



Safety of recycled paper and board according to Industry

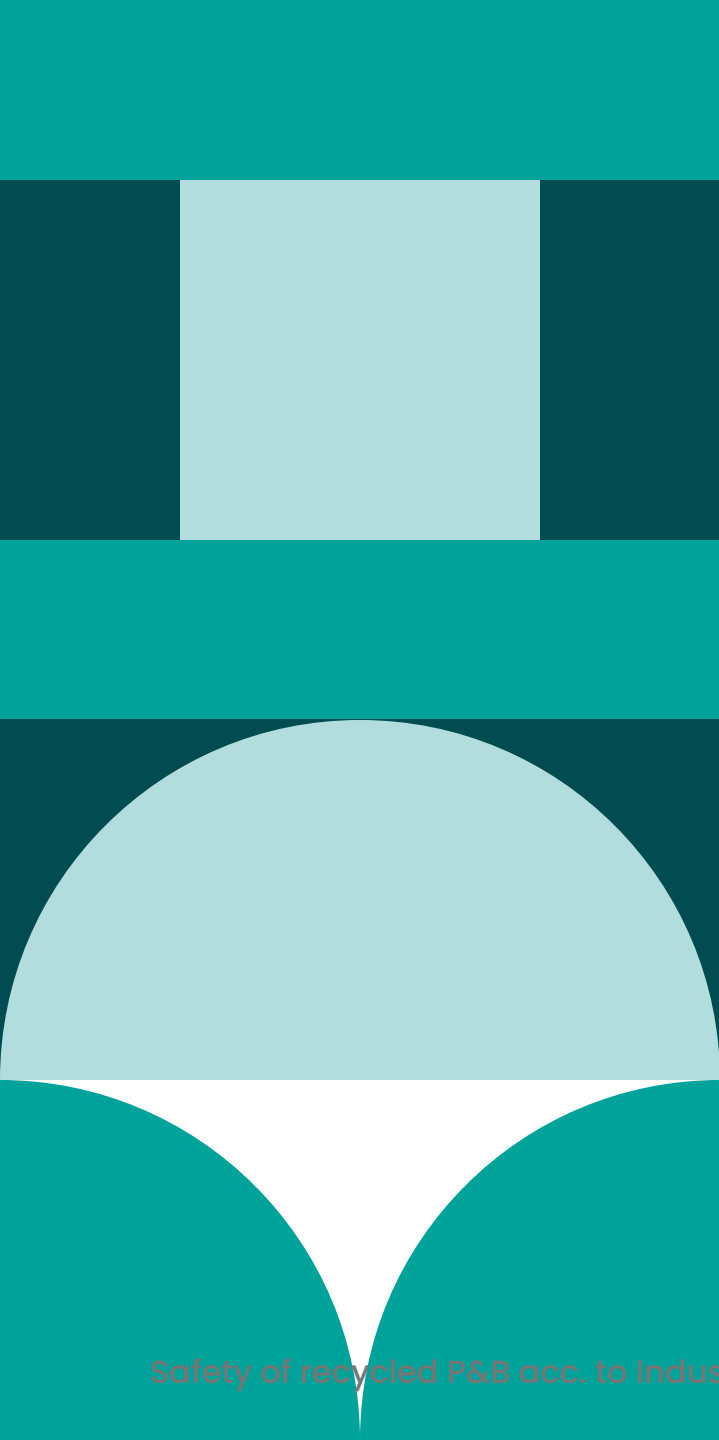
Sigrid Gerold on behalf of CEPI and CITPA – 12th EFSA FCM Network meeting
21st & 22nd October 2025

