Proof of Corollary 2:

For any $p \in \Omega$, we have, by Theorem 5 (p.44), there exists a $\delta_p > 0$ s.t. $B(p, \delta_p)$ is a totally normal neighborhood of p.

Then $\{ B(p, \delta_{p}/2) \mid p \in \Omega \}$ provides a covering of Ω. By compactness of Ω, we have a finite subcover $\{ B(p_i, \frac{\delta_{p_i}}{2}) \}_{i=1}^{m}$.

Pick $\rho_0 := \min \frac{\delta_{p_i}}{2}$.

$\forall q \in \Omega$, $\exists p_i$ s.t. $q \in B(p_i, \frac{\delta_{p_i}}{2})$.

Then we have $\cancel{B(q, \frac{\delta_{p_i}}{2}) \subset}$

$$B(q, \rho_0) \subset B(q, \frac{\delta_{p_i}}{2}) \subset B(\cancel{q}\, p_i, \delta_{p_i})$$

In particular $B(q, \rho_0)$ is a normal ~~coord~~ neighborhood of q, and, therefore, ~~on~~ the Rie polar coordinates can be introduced on that.