium	300 – 600 mm (each dimension)	Single-wall or double-wall (depending on product weight)	Single-wall: Minimum ECT 44 Double-wall: ECT 32 (~3–4 mm thickness)	For products with moderate weight; may require reinforced corners.
Large	Dimensions greater than 600 mm in any direction	Double-wall corrugated cardboard	Minimum ECT 44 (~4–5 mm thickness)	Robust construction required; additional edge protection may be necessary.

Long/flat	Packages with one large, flat side (e.g., length >600 mm and height <150 mm)	Single- or double-wall (depending on the load)	Minimum ECT 32–44 (depending on load)	Designed for long, flat products.
Irregular/custom	Non-standard shapes (e.g., boxes with one thick side and one thin/elongated side)	Customized solutions using high-quality corrugated cardboard, possibly multi-layered or with inserts	Case-by-case evaluation; generally aim for minimum ECT 32–44	Requires custom design and prototype testing to confirm performance.

Material Choice Flexibility vs. Standardization
VONROC primarily relies on corrugated cardboard (preferably FSC-certified) and moulded paper pulp inlays to meet environmental and performance criteria (e.g., ISTA-2A tests). However, suppliers may propose alternative materials—such as honeycomb board or different eco-friendly solutions—provided that:

1. All drop test and strength requirements (ISTA-2A or otherwise agreed-upon tests) are successfully met, and
2. The environmental goals stated in § 3.3 are not compromised (e.g., recyclability, minimal plastic usage).

Final approval for any material deviation remains with VONROC. These guidelines exist to standardize packaging and reduce complexity. Suppliers are encouraged to suggest innovations, but must demonstrate through test data that the proposed materials perform at least as well as the standard solutions.

Plastic-Free Packaging & Cost Threshold
VONROC aspires to reduce or eliminate plastic from all product packaging. We recognize that fully plastic-free solutions may sometimes be cost-prohibitive. As a guideline, suppliers should explore plastic-free alternatives whenever the additional cost remains within the internal threshold established by our Product Management.

Break-Even Analysis:
- If the projected cost for switching from a plastic component (e.g., PE bag) to a biodegradable or paper-based alternative remains within this internal threshold, VONROC expects suppliers to adopt the more sustainable option.
- If this threshold is exceeded, suppliers must provide a cost analysis and proposed timeline for future improvements.

This approach balances our sustainability goals with commercial feasibility. VONROC will periodically review and update this cost threshold as eco-friendly material technologies evolve.

3.6 FEFCO Packaging types

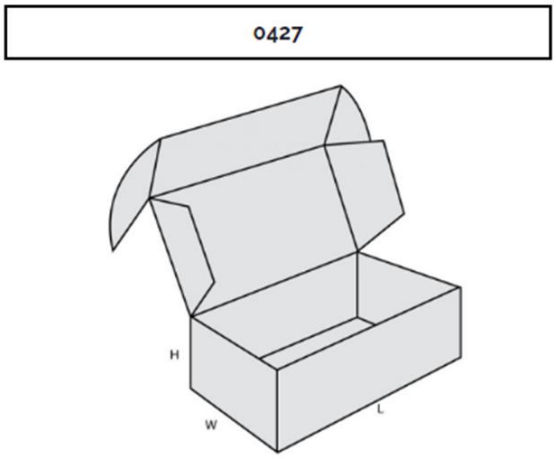
The European Federation of Corrugated Board Manufacturers (FEFCO) has established a standardized code system for corrugated box designs. Each FEFCO code corresponds to a

specific style or shape of box, streamlining communication between manufacturers and end users. Effective packaging design is critical to ensure product protection, ease of access, and operational efficiency. In our approach, we emphasize both the use of standardized FEFCO codes and the preference for self-locking packaging solutions. When selecting the appropriate FEFCO design for VONROC products, the following considerations are crucial:

Resealability and Reopenability
A packaging solution that can be opened and closed multiple times without significant damage or the need for tape.

