$$\Gamma^{a;b,c}_{\text{un}}\,(p;q,r)_\mu \Big|_{p^2 = q^2 = r^2 = -\mu^2} = \tilde{Z}_1^{-1}\,\Gamma^{a;b,c}_{\text{BARE}}\,(p;q,r)_\mu \tag{2.9}$$

The Ward identities[34,35] ensure that these constants are related by:

$$Z_3/Z_1 = \tilde{Z}_3/\tilde{Z}_1 \tag{2.10}$$

and that the longitudinal part of the inverse vector propagator is unrenormalized:

$$D^{-1}_{\text{un}}\,(k)\,{}^{ab}_{\mu\nu} = \ldots + \frac{i}{\alpha_u}\,k_\mu k_\nu \tag{2.11}$$

where α_u is the unrenormalized gauge parameter.

The renormalized Green's functions are then defined by scaling the fields according to:

$$\begin{aligned} (B^a_\mu)_r &= Z_3^{-\frac{1}{2}}\,(B^a_\mu)_u \\ (\phi^a)_r &= \tilde{Z}_3^{-\frac{1}{2}}\,(\phi^a)_u \end{aligned} \tag{2.12}$$

and defining the renormalized charge to be

$$g_r = Z_3^{+\frac{3}{2}}\,Z_1^{-1}\,g_u \tag{2.13}$$

and the renormalized gauge parameter to be

$$\alpha_r = Z_3^{-1}\,\alpha_u \tag{2.14}$$

The renormalized one-particle irreducible (1PI) Green's functions $\Gamma^{(n)}_{\mu_1..\mu_n}\,(P_1..P_n)$ $\left[\,\Gamma^{(2)}\right.$ is the inverse propagator$\left.\right]$:

$$\Gamma^{(n)}_{\mu_1..\mu_n}\,(P_1...P_n) = Z_3^{n/2}\,\Gamma^{(n)}_{\mu_1..\mu_n}\,(P_1..P_n)_{\text{unrenormalized}} \tag{2.15}$$