Guiding documents

- CEPI/CITPA Food contact guidelines for the compliance of paper and board materials and articles http://www.citpa-europe.org/sites/default/files/Food%20Contact%20Guidelines_2019_final.pdf
- CEPI Guideline on good manufacturing practice for the manufacture of paper and board for food contact <https://www.cepi.org/updated-good-manufacturing-practice-gmp-guidelines-for-the-manufacture-of-paper-board-for-food-contact/>
- CEPI Eurokraft / EUROSAC Food Contact Guideline https://www.eurosac.org/fileadmin/pdf/pdf_food_contact/2025_Food_Contact_Guideline_EN.pdf
- CEPI Guidelines for Responsible Sourcing and Supply of Recovered Paper https://www.cepi.org/wp-content/uploads/2022/02/19-2905_Industry-position-paper-on-separate-collection_A4_20190903.pdf
- ECMA Good Manufacturing Practice for Food Safety <https://ecma.org/industry-topics/guidelines-and-gmp/ecma-good-manufacturing-practice-for-food-safety/>
- FEFCO Good Manufacturing Practice (GMP) standard <https://www.fefco.org/sites/default/files/2020-2019/March/FEFCO%20GMP%20FINAL%202020.pdf>
- PIJITF GUIDANCE Information and Transparency in the Printed Food Packaging Supply Chain https://www.eupia.org/wp-content/uploads/2025/03/PIJITF-Guidance-on-Information-Flow-and-Transparency-in-the-Supply-Chain_Final-March-2024.pdf
- EDQM Technical guide on documentation supporting compliance and safety of food contact materials and articles – 1st edition, 2024 [Documentation supporting the compliance and safety of food contact materials and articles – European Directorate for the Quality of Medicines & HealthCare](#)
- EDQM Paper and board used in food contact materials and articles <https://www.edqm.eu/en/paper-and-board-used-in-food-contact-materials-and-articles>
- CoE Resolution CM/Res(2020)9 on the safety and quality of materials and articles for contact with food <https://rm.coe.int/090000016809fe04a>
- EuPIA documents on the use of printing inks on food contact materials and articles <https://www.eupia.org/key-topics/food-contact-materials/general-overview-of-fcm/>
- BfR Recommendations on Food Contact Materials <https://www.bfr.bund.de/service/datenbanken/bfr-empfehlungen-zu-materialien-fuer-den-lebensmittelkontakt/>
- BfR Methodensammlung Papier, Karton und Pappe <https://www.bfr.bund.de/service/datenbanken/bfr-empfehlungen-zu-materialien-fuer-den-lebensmittelkontakt/methodensammlung-papier-karton-und-pappe/>

Ensuring safe products of recycled paper and board (P&B) involves:

1. Product design
2. Risk management
3. Raw material selection
4. Good Manufacturing Practice (GMP)
5. Stock preparation of fibres for recycling
6. Recycled P&B testing



1. **Product Design**

National restrictions on use of recycled P&B FCMs

Italy:

- DM 21.03.73 allows the use of recycled paper only for “low-risk” foods (dry and solid) and set strict limits
 - Ash residue, Lead migration (D.M. 21/03/1973) et al.

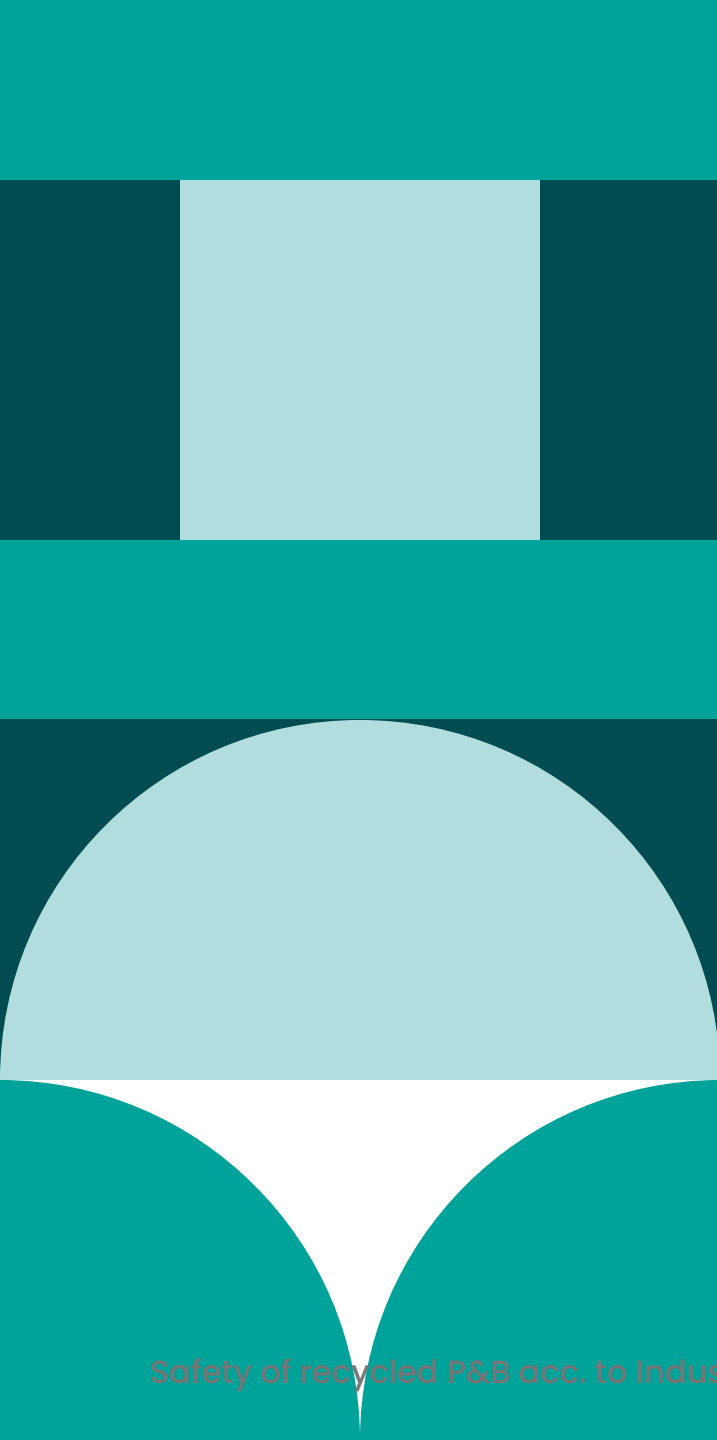
France:

