Explosive volcanic eruptions have hitherto been largely interpreted in terms of multiphase flows through rigid conduits of a fixed cross-section, ranging from cylinders to parallel-sided conduits to simulate dykes. Accounting for wall rock elasticity, recent studies of explosive flows along dykes showed major differences to results for rigid conduits. Dyke flows show very large underpressures with respect to lithostatic around the fragmentation level where the conduit significantly narrows or even closes. This result is inconsistent with the geologic record of large-magnitude explosive eruptions, which appear to be erupted from a dyke. Our understanding of how to erupt hundreds of cubic kilometres of magma during single eruptions is thus incomplete. Here we document the dramatic influence of local crustal extension on the intensity of volcanic eruptions through a dyke. We find that the larger the extensional stress, the greater the sustainable dyke length during eruption. Mass eruption rates in excess of $10^{10}$ kg/s are readily attained during moderate extensional stresses indicative of eruption duration of the order of days for volumes larger than 500-1000 km$^3$. Our study documents the increased efficiency in erupting large volumes of silicic magmas through fissures promoted by crustal extension. We provide answers to outstanding questions regarding the intensity and duration of catastrophic volcanic eruptions and the link between basin formation and large-scale volcanism on Earth.