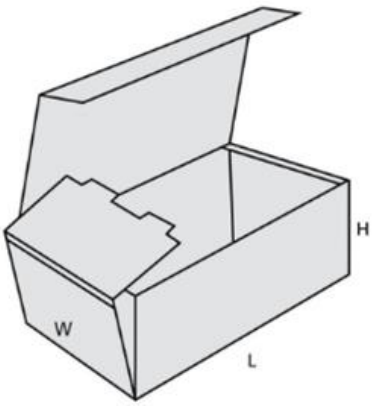
Advantages:
- Incoming Goods QC: Allows for quick checks upon arrival without destroying the packaging.
- Combination Sales and Rework: Facilitates adding accessories (e.g., a screw bit set or battery) into the main product box. If it does not fit, both packages can be strapped together or placed in a larger box.
- Reduced Waste: Minimizes the need for extra tape or stickers and prolongs the life of the packaging.

Recommended FEFCO Codes
- FEFCO 0427:
  Often cited as a prime example for a self-locking design that can be reclosed easily. This style features flaps that interlock, eliminating the need for tape or additional adhesives in most cases. FEFCO 0427 designs are generally suitable for boxes up to a maximum length of approximately 600 mm on any side. Beyond these dimensions—or if the product weight or shape is not compatible—an alternative design must be used. For example, larger or heavier items (e.g., mitre saws, pressure washers) often exceed practical limits for self-locking 0427 boxes, and a different FEFCO code or a custom solution may be required.



- Other Variants (e.g., 0421, 0426, 0210, 0211, 0215, 0470, 0471):
  These can also be considered if they meet the dimension, strength, and reuse requirements. Each code has unique features—such as extended dust flaps, crash-lock bases, or tuck-in closures—that can be tailored to product size and handling needs.

0421



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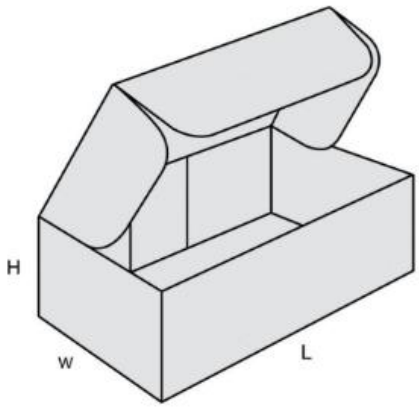

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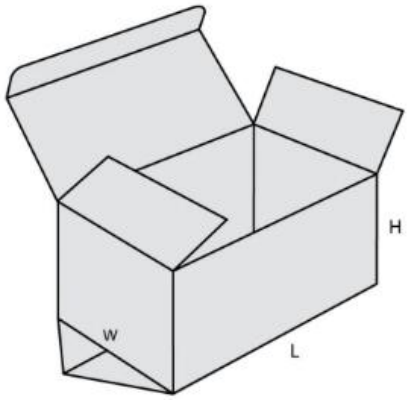

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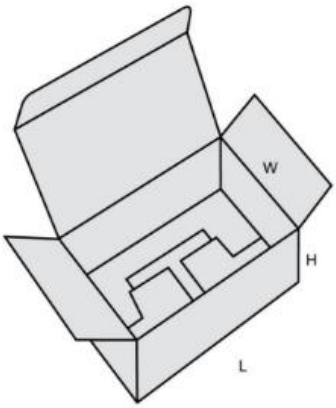
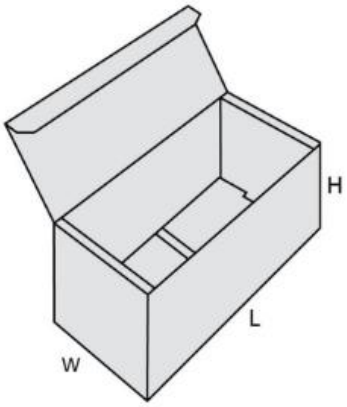