- Use of a **functional barrier** to avoid the transfer of chemicals to food when contamination by one or more chemicals is not under control (barrier may be replaced by other means of equivalent effectiveness).
- Specific limits for recycled P&B on Phthalates, other plastifiers, Lead, Mercury et al.

Design of products made of recycled P&B

Considerations on:

- **Selection of fibre qualities** in regard to
 - FCM requirements
 - Buildup (e.g., lower quality fibres embedded in matrix)
- Additional requirements (e.g., Blauer Engel for hygiene paper)
- Use of a **barrier** layer? (on the P&B or as an additional packaging component)
- Addition of **adsorbents** to the recycled pulp? (to retain substances in packaging)
- **Recyclability** of the final product



2. **Risk management**

Risk management on fibres for recycling

- The supplier of the paper for recycling raw material will be requested to provide statements of compliance with the **CEPI Responsible Sourcing Guidelines**.
- In addition, reference should be made to **EN 643**, to exclude those grades that are clearly unsuitable for the manufacturing of food contact P&B.
- Impurities and contaminants must be taken into consideration, at least as far as they **have the potential to migrate according to the specific application**.

Non intentionally added substances (NIAS) in fibres for recycling

- NIAS include contaminants **from printing inks, adhesives, and coatings**, which originate from the paper's previous uses.
- NIAS may be either **anticipated or predicted** based on the knowledge of chemical processes, manufacturer's experience, and paper classification (EN 643). They may then be identified and quantified rather easily by targeted chemical analyses. NIAS may also be completely **unknown** substances that may include **impurities** or other reaction products. The NIAS that cannot be anticipated or predicted are sometimes completely unknown analytically (identity and quantity) and likely lack a toxicological profile.
- By using **non-targeted screening methods**, additional NIAS may be detected and identified

A complete characterisation of all NIAS is not currently feasible, and identifying those that may be of concern is very challenging. Industrial research is designed to improve NIAS reconnaissance, with the aim of providing a more comprehensive and detailed analysis of the target.

Typical NIAS in fibres for recycling

- Bisphenoles (A, S): from thermo paper and labels
- Mineral oil compounds (MOSH / MOAH): from printing inks
- DIPN: from carbonfree copying paper
- Various Photoinitiators: from printing inks
- Michler's ketone: from printing inks (mostly outphased)
- PFAS: from coatings (usually not used anymore, but still in the recycling stream)
- Phthalates
- Optical brighteners

Specific migration limits for NIAS in recycled fibre as raw materials listed in:

- BfR XXXVI annex: NIAS with specific migration limits
- French Fiche no. 4: Phthalates et al.



3.

