Physics Reference Manual, Release 10.7, Chapter 7.5, p.78:

"For electrons and positrons ionisation above 10 keV a simplified Berger-Seltzer energy loss formula ((10.2)) is used…". The formula (p.121 of the manual) contains function $F^{-}(\tau, \tau_{up})$:

$$F^{-}(\tau, \tau_{up}) = -1 - \beta^2 + \ln\left[(\tau - \tau_{up})\tau_{up}\right] + \frac{\tau}{\tau - \tau_{up}} + \frac{1}{\gamma^2}\left[\frac{\tau_{up}^2}{2} + (2\tau + 1)\ln\left(1 - \frac{\tau_{up}}{\tau}\right)\right],$$

where $\tau = \gamma - 1$, τ_{up} – upper limit for τ, $\tau_{up} = \min(\tau_{cut}, \tau_{max})$, $\tau_{max} = \tau/2$ for electron. Substituting $\tau_{up} = \tau_{max} = \tau/2$, we get:

$$F^{-}(\tau, \tau/2) = 1 - \beta^2 + \ln\left(\frac{\tau^2}{4}\right) + \frac{1}{\gamma^2}\left[\frac{\tau^2}{8} + (2\tau + 1)\ln\left(\frac{1}{2}\right)\right]$$

On the other hand, function G4RToEConvForElectron::ComputeLoss (line 94 and 107 in G4RToEConvForElectron.cc) uses another formula:

$$F^{-} = 1 - \beta^2 + \ln\left(\frac{\tau^2}{2}\right) + \frac{1}{\gamma^2}\left[\frac{1}{2} + \frac{\tau^2}{4} + (2\tau + 1)\ln\left(\frac{1}{2}\right)\right].$$