0470



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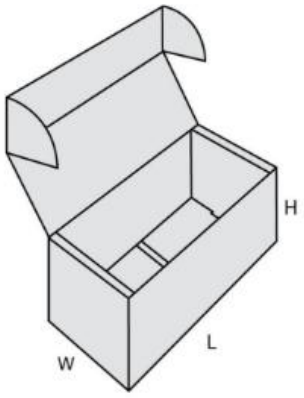
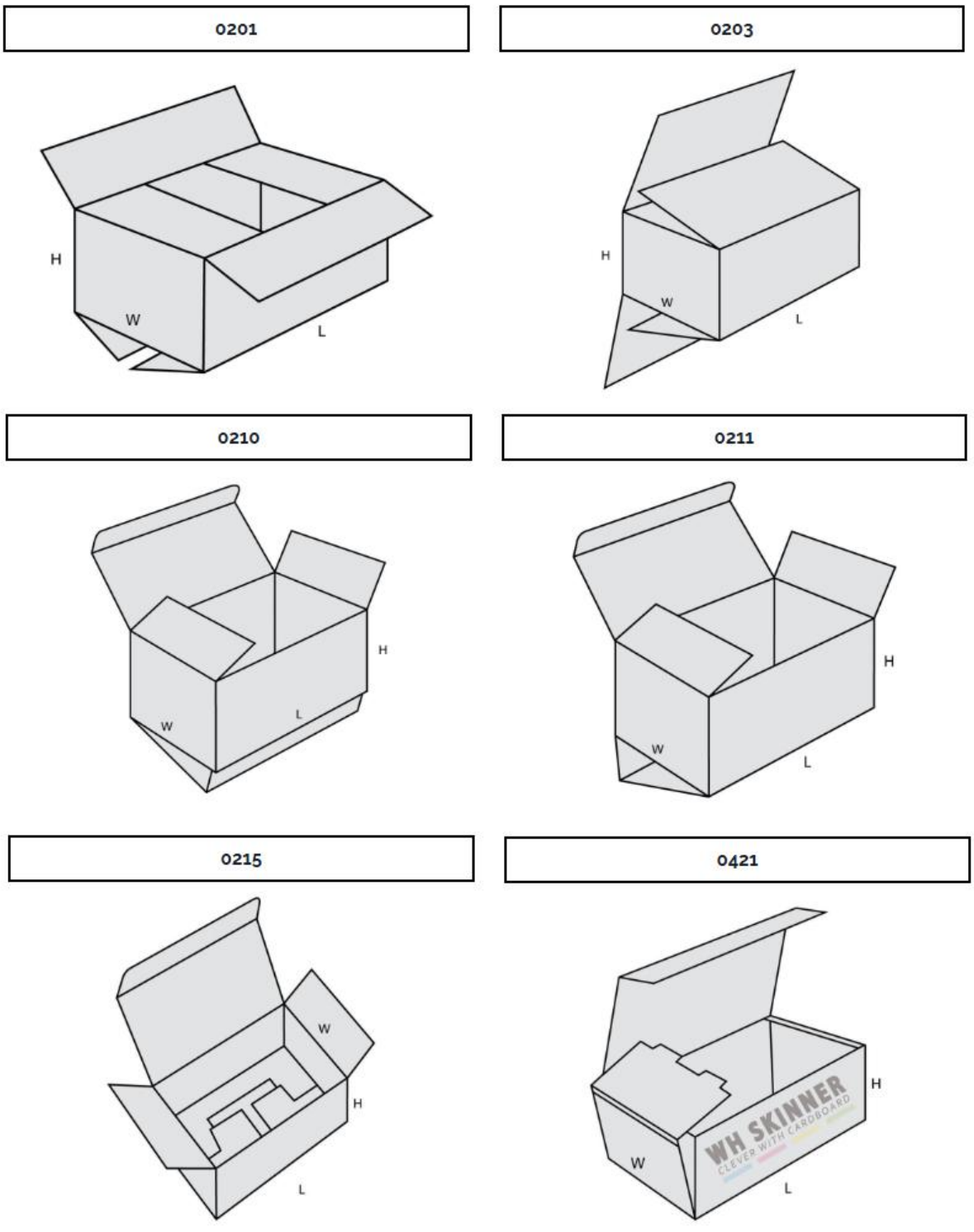


