

## Questions FERVER to KRS:

1. Could you gain experience in these products in terms of volume in other markets?

ANSWER: The longest experience with dark glass comes from the Irish glass market in form of Baylies bottles which are quite common there. So there are more dark cullet pieces present in the input compared to other markets but not (yet) in volumes which are extremely high. The recycling mostly ends in downcycling as the dark cullet is ejected as CSP into the reject. At present, it is possible to recover these with additional technology from the reject but not in that purity that it can be reasonably used in the remelting process again. Especially not in times where the allowed limits for the g/t value of CSP are getting lower and lower. In the meanwhile we have seen also some extremely dark beer bottles and some kind of other very dark bottles but not yet in extremely high quantities. The trend however seems to be growing a little bit.

2. How are S+S recycling machines handling these products?

ANSWER: In standard CSP separation machines, extremely dark cullet is ejected as CSP. Due to its black colour it can be recovered from the CSP waste but there are still some false detections of black glazed ceramic, black painted porcelain and other problematic contaminations which are also non transparent and have additionally a nearly black surface. So the purity of the recovered glass can until now not meet the remelting specifications.

3. Is there any technical solution for getting the black cullet into the final product stream instead of the waste stream?

ANSWER: As mentioned above there are technologies (especially the latest Flash Technology) which can recover the glass from the reject but until now there are still too much other contaminations together with this glass, so that it can not be used for the normal remelting process. For sure the development and further refinement of the recovery process is going on and there are already further technologies in development to improve the dark cullet detection but until now there is no ready to market solution available for this problem.

From the perspective of the recyclers (our customers) we see the trend of the increasing dark cullet quite problematic as this surely reduces the amount of normal recyclable glass for normal recycling plants and even with further investment to recover more of the dark cullet from the CSP waste, it increases the cost of the recycling process and does not necessarily contribute to the bottle to bottle recycling. Despite all new developments and technical innovations, the recycling and especially the CSP sorting process will always remain a compromise between investment and processing costs, throughput, glass loss and the required output quality. And surely the dark cullet will always have a negative influence to this compromise.

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