Raw material selection

Detection of recycled material:

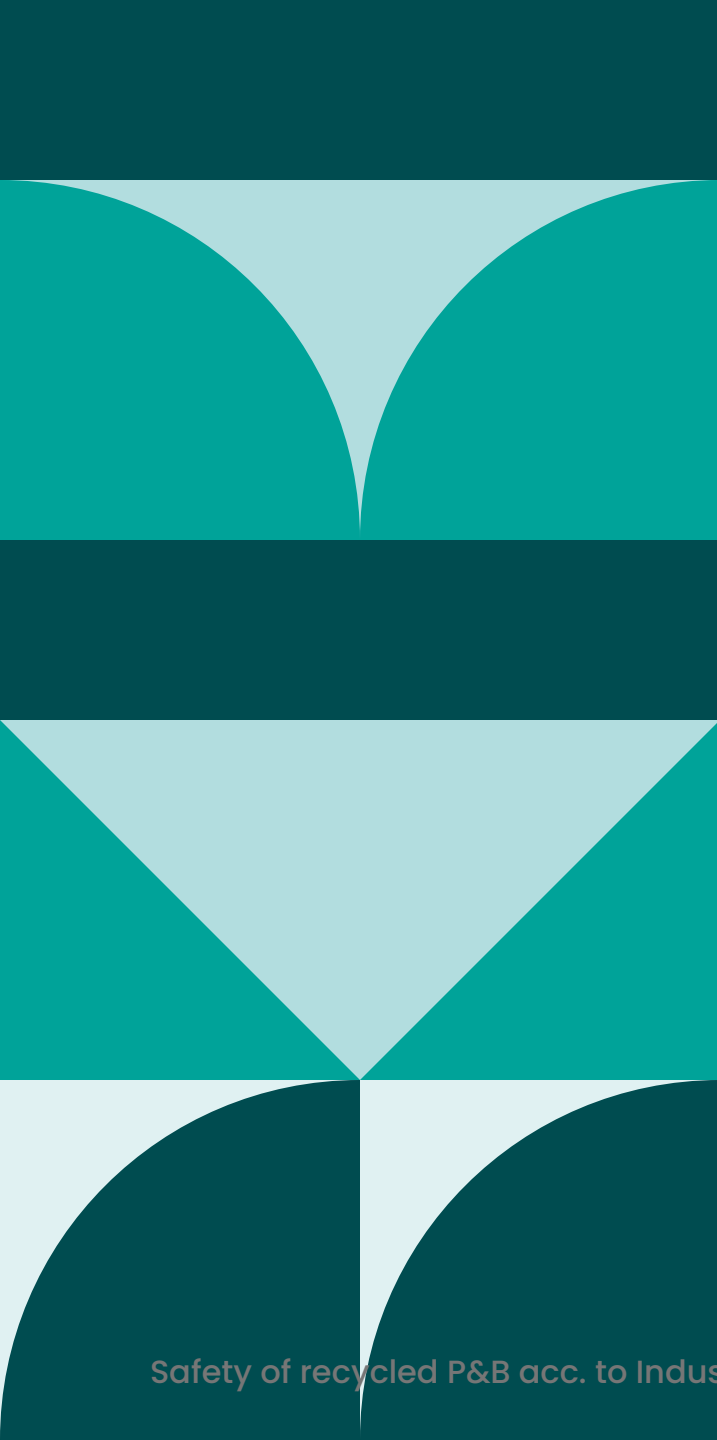
Top layer of recycled paperboard may consist of fresh fibre or highly purified material =>

- **Identification by UV illumination**
 - Under UV illumination at 366 nm, an irregular pattern of spots of whitened or fluorescent particles is observed in the recycled material
- **Identification by light microscopy**
 - Particles of coloured paper and plastic can be detected by reflection or transmission light microscopy
- **Marker substances for recycled material**
 - **Diisopropyl naphthalenes (DIPNs)** are commonly used as solvents for dyes in **carbonless copy paper**. DIPNs may be detected in solvent extracts.
 - **Bisphenol A and S** is used in **thermal paper**, e.g. in cash register receipts and labels. It may be measured in P&B by solvent extraction with 95% ethanol or methanol.
 - **printing ink components**
 - **Ashes content:** if above 10 to 12% consider it to be recycled content (naturally 3-4% present in natural fibres)

Fibre and Chemicals selection – P&B recipe development

Under consideration of:

