

## Basis Warsaw up (EFT SMEFT)

Variant of the Warsaw basis where the up-type quark mass matrix (rather than the down-type quark) is diagonal.

### Sectors

The effective Lagrangian is defined as

$$\mathcal{L}_{\text{eff}} = -\mathcal{H}_{\text{eff}} = \sum_{O_i=O_i^\dagger} C_i O_i + \sum_{O_i \neq O_i^\dagger} (C_i O_i + C_i^* O_i^\dagger).$$

dB=dL=0

| WC name    | Operator  | Type |
|------------|---|------|
| G          | $f^{ABC} G_\mu^{A\nu} G_\nu^{B\rho} G_\rho^{C\mu}$                  | R    |
| Gtilde     | $f^{ABC} \tilde{G}_\mu^{A\nu} G_\nu^{B\rho} G_\rho^{C\mu}$          | R    |
| W          | $\epsilon^{IJK} W_\mu^{I\nu} W_\nu^{J\rho} W_\rho^{K\mu}$           | R    |
| Wtilde     | $\epsilon^{IJK} \tilde{W}_\mu^{I\nu} W_\nu^{J\rho} W_\rho^{K\mu}$   | R    |
| phi        | $(\varphi^\dagger \varphi)^3$                                       | R    |
| phiBox     | $(\varphi^\dagger \varphi) \square (\varphi^\dagger \varphi)$       | R    |
| phiD       | $(\varphi^\dagger D^\mu \varphi)^* (\varphi^\dagger D_\mu \varphi)$ | R    |
| phiG       | $\varphi^\dagger \varphi G_{\mu\nu}^A G^{A\mu\nu}$                  | R    |
| phiB       | $\varphi^\dagger \varphi B_{\mu\nu} B^{\mu\nu}$                     | R    |
| phiW       | $\varphi^\dagger \varphi W_{\mu\nu}^I W^{I\mu\nu}$                  | R    |
| phiWB      | $\varphi^\dagger \tau^I \varphi W_{\mu\nu}^I B^{\mu\nu}$            | R    |
| phiGtilde  | $\varphi^\dagger \varphi \tilde{G}_{\mu\nu}^A G^{A\mu\nu}$          | R    |
| phiBtilde  | $\varphi^\dagger \varphi \tilde{B}_{\mu\nu} B^{\mu\nu}$             | R    |
| phiWtilde  | $\varphi^\dagger \varphi \tilde{W}_{\mu\nu}^I W^{I\mu\nu}$          | R    |
| phiWtildeB | $\varphi^\dagger \tau^I \varphi \tilde{W}_{\mu\nu}^I B^{\mu\nu}$    | R    |
| uphi_11    | $(\varphi^\dagger \varphi) (\tilde{q}_1 u_1 \tilde{\varphi})$       | C    |
| uphi_12    | $(\varphi^\dagger \varphi) (\tilde{q}_1 u_2 \tilde{\varphi})$       | C    |
| uphi_13    | $(\varphi^\dagger \varphi) (\tilde{q}_1 u_3 \tilde{\varphi})$       | C    |
| uphi_21    | $(\varphi^\dagger \varphi) (\tilde{q}_2 u_1 \tilde{\varphi})$       | C    |
| uphi_22    | $(\varphi^\dagger \varphi) (\tilde{q}_2 u_2 \tilde{\varphi})$       | C    |
| uphi_23    | $(\varphi^\dagger \varphi) (\tilde{q}_2 u_3 \tilde{\varphi})$       | C    |
| uphi_31    | $(\varphi^\dagger \varphi) (\tilde{q}_3 u_1 \tilde{\varphi})$       | C    |
| uphi_32    | $(\varphi^\dagger \varphi) (\tilde{q}_3 u_2 \tilde{\varphi})$       | C    |
| uphi_33    | $(\varphi^\dagger \varphi) (\tilde{q}_3 u_3 \tilde{\varphi})$       | C    |
| dphi_11    | $(\varphi^\dagger \varphi) (\tilde{q}_1 d_1 \varphi)$               | C    |
| dphi_12    | $(\varphi^\dagger \varphi) (\tilde{q}_1 d_2 \varphi)$               | C    |
| dphi_13    | $(\varphi^\dagger \varphi) (\tilde{q}_1 d_3 \varphi)$               | C    |
| dphi_21    | $(\varphi^\dagger \varphi) (\tilde{q}_2 d_1 \varphi)$               | C    |
| dphi_22    | $(\varphi^\dagger \varphi) (\tilde{q}_2 d_2 \varphi)$               | C    |

