Difference between Q_{Kappa} and Q_p:

Dahlen and Tromp 1998, page 350

$$c_p = \sqrt{\frac{K + \frac{4}{3}\mu}{\rho}} = \sqrt{\frac{\lambda + 2\mu}{\rho}}$$

$$\Rightarrow \quad K = \lambda + 2\mu - \frac{4}{3}\mu = \lambda + \frac{2}{3}\mu \quad \text{in 3D}$$

Carcione 1993 generalizes this to 2D and 3D by writing: (see also Carcione et al 1988 equation (A9))

$$K = \lambda + \frac{2}{n}\mu$$ with n the spatial dimension ($n = 2$ or $n = 3$)

Q_μ is always equal to Q_S, but Q_{Kappa} is not equal to Q_p in general.
The formula to convert one to the other is given in Dahlen and Tromp (1998) eq (9.59):

$$Q_p = \frac{1}{\dfrac{1 - \frac{4}{3}\left(\frac{c_s}{c_p}\right)^2}{Q_{Kappa}} + \dfrac{\frac{4}{3}\left(\frac{c_s}{c_p}\right)^2}{Q_{mu}}}$$

This formula is wrong in 2D plane strain, see next page.

(f) and $c_p = c_p(f)$ are given
[...]cy at which one wants to
[...] conversion (for a really constant Q,
[...]y does not matter); however
[...]epresentation of a constant Q it
does vary a little bit, because $\frac{c_s}{c_p}$ will slightly
vary with f because they scale as $\sqrt{\frac{1}{N}\sum \frac{\tau_{\varepsilon 1}}{\tau_{\sigma 1}}}$ and $\sqrt{\frac{1}{N}\sum \frac{\tau_{\varepsilon 2}}{\tau_{\sigma 2}}}$.

In 2D plane strain, one spatial dimension is much greater than the others (see for example: http://www.engineering.ucsb.edu/~hpscicom/projects/stress/introge.pdf) and thus kappa = lambda + mu in 2D plane strain (instead of kappa = lambda + 2/3 mu in 3D).
See for example equation 6 in http://cherrypit.princeton.edu/papers/paper-99.pdf.
In 2D axisymmetric I think the 2/3 coefficient is OK, but it would be worth doublechecking.