On the (outer) Minkowski content with lower-dimensional structuring element

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Abstract: Given a convex body Q (structuring element) and a set A in a Euclidean space, we consider the Q-Minkowski content of A. It is defined as the usual isotropic Minkowski content of A, but where the Euclidean ball is replaced by Q. When Q is full-dimensional, the existence of the Q-Minkowski content can be assured by a sufficient condition which was stated by Ambrosio, Fusco and Pallara in the isotropic case. If Q is not full-dimensional, we show that a weaker condition is sufficient for this purpose. We also consider the outer Q-Minkowski content of A yielding the anisotropic perimeter of A and we find a sufficient condition for its existence. Finally, we present an example of a set in three-dimensional Euclidean space, which does not admit the isotropic outer Minkwski content, but it admits the outer Q-Minkowski content for all two-dimensional disks Q.