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Colour of paper release liner of adhesive tapes: Impact on material circularity

Executive summary

Light coloured paper release liners used in adhesive tapes can be recycled in a closed loop into paper products for diverse applications including production of new release liners, thus enabling full circularity. This is favourable as the fibres incorporated in glassine are of high quality for paper making. It is also possible to recycle them in an open loop into lower grade fibre products or alternative materials such as construction products.

Dark coloured paper release liner used in adhesive tapes can be recycled only in an open loop into lower grade fibre products and alternative materials. Presence of small amounts of dark release liner paper in a waste stream can result in rejection of complete bales as feedstock for paper recycling. Manufacture of dark release liner requires the addition of dyes in larger amounts that cannot be efficiently removed in the recycling process.

The use of dark release liners is not required for performance or from a supply chain perspective. Switching dark release liners for light coloured ones would enable better recycling of paper release liner from adhesive tapes, and better integration with ongoing efforts in adjacent industries.

Release liners used in adhesive tapes

Adhesive tapes are multi-layered products composed of a tape backing (e.g., plastic, paper, cloth, etc.) that is coated on one or two-sides with an adhesive material. In some cases, tapes incorporate a release liner that enables the winding of the tape material into a roll, prevents early adhesion and is removed upon application of the tape.

Release liners used in adhesive tapes are composed of a paper or plastic substrate, covered by a thin layer of silicone coating. The silicone coating can be present on one or both faces of the substrate, depending on the application.

Paper release substrates include glassine, supercalendered kraft (SCK) and clay-coated kraft (CCK).

Film substrates include polyethylene terephthalate (PET), polyethylene (PE) and polypropylene (PP).

Light and dark coloured paper release liner

The colour of paper release liners used in adhesive tapes varies from white, through yellow /light brown to dark brown. Some adhesive tapes include a dark paper release liner, with colours such as “Havana”, “Topaz” or “Brown” (see Figure 1).



Figure 1: Colour of release liner. *Left:* dark glassine release liner; *right:* light glassine release liner; *centre:* glassine release liner resulting from recycling dark and light release liners together. Photo courtesy of UPM Specialty Papers.

The colour of the release liner is determined by the addition of specific dyes during the manufacture. Light coloured release liner requires the addition of lower amounts of dye than dark release liners. On the other hand, during paper recycling it is challenging to remove the dyes from the fibres, impacting the quality and applicability of the recycled paper (see Figure 2).



Figure 2: Impact of release liner colour on recycling outcome. Detail of recycled glassine release liner resulting from mixing dark and light release liners; note the dark specks on the surface. Photo courtesy of UPM Specialty Papers.

Thus, lighter coloured release liner papers are less complex to manufacture, require less chemicals, and enable a wider applicability of the recycled fibres.

Closed-loop recycling of paper release liner

Release liner from adhesive tapes becomes waste upon application of the tape to the intended substrate. Silicone-coated paper release liners, like many other grades of paper, can be (and indeed already are) recycled. Recycling of siliconized release liner requires an additional step in the paper recycling process called deinking, where coatings such as printing inks and silicones are removed from the paper prior to the repulping. However, not all paper mills are equipped with a deinking station.

Double-sided siliconization of a paper release liner is not an obstacle for its recycling, as the de-inking step used during the recycling process enables the removal of the coating on both sides followed by repulping.

The physical form of the release liner waste (e.g., rolls, sheets, strips) is not an impediment for its recycling, as long as it is possible to make into bales.

Contamination of release liner can be an issue for recycling. Presence of adhesives, tape residues or cores can hinder the recycling process and reduce the quality of the recycled fibre obtained.

CELAB-Europe (Circular Economy for LABELs), a project of the self-adhesive labels industry aimed at enhancing the recycling of release liner used in self-adhesive labels, published a position letter in February 2023 strongly recommending “all producers and users of paper release liners to only use – so that they are recyclable – white or lightly tinted release liners”.ⁱ

Incompatibility of dark-coloured release liners with closed-loop recycling

Dark release liner is challenging to recycle in paper mills that process siliconized liner to produce paper products. Dark grades cannot be de-inked efficiently, which forces waste streams containing darker release liner to be rejected as feedstock for recycling; the presence of a small amount of dark release liner in a bale can cause the complete bale to be rejected for recycling into paper.

The volumes of dark release liner are comparatively small, therefore its separate recycling in a specific process is not economical, if at all feasible.

All of this results in dark release liners being rejected for closed-loop recycling.

Open-loop recycling of paper release liner

Besides recycling of paper release liner into paper products, some companies can use release liner waste as a feedstock for the manufacture of other fibre-based products, such as some qualities of paperboard. The presence of silicones in the release liner remains an issue for these recycling processes, with many recyclers limiting the amount of siliconized material accepted as input for recycling.

These alternative recovery processes or open-loop recycling can use both light and dark coloured release liner as feedstock.

Why is dark paper release liner used in adhesive tapes?

The Waste Management Workstream of the Afera Flagship Sustainability Project surveyed the topic among suppliers of release paper, tape manufacturers, and tape converters.

Suppliers of release liner stated that there are no differences in the performance of a light versus a dark release liner, and they see no difficulties to supply any shade of release liner to the tape industry.

Application of tapes can rely on the contrast of a dark release liner, but this could be bridged with the right technology (software or hardware updates).

For some tape products, a dark release liner is perceived as part of the identity of the product, as it has been marketed as such for a considerable time.

Attempts from tape manufacturers to change the dark release liner with a lighter coloured liner in the past were unsuccessful, citing customer confusion and questions about performance as reasons for rolling back to a dark release liner.

In summary, there is no technical requirement for adhesive tapes to incorporate a dark release liner, and suppliers of paper liners are able to provide light coloured release liners offering the same performance.

ⁱ CELAB-Europe, [Release paper liner colour to enable recycling](#). Published 17 February 2023.