Note: For certain products with unique dimensions or handling challenges, it may be necessary to deviate from the standard FEFCO designs. Such deviations must be agreed upon through consultation with all relevant stakeholders.



Locking tab

A key feature of our preferred packaging is the use of a locking tab—commonly found in FEFCO 0427-style boxes—which secures the box without requiring additional tape. This locking tab (or tuck tab) is essential because:

- Resealability: It allows the box to be opened and closed repeatedly, facilitating efficient incoming goods QC checks and enabling the packaging to be reused for combination sales (e.g., placing small accessories into the larger machine's box).

- Operational Efficiency: A self-locking design minimizes the need for extra sealing materials such as tape or paper sealing stickers. However, if the packaging does not achieve self-closure through its design, a paper sealing sticker must then be applied to secure the box.

3.7 Lithium-Ion Battery Packaging & Labelling Requirements

Lithium-ion batteries and battery-powered products require additional considerations due to international dangerous goods regulations. This section outlines the key guidelines for packaging, labelling, and shipping VONROC products that include lithium-ion batteries (e.g., standalone packs or batteries packed with/within equipment). Since VONROC primarily uses batteries up to 80 Wh at present, these guidelines focus on meeting the 100 Wh threshold for "excepted" shipments. Any future batteries exceeding 100 Wh must comply with stricter regulations, as outlined below.

UN Classification

- UN3480 (Lithium Ion Batteries): For standalone lithium-ion batteries.
- UN3481 (Lithium Ion Batteries contained in equipment or packed with equipment): For batteries shipped alongside tools or installed within a product.
- UN3490 (Lithium metal batteries)
- UN3491 (Lithium metal batteries contained in equipment or packed with equipment)

Capacity Thresholds and Shipping Conditions

Up to 100 Wh

- Can typically be shipped under "Excepted" provisions if they meet all requirements (e.g., passing UN 38.3 tests).
- Must carry the lithium battery handling label (commonly referred to as the 'Lithium Battery Mark').
- Ensure adherence to packaging requirements to prevent short-circuits or accidental activation.

Above 100 Wh

- Subject to additional dangerous goods regulations (e.g., full Class 9 provisions under IATA/IMDG/ADR).
- Requires Class 9 hazard labels on the shipping carton, and documentation such as the Shipper's Declaration for Dangerous Goods.

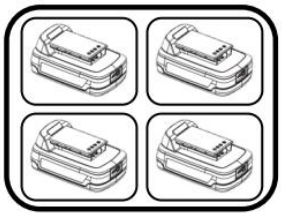
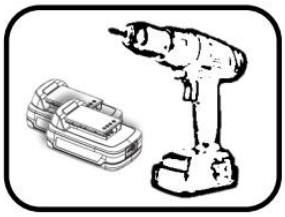
- Contact VONROC for approval and specific instructions before proceeding with packaging design or shipment of higher-capacity batteries.

Ex-mark Labelling and Consolidation
When shipping lithium-ion batteries or battery-powered products, determine if you need a standard lithium battery marking on the outer carton (UN3480/UN3481) or an Overpack label. These markings are generally mutually exclusive, as follows:

The outermost package/overpack should display all relevant marks, including:

Direct Labelling (Single Package)
- If the outermost carton directly contains the battery or battery-powered item, use the appropriate UN3480 or UN3481 lithium battery mark on that outer carton.
- The carton must clearly display the UN number and handling symbol, and it must meet all relevant packaging requirements.