- Intended end use of the product
 - **Type I – Aqueous and/or fatty foodstuffs**
Frozen foods of Type I can be considered to be dry, non-fatty of Type II provided that the food is not defrosted in contact with P&B.
 - **Type II – Dry, non-fatty foodstuffs**
Frozen foodstuffs of Type II are considered to be foodstuff Type I if they are defrosted in contact with P&B.
 - **Type III – Foodstuffs which are shelled or peeled or washed before consumption**
Examples of Type III foodstuffs are fruits, vegetables, nuts and potatoes.
- Source and quality of recovered fibres;
- Processing technologies that will be applied to remove contaminants from recycled fibres
- Potential migration of NIAS
- National regulatory requirements

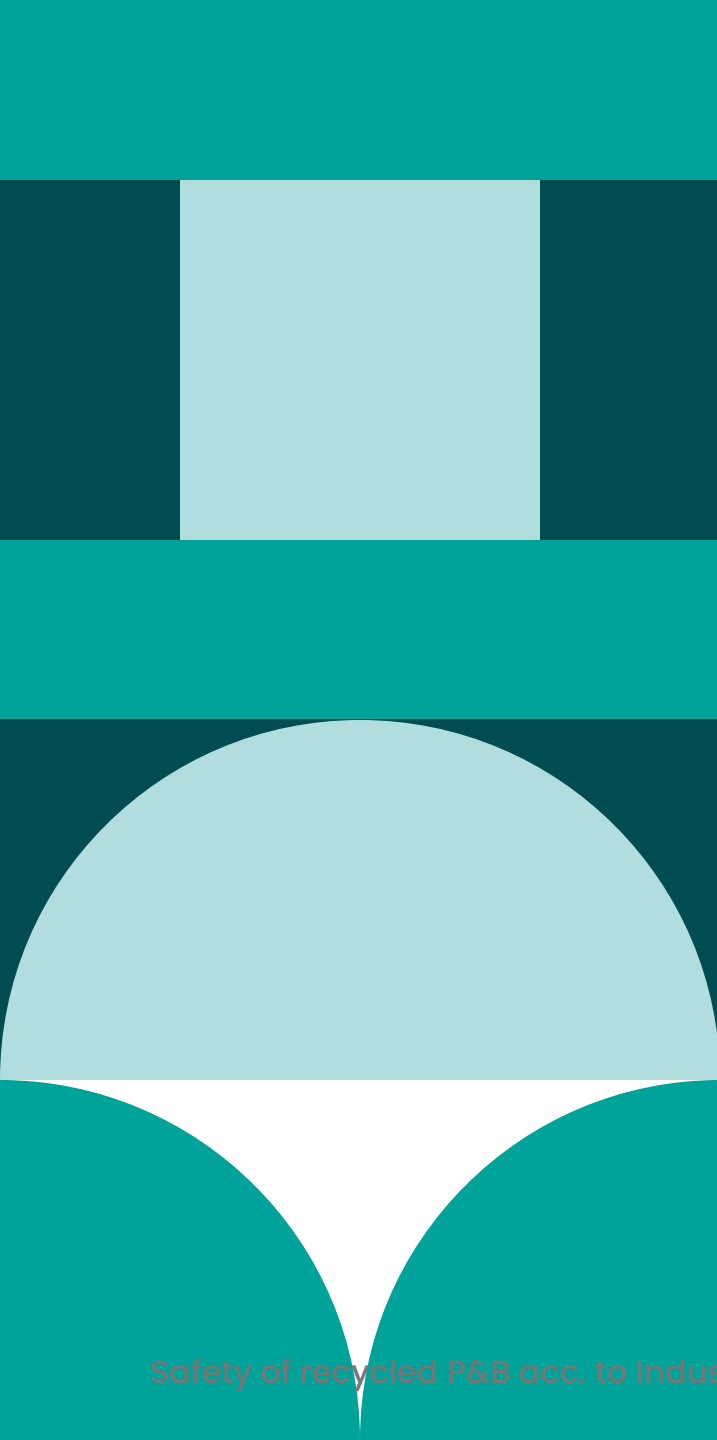


4.