| WC name | Operator  | Type |
|---------|---|------|
| dphi_23 | $(\varphi^\dagger \varphi) (\bar{q}_2 d_3 \varphi)$                   | C    |
| dphi_31 | $(\varphi^\dagger \varphi) (\bar{q}_3 d_1 \varphi)$                   | C    |
| dphi_32 | $(\varphi^\dagger \varphi) (\bar{q}_3 d_2 \varphi)$                   | C    |
| dphi_33 | $(\varphi^\dagger \varphi) (\bar{q}_3 d_3 \varphi)$                   | C    |
| ephi_11 | $(\varphi^\dagger \varphi) (\bar{\ell}_1 e_1 \varphi)$                | C    |
| ephi_12 | $(\varphi^\dagger \varphi) (\bar{\ell}_1 e_2 \varphi)$                | C    |
| ephi_13 | $(\varphi^\dagger \varphi) (\bar{\ell}_1 e_3 \varphi)$                | C    |
| ephi_21 | $(\varphi^\dagger \varphi) (\bar{\ell}_2 e_1 \varphi)$                | C    |
| ephi_22 | $(\varphi^\dagger \varphi) (\bar{\ell}_2 e_2 \varphi)$                | C    |
| ephi_23 | $(\varphi^\dagger \varphi) (\bar{\ell}_2 e_3 \varphi)$                | C    |
| ephi_31 | $(\varphi^\dagger \varphi) (\bar{\ell}_3 e_1 \varphi)$                | C    |
| ephi_32 | $(\varphi^\dagger \varphi) (\bar{\ell}_3 e_2 \varphi)$                | C    |
| ephi_33 | $(\varphi^\dagger \varphi) (\bar{\ell}_3 e_3 \varphi)$                | C    |
| eW_11   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_1) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_12   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_2) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_13   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_3) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_21   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_1) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_22   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_2) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_23   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_3) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_31   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_1) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_32   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_2) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eW_33   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_3) \tau^I \varphi W_{\mu\nu}^I$      | C    |
| eB_11   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_1) \varphi B_{\mu\nu}$               | C    |
| eB_12   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_2) \varphi B_{\mu\nu}$               | C    |
| eB_13   | $(\bar{\ell}_1 \sigma^{\mu\nu} e_3) \varphi B_{\mu\nu}$               | C    |
| eB_21   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_1) \varphi B_{\mu\nu}$               | C    |
| eB_22   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_2) \varphi B_{\mu\nu}$               | C    |
| eB_23   | $(\bar{\ell}_2 \sigma^{\mu\nu} e_3) \varphi B_{\mu\nu}$               | C    |
| eB_31   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_1) \varphi B_{\mu\nu}$               | C    |
| eB_32   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_2) \varphi B_{\mu\nu}$               | C    |
| eB_33   | $(\bar{\ell}_3 \sigma^{\mu\nu} e_3) \varphi B_{\mu\nu}$               | C    |
| uG_11   | $(\bar{q}_1 \sigma^{\mu\nu} T^A u_1) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_12   | $(\bar{q}_1 \sigma^{\mu\nu} T^A u_2) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_13   | $(\bar{q}_1 \sigma^{\mu\nu} T^A u_3) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_21   | $(\bar{q}_2 \sigma^{\mu\nu} T^A u_1) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_22   | $(\bar{q}_2 \sigma^{\mu\nu} T^A u_2) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_23   | $(\bar{q}_2 \sigma^{\mu\nu} T^A u_3) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_31   | $(\bar{q}_3 \sigma^{\mu\nu} T^A u_1) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_32   | $(\bar{q}_3 \sigma^{\mu\nu} T^A u_2) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uG_33   | $(\bar{q}_3 \sigma^{\mu\nu} T^A u_3) \tilde{\varphi} G_{\mu\nu}^A$    | C    |
| uW_11   | $(\bar{q}_1 \sigma^{\mu\nu} u_1) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_12   | $(\bar{q}_1 \sigma^{\mu\nu} u_2) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |

| WC name | Operator  | Type |
|---------|---|------|
| uW_13   | $(\bar{q}_1 \sigma^{\mu\nu} u_3) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_21   | $(\bar{q}_2 \sigma^{\mu\nu} u_1) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_22   | $(\bar{q}_2 \sigma^{\mu\nu} u_2) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_23   | $(\bar{q}_2 \sigma^{\mu\nu} u_3) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_31   | $(\bar{q}_3 \sigma^{\mu\nu} u_1) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_32   | $(\bar{q}_3 \sigma^{\mu\nu} u_2) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uW_33   | $(\bar{q}_3 \sigma^{\mu\nu} u_3) \tau^I \tilde{\varphi} W_{\mu\nu}^I$ | C    |
| uB_11   | $(\bar{q}_1 \sigma^{\mu\nu} u_1) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_12   | $(\bar{q}_1 \sigma^{\mu\nu} u_2) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_13   | $(\bar{q}_1 \sigma^{\mu\nu} u_3) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_21   | $(\bar{q}_2 \sigma^{\mu\nu} u_1) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_22   | $(\bar{q}_2 \sigma^{\mu\nu} u_2) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_23   | $(\bar{q}_2 \sigma^{\mu\nu} u_3) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_31   | $(\bar{q}_3 \sigma^{\mu\nu} u_1) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_32   | $(\bar{q}_3 \sigma^{\mu\nu} u_2) \tilde{\varphi} B_{\mu\nu}$          | C    |
| uB_33   | $(\bar{q}_3 \sigma^{\mu\nu} u_3) \tilde{\varphi} B_{\mu\nu}$          | C    |
| dG_11   | $(\bar{q}_1 \sigma^{\mu\nu} T^A d_1) \varphi G_{\mu\nu}^A$            | C    |
| dG_12   | $(\bar{q}_1 \sigma^{\mu\nu} T^A d_2) \varphi G_{\mu\nu}^A$            | C    |
| dG_13   | $(\bar{q}_1 \sigma^{\mu\nu} T^A d_3) \varphi G_{\mu\nu}^A$            | C    |
| dG_21   | $(\bar{q}_2 \sigma^{\mu\nu} T^A d_1) \varphi G_{\mu\nu}^A$            | C    |
| dG_22   | $(\bar{q}_2 \sigma^{\mu\nu} T^A d_2) \varphi G_{\mu\nu}^A$            | C    |
| dG_23   | $(\bar{q}_2 \sigma^{\mu\nu} T^A d_3) \varphi G_{\mu\nu}^A$            | C    |
| dG_31   | $(\bar{q}_3 \sigma^{\mu\nu} T^A d_1) \varphi G_{\mu\nu}^A$            | C    |
| dG_32   | $(\bar{q}_3 \sigma^{\mu\nu} T^A d_2) \varphi G_{\mu\nu}^A$            | C    |
| dG_33   | $(\bar{q}_3 \sigma^{\mu\nu} T^A d_3) \varphi G_{\mu\nu}^A$            | C    |
| dW_11   | $(\bar{q}_1 \sigma^{\mu\nu} d_1) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_12   | $(\bar{q}_1 \sigma^{\mu\nu} d_2) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_13   | $(\bar{q}_1 \sigma^{\mu\nu} d_3) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_21   | $(\bar{q}_2 \sigma^{\mu\nu} d_1) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_22   | $(\bar{q}_2 \sigma^{\mu\nu} d_2) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_23   | $(\bar{q}_2 \sigma^{\mu\nu} d_3) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_31   | $(\bar{q}_3 \sigma^{\mu\nu} d_1) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_32   | $(\bar{q}_3 \sigma^{\mu\nu} d_2) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dW_33   | $(\bar{q}_3 \sigma^{\mu\nu} d_3) \tau^I \varphi W_{\mu\nu}^I$         | C    |
| dB_11   | $(\bar{q}_1 \sigma^{\mu\nu} d_1) \varphi B_{\mu\nu}$                  | C    |
| dB_12   | $(\bar{q}_1 \sigma^{\mu\nu} d_2) \varphi B_{\mu\nu}$                  | C    |
| dB_13   | $(\bar{q}_1 \sigma^{\mu\nu} d_3) \varphi B_{\mu\nu}$                  | C    |
| dB_21   | $(\bar{q}_2 \sigma^{\mu\nu} d_1) \varphi B_{\mu\nu}$                  | C    |
| dB_22   | $(\bar{q}_2 \sigma^{\mu\nu} d_2) \varphi B_{\mu\nu}$                  | C    |
| dB_23   | $(\bar{q}_2 \sigma^{\mu\nu} d_3) \varphi B_{\mu\nu}$                  | C    |
| dB_31   | $(\bar{q}_3 \sigma^{\mu\nu} d_1) \varphi B_{\mu\nu}$                  | C    |
| dB_32   | $(\bar{q}_3 \sigma^{\mu\nu} d_2) \varphi B_{\mu\nu}$                  | C    |
| dB_33   | $(\bar{q}_3 \sigma^{\mu\nu} d_3) \varphi B_{\mu\nu}$                  | C    |