Overpack Label (Consolidated Packages)
- If multiple individually labelled packages (each already showing UN3480/UN3481 marks) are placed into a larger carton or pallet (making the original labels no longer visible), the larger container should bear an "Overpack" mark.
- In this case, do not also place a direct UN3480/UN3481 mark on the overpack itself; instead, replicate the lithium battery mark(s) from the inner packages alongside the word "OVERPACK."

	WEGVERVOER (ADR)	
Transportmodus	< 100 Wh (per accu)	
	Accu's (zonder toestel) 	**Accu's verpakt met of in het toestel** 
Markering		
Opmerking markering	Eén markering per buitenverpakking is voldoende. Plaats het etiket zo op de verpakking: 	
Verpakking	Accu's moeten in binnenverpakkingen geplaatst worden die de accu volledig omsluiten, tenzij ze in het toestel zitten of eraan aangesloten zijn. De accu's moeten beschermd zijn om kortsluiting te vermijden. Sterke buitenverpakking, bijv. karton (valtest van 1.2m doorstaan: inhoud mag niet beschadigd of verplaatst zijn)	

Packaging Best Practices for Battery Products

- Prevention of Movement: Batteries or battery-containing products must be secured to prevent shifting or damage during transit. Use protective inserts or moulded pulp to stabilize the battery and avoid direct contact with sharp edges.

- Short-Circuit Protection: Terminals should be protected to avoid accidental short-circuits.

- Temperature & Humidity: Use moisture-resistant materials or liners if shipping routes involve humid or variable climate conditions.

- Compliance with UN 38.3 Testing: All lithium-ion cells/batteries must have passed UN 38.3 testing. Documentation must be readily available for inspection.

Documentation and Compliance

1. Required Documentation
   - Lithium Battery Test Summary (UN 38.3)
   - Material Safety Data Sheet (MSDS)
   - Shipper's Declaration for Dangerous Goods (Class 9), if above 100 Wh or otherwise required.
2. Regulatory Framework
   - Comply with IATA (air), IMDG (sea), ADR (road), and applicable local transport regulations.
   - Ensure the correct shipping name, UN number, and labelling on all documentation and cartons.
3. Supplier Responsibility
   - All documentation must be submitted to VONROC at the time of order confirmation, ensuring packaging design and regulatory files are finalized before production begins.
   - Suppliers are responsible for keeping certificates and reports current and must immediately notify VONROC of any changes in battery specifications that could affect packaging, labelling, or shipping compliance.
   - Immediately notify VONROC if any changes to battery specifications occur, as this may alter the required packaging and labelling instructions.
4. Labelling & Artwork Responsibilities
   - All required hazard symbols, UN numbers, and compliance marks are integrated into the printed packaging design, not applied as separate stickers, unless specifically agreed otherwise.
   - VONROC's DTP team provides complete artwork files, which suppliers must print exactly as delivered.
   - Suppliers are responsible for verifying that the correct design files are used and remain compliant during production.

3.8 Packaging size & weight limits

For shipping within the EU, VONROC relies primarily on carriers such as DPD and DHL. All packaging must therefore respect the typical size and weight limits set by these carriers for business shipments:

DPD
- Maximum parcel weight: 31.5 kg
- Maximum length: 175 cm
- Maximum girth (L + 2xW + 2xH): 295 cm

DHL
Letterbox Package
- Maximum dimensions: 38 × 26.5 × 3.2 cm (L × W × H)
- Maximum weight: 1 kg

Standard Parcel
- Maximum length: 120 cm
- Maximum weight: 31.5 kg
- Maximum volume: 432 litres

Suppliers must ensure final export cartons or single master cartons remain within these constraints, unless explicitly instructed otherwise by VONROC. Exceeding these limits can result in surcharge fees, refusal of delivery, or damage risk during handling.