Good Manufacturing Practice

Good Manufacturing Practice

- Processing technologies applied to **remove contaminants** in the “**Stock preparation process**” must be suitable and sufficient for the intended use
- **Monitoring process on finished material:**
 - Periodic **purity testing for target contaminants** to determine the presence of non intentionally added, specific substances in the finished P&B materials
 - **Frequency** based on risk analyses, decade-long experience and process control



5.

Stock preparation of fibres for recycling

as already presented ;-)



6. **Recycled P&B testing**

Testing of P&B made from recycled fibres

Tests are necessary wherever there are **actual or potential health risks**.

Risks depend on:

- Selected recovered paper
- Effectiveness of recycling treatments
- Intended contact with foodstuffs

Test regimes are the **same as for virgin P&B** qualities, with **same regulatory and process-related challenges!**

Ensurance of compliance done by routine batch testing:

1. Simulation of transfer (migration, extraction etc.)
2. Analyses as for P&B made from virgin fibres
3. **Additional analyses on specific substances under particular consideration of NIAS known to be contained in recycled fibres**

„Minimum“ of required NIAS analytics:

- For contact with **Dry, non-fatty** food:
 - Phthalates, Benzophenones, DIPN, volatile substances, Polycyclic aromatic hydrocarbons,, Heavy metals and PFAS (due to PPWR), other known NIAS that might migrate into dry, non-fatty food
- Additional for **moist and/or fatty foodstuffs**:
 - Michler's ketone, Azocolourants, Aromatic amines, Colorants, Optical brighteners, Aluminium...

Tests on a recycled board intended for dry, fatty and fast-food contact (example):

Dry residue in water extract and iso-octane extract
Formaldehyde in water extract
Glyoxal in water extract
Elements (Pb, Cd, Cr, Hg, Al) in cold water extract
Heavy metals (Packaging Regulation 94/62/EC)
Fluorescent components (optically brighteners)
Antimicrobial components (Hemmhof test)
Anthraquinone and 2-ethylanthraquinone
Volatile contaminants (DIPN, benzophenones, phthalates, etc.)
Benzophenones, aromatic ketones, bisphenols, Pergafast (coldwater extract)
Benzophenones, aromatic ketones, bisphenols, Pergafast (ACN extract)
MOSH/MOAH (content)
Aluminium
DCP/MCPD (when using an epichlorohydrin resin)

Color fastness
Biocides
DEHSS
PAH
Photoinitiators via extract (France)
Methanal
Pentachlorophenol (PCP)
Polychlorinated biphenyls (PCB)
Reductively cleavable amines
Primary aromatic amines
Glycols
BTEX/LHKW
Dioxins
Specific PFAS
Total fluorine; total organic fluorine
Sensory tests
etc.

Testing of functional barriers on and functional adsorbents in P&B

- Mineral oil components: test acc. To DIN Spec. 5010 (Tenax migration)
- Other substances:
 - Average concentration of contamination is known to the producer; the Tenax migration test result is compared with the theoretical 100% transfer.
 - Transfer of surrogate substances to the non-food contact side of the paper or board from a donor paper or board (to avoid spiking with a solution) and then measure the transferred amount. The migration into the receptor (e.g. silicone paper) can then be determined as described above.

Conclusion

- Recycled P&B can be used for indirect and certain direct food contact applications
- Specific regard has to be taken on intended use and actual risk of transfer of substances into food
- Risk can be minimized by suitable stock preparation and design of packaging (resp. use of suitable barriers)

Food-contact P&B made of virgin and recycled fibres are safe and suitable for use in direct or indirect food contact applications. The risk assessment must consider how the P&B product is intended to be used, with the safety evaluation focusing on substances that can potentially migrate from the product into food.

To evaluate the safety of unconverted P&B, it is essential to have an in-depth understanding of the raw materials and the production process technology and conditions. Therefore, only P&B producers can risk-assess the material and ensure that food contact materials made of board and paper are safe for the intended use.

Downstream players in the value chain select suitable P&B material for the intended use, relying on information from P&B producers.

The safety assessment conducted on converted P&B differ significantly from those on unconverted P&B. It focuses on components added or formed during the converting process.

Currently, established methods of ascertaining compliance of P&B do not all reflect migration into food; rather, they are extraction methods that overestimate the actual transfer into foodstuffs.

The P&B industry lacks applicable, specific, harmonised EU-wide food contact legislation that would standardise the fragmented national approach to compliance and safety.



Any questions?



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