A signed graph is a graph $G$ associated with a mapping $\sigma : E(G) \to \{-1, +1\}$, denoted by $(G, \sigma)$. A cycle of $(G, \sigma)$ is a connected 2-regular subgraph. A cycle $C$ is positive if it has an even number of negative edges, and negative otherwise. A circuit of a signed graph $(G, \sigma)$ is a positive cycle or a barbell consisting of two edge-disjoint negative cycles joined by a path. A circuit cover of $(G, \sigma)$ is a family of circuits covering all edges of $(G, \sigma)$. A shortest circuit cover of $(G, \sigma)$ is a circuit cover with the shortest length which is denoted by $scc(G, \sigma)$. Bouchet proved that a signed graph with a circuit cover if and only if it is flow-admissible (i.e., has a nowhere-zero integer flow). We show that every 2-edge-connected cubic signed graph has $scc(G, \sigma) \leq 26|E(G)|/9$ if it is flow-admissible. (Received September 14, 2016)