3.9 Printing requirements

VONROC provides a dedicated packaging design file for each product, which factories must strictly follow. While our designs typically use a limited colour palette to minimize ink usage and reduce environmental impact, the final printing must still meet the following standards:

Clarity and Legibility
- All text, icons, and barcodes must be clearly readable at normal viewing distance.
- Colours should match the approved design file, avoiding issues like bleed, fading, or poor contrast.

Consistency
- Packaging serves as an extension of our brand identity, so colour fidelity and layout arrangement must remain consistent across different production runs and product lines.
- Any significant deviations in appearance or material finish must be communicated to and approved by VONROC in advance.

Print Quality
- Use offset or high-quality flexographic printing to achieve crisp edges, stable colour saturation, and minimal smudging or defects.
- The number of print passes for standard VONROC packaging is up to three colours (CMYK or Pantone), and any additional passes—such as for ADR markings or special finishes—must be quoted separately and approved by VONROC in advance as they may affect production costs.
- A final print proof may be requested by VONROC to verify alignment with the design file prior to mass printing.

5. Packaging Process and Best Practices

4.1 Sample Review in Product Development

During initial product development, the first sample often arrives in non-final or provisional packaging. Since the product itself may still be under evaluation—and could potentially be discontinued if tests fail—this preliminary packaging is not always assessed according to our full packaging standards. However, waiting until mass production to see the finalized packaging has repeatedly led to last-minute issues and suboptimal results. To mitigate this:

Dedicated Final Packaging Sample

- Once the product design is confirmed, the factory must provide a separate, fully representative packaging sample for VONROC's review.
- This sample must arrive before mass production starts, ensuring we can thoroughly test and confirm that it meets all quality, functional, and sustainability requirements.

Comprehensive Testing & Feedback

- The dedicated packaging sample will undergo standard drop tests (e.g., ISTA-2A) and assessments for dimension conformity, environmental compliance (FSC, recycled content), and user-friendliness.
- Feedback and required changes will be communicated promptly so that any packaging flaws are addressed before large-scale manufacturing begins.

By incorporating an early packaging sample review into the development cycle, we proactively identify and resolve potential packaging weaknesses, minimize the risk of costly rework, and maintain higher overall quality standards.

4.2 Packaging preparation, assembly and quality check

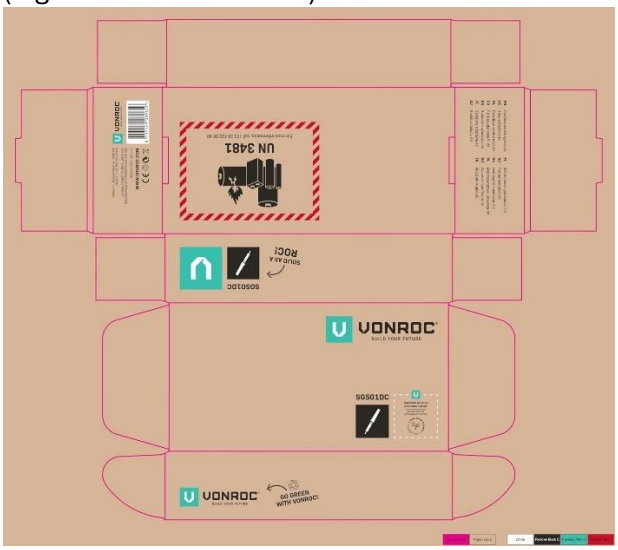
A streamlined and consistent packaging process ensures product integrity, minimizes damage, and improves overall efficiency. Below are the key steps and best practices to follow, along with examples of good and poor packaging.

1. **Preparation and Material Inspection**
   - Verify that all packaging materials (e.g., boxes, fillers, sealing materials) meet quality, environmental, and compliance standards.
   - Store materials in a clean, dry environment to maintain their integrity.
   - Inspect each product for completeness and damage before packaging; document any issues for continuous improvement.

