We enumerate and classify all stationary logarithmic configurations of \( d + 2 \) points on the unit sphere in \( d \)-dimensions. In particular, we show that the logarithmic energy attains its relative minima at configurations that consist of two orthogonal to each other regular simplexes of cardinality \( m \) and \( n \). The global minimum occurs when \( m = n \) if \( d \) is even and \( m = n + 1 \) otherwise. This characterizes a new class of configurations that minimize the logarithmic energy on \( S^{d-1} \) for all \( d \). The other two classes known in the literature, the regular simplex \((d + 1)\text{ points on } S^d\) and the cross polytope \((2d)\text{ points on } S^d\), are both universally optimal configurations. (Received September 16, 2019)