| WC name  | Operator  | Type |
|----------|---|------|
| phil1_11 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_1 \gamma^\mu \ell_1)$          | R    |
| phil1_12 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_1 \gamma^\mu \ell_2)$          | C    |
| phil1_13 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_1 \gamma^\mu \ell_3)$          | C    |
| phil1_22 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_2 \gamma^\mu \ell_2)$          | R    |
| phil1_23 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_2 \gamma^\mu \ell_3)$          | C    |
| phil1_33 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{\ell}_3 \gamma^\mu \ell_3)$          | R    |
| phil3_11 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_1 \tau^I \gamma^\mu \ell_1)$ | R    |
| phil3_12 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_1 \tau^I \gamma^\mu \ell_2)$ | C    |
| phil3_13 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_1 \tau^I \gamma^\mu \ell_3)$ | C    |
| phil3_22 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_2 \tau^I \gamma^\mu \ell_2)$ | R    |
| phil3_23 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_2 \tau^I \gamma^\mu \ell_3)$ | C    |
| phil3_33 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{\ell}_3 \tau^I \gamma^\mu \ell_3)$ | R    |
| phie_11  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_1 \gamma^\mu e_1)$                | R    |
| phie_12  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_1 \gamma^\mu e_2)$                | C    |
| phie_13  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_1 \gamma^\mu e_3)$                | C    |
| phie_22  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_2 \gamma^\mu e_2)$                | R    |
| phie_23  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_2 \gamma^\mu e_3)$                | C    |
| phie_33  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{e}_3 \gamma^\mu e_3)$                | R    |
| phiq1_11 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_1 \gamma^\mu q_1)$                | R    |
| phiq1_12 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_1 \gamma^\mu q_2)$                | C    |
| phiq1_13 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_1 \gamma^\mu q_3)$                | C    |
| phiq1_22 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_2 \gamma^\mu q_2)$                | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| phiq1_23 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_2 \gamma^\mu q_3)$          | C    |
| phiq1_33 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{q}_3 \gamma^\mu q_3)$          | R    |
| phiq3_11 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_1 \tau^I \gamma^\mu q_1)$ | R    |
| phiq3_12 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_1 \tau^I \gamma^\mu q_2)$ | C    |
| phiq3_13 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_1 \tau^I \gamma^\mu q_3)$ | C    |
| phiq3_22 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_2 \tau^I \gamma^\mu q_2)$ | R    |
| phiq3_23 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_2 \tau^I \gamma^\mu q_3)$ | C    |
| phiq3_33 | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu^I \varphi \right) (\bar{q}_3 \tau^I \gamma^\mu q_3)$ | R    |
| phiu_11  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_1 \gamma^\mu u_1)$          | R    |
| phiu_12  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_1 \gamma^\mu u_2)$          | C    |
| phiu_13  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_1 \gamma^\mu u_3)$          | C    |
| phiu_22  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_2 \gamma^\mu u_2)$          | R    |
| phiu_23  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_2 \gamma^\mu u_3)$          | C    |
| phiu_33  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{u}_3 \gamma^\mu u_3)$          | R    |
| phid_11  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_1 \gamma^\mu d_1)$          | R    |
| phid_12  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_1 \gamma^\mu d_2)$          | C    |
| phid_13  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_1 \gamma^\mu d_3)$          | C    |
| phid_22  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_2 \gamma^\mu d_2)$          | R    |
| phid_23  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_2 \gamma^\mu d_3)$          | C    |
| phid_33  | $\left( \varphi^\dagger i \overleftrightarrow{D}_\mu \varphi \right) (\bar{d}_3 \gamma^\mu d_3)$          | R    |
| phiud_11 | $\left( \tilde{\varphi}^\dagger i D_\mu \varphi \right) (\bar{u}_1 \gamma^\mu d_1)$                       | C    |
| phiud_12 | $\left( \tilde{\varphi}^\dagger i D_\mu \varphi \right) (\bar{u}_1 \gamma^\mu d_2)$                       | C    |
| phiud_13 | $\left( \tilde{\varphi}^\dagger i D_\mu \varphi \right) (\bar{u}_1 \gamma^\mu d_3)$                