In this paper, the hydraulic-thermal performance of a double-pipe heat exchanger equipped with 45°-helical ribs is numerically studied. The ribbed double-pipe heat exchanger is modelled using three heights (H = 0, 2.5, 3.75, 5 mm) of 45°-helical ribs. Two numbers (4-ribs and 8-ribs) of 45°-helical ribs are attached on the outer surface of the inner pipe of the counter-flow double-pipe heat exchanger and compared with a smooth double-pipe heat exchanger. Three-Dimensional computational fluid dynamics (CFD) model for a laminar forced annular flow is performed in order to study the characteristics of pressure drop and convective heat transfer. In addition, the influence of rib geometries and hydraulic flow behaviour on the thermal performance is system-atically considered in the evaluations. The annular cold flow is investigated with the range of Reynolds numbers from 100 to 1000, with three heights of ribs at the same width (W = 2 mm) and inclined angles of (θ = 45°).The results illustrate that the average Nusselt number and pressure drop increase with an in-creasing number of ribs, the height of ribs and Reynold number, while the friction factor decreas-es with increasing Reynolds numbers. The percentage of averaged Nusselt number enhancement for three rib heights (H = 2.5, 3.75 and 5 mm) at 4-ribs is (34%, 65% and 71%), respectively, While for 8-ribs the enhancement percentage is (48%, 87% and 133%) as compared with the smooth double-pipe heat exchanger at Re = 100. The best performance evaluation criteria of (PEC) at (8-ribs, and H = 5 mm) is 2.8 at Re = 750. The attached 45-helical ribs in the annulus path can generate kind of secondary flows, which enhance the fluid mixing operation between the hot surface of the annular gap and the cold fluid in the mid of the annulus, which lead to a high-temperature distribution. Increasing the height of 45°-helical ribs lead to an increase in the sur-face area subjecting to convective heat transfer.