2. **Assembly and Filling**
   - Place the product in the designated packaging, using protective materials (e.g., moulded paper pulp inlay or moulded inserts) to minimize movement and absorb shocks.
   - Distribute weight evenly to maintain balance and reduce the risk of damage during handling or transit.

3. **Sealing and Labelling**
   - Securely close the packaging using recommended methods (e.g., interlocking flaps, paper sealing sticker).

- Affix clear, durable labels displaying product details, serial numbers, handling instructions (e.g., “Fragile” or “Handle with Care”), and any required regulatory markings (e.g. UN3480 or UN3090).



- Include necessary documentation or inserts (e.g., user manuals, warranties) inside or on the packaging.

4. **Final Quality Check**
   - Conduct a final inspection using a predefined checklist to ensure correct sealing, proper label placement, and absence of visible damage.
   - Record outcomes of any required tests (e.g., drop tests) and confirm the package meets all specified guidelines before shipment.

4.3 Best Practices

Use Eco-Friendly Materials:
Opt for FSC-certified cardboard and recycled fillers to reduce environmental impact.

Optimize Dimensions:
Ensure the packaging size is appropriate for the product to minimize void space and reduce filler usage.

Standardize Packaging:
Wherever possible, use standardized box sizes and weights to simplify logistics and ensure consistency.

4.4 Examples of Good vs. Poor Packaging

Good Example:
- A product is enclosed in a robust, multi-layer box made of FSC-certified cardboard.
- Internal padding (e.g., moulded paper pulp inlay) prevents product movement.
- The package is sealed with minimal tape, and labels are clearly visible.
- Drop tests confirm durability under expected handling conditions.

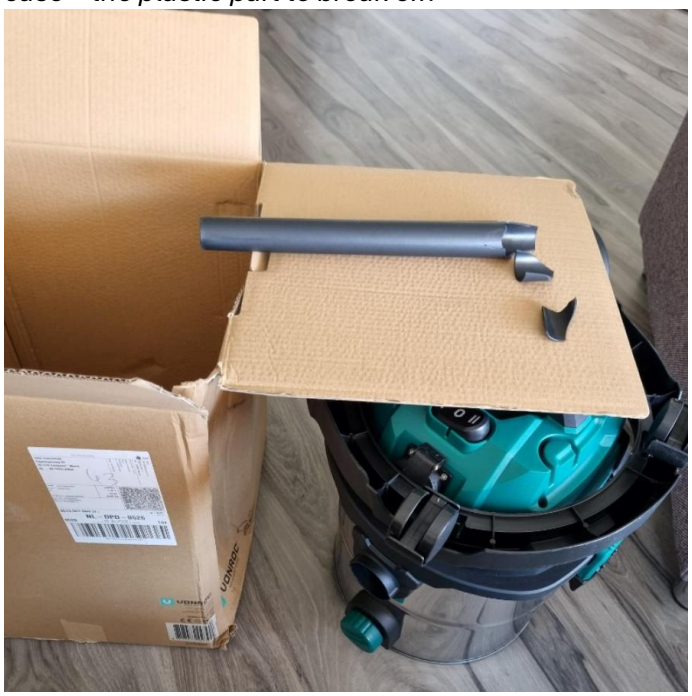
Poor Example:
- A product is placed in a thin, low-quality cardboard box that bends easily.

- Excessive tape is needed to keep the box closed.
- No internal cushioning, leading to product movement and higher risk of damage.
- Labels are unclear or missing, causing confusion during handling or transit.

Poor example 1: Packaging too large for the product, no additional filling material. The machine can move freely in the box. No locking tab.

Poor example 2: The packaging is far too large for the product, and the product is completely loose inside the packaging. No filler material or protection has been used.
The orientation of the die cut is incorrect. The product requires a horizontally oriented die cut, but the current one is vertically oriented, causing the packaging to tip over easily and become damaged.

Poor example 3: Subpar quality cardboard was used, with insufficient layer thickness. There was not enough fill material. Some plastic parts of the product are in direct contact with the cardboard packaging; with every impact, the shock is transferred directly to the product, causing—in this case—the plastic part to break off.



Poor example 4: Although the FEFCO type is correct, the locking tab is missing.

Good example 1: Correct FEFCO type with a double opening flap and a locking tab. The filling material is a moulded paper pulp inlay, not polystyrene foam. At no point does the product come into direct contact with the outside of the box.

Good example 2: Correct FEFCO type with a locking tab. The fill material is made of cardboard, ensuring the product does not come into direct contact with the outside of the packaging. Accessories are placed in paper envelopes, not in plastic bags.

Good example 3: An incorrect FEFCO type has been used, but given the product's external dimensions, no alternative is possible, thereby departing from the standard. An improvement has been made by switching the fill material from polystyrene foam to moulded paper pulp inlay.

Good example 4: The correct FEFCO type has been used, with locking tabs. Additional honeycomb cardboard has been used as fill material. The accessories are packed in an additional cardboard box. There was a departure from the standard of using as few plastic bags as possible because there is no reasonable alternative for this product (the plastic protects the metal components from corrosion).

Good example 5: Example of correctly packaged accessories and/or spare parts. Export box with clear printing. Each accessory is individually packed in a paper envelope. Each individual package is provided with our "EAN sticker" label.

Picture 1: Export carton

Picture 2: Export carton

Picture 3: Export carton

Picture 4: Inner box

Picture 5: Inner box

Picture 6: HF803AA

5. Roles, responsibilities and communication

Effective communication and clearly defined roles are critical for ensuring that our packaging processes meet the required quality standards and are continuously improved. The following outlines the responsibilities of each key stakeholder involved in the packaging process:

- **Packing Specialist:**
  He/she is the dedicated expert in packaging and is fully responsible for this project. He will lead the development, implementation, and ongoing improvement of the packaging standards. In addition, he/she will be the primary point of contact for all communications with the factories regarding packaging specifications, process adjustments, and sample evaluations.

- **Director PTH Shanghai:**
  As the final authority on process implementation in Shanghai, he/she oversees all aspects of packaging from a strategic standpoint. He/she is accountable for ensuring that all communications with the factories are aligned with our overall operational goals and quality requirements. He/she acts as the ultimate decision-maker regarding any deviations or improvements suggested by the factories.

- **Product Management:**
  The Product Management team is responsible for all aspects of our products, including packaging. They ensure that packaging meets technical standards and supports product positioning and market requirements by coordinating closely with the packing specialist and the QA teams to integrate packaging improvements into the product development process. The Lead Product Manager oversees all aspects of packaging from a product management standpoint.

- **QA Team:**
  Our QA team is actively involved during product development. They review packaging samples as part of the product validation process and provide feedback to ensure that packaging aligns with both quality and environmental standards. Their continuous oversight helps to pre-empt potential issues and drive improvements before mass production.

- **QC Team China:**
  This team performs inline inspections during production, conducts Post-Shipment Inspections (PSI) and prepares Product Inspection Reports (PIR) to ensure that packaging quality is maintained at the factory level. They also inspect the packaging at the shipment container stage to confirm compliance with established standards.

- **QC Team Netherlands:**
  Responsible for assessing packaging during the incoming goods inspection and container unpacking processes. They identify any discrepancies or issues and prepare improvement reports. Their feedback is critical for driving corrective actions and maintaining consistency across the supply chain.

- **Warehouse Colleagues (Netherlands):**
  The colleagues in our warehouse are on the frontline during container unpacking, palletization, and order picking. They are tasked with monitoring the condition of the packaging during these processes. Any issues or inconsistencies observed are immediately

reported to the Product Management team (PM), ensuring that problems are addressed swiftly to avoid downstream impacts.

This structured approach to roles and responsibilities ensures that all facets of the packaging process—from design to final delivery—are monitored, evaluated, and continuously improved through effective communication and collaboration across our teams and with our external partners.