For integers $n \geq k \geq 2$, let $V$ be an $n$-element set, and let $\binom{V}{k}$ denote the set of all $k$-element subsets of $V$. Let $\mathcal{C}$ be a collection of pairs $\{A, B\} \in \mathcal{C}$ of disjoint subsets $A, B \subset V$. We say that $\mathcal{C}$ covers $\binom{V}{k}$ if, for every $K \in \binom{V}{k}$, there exists $\{A, B\} \in \mathcal{C}$ so that $K \subseteq A \cup B$ and $K \cap A \neq \emptyset \neq K \cap B$. When $k = 2$, such a family $\mathcal{C}$ is called a separating system of $V$, where this concept was introduced by Rényi, and studied by many authors.

Let $h(n, k)$ denote the minimum value of $\sum_{\{A, B\} \in \mathcal{C}}(|A| + |B|)$ over all covers $\mathcal{C}$ of $\binom{V}{k}$. Hansel determined the sharp bounds $[n \log_2 n] \leq h(n, 2) \leq n[\log_2 n]$, and Bollobás and Scott sharpened these bounds to an exact formula for $h(n, 2)$, for all integers $n \geq 2$. Here, we extend these results by determining an exact formula for $h(n, k)$, for all integers $n \geq k \geq 2$. (Received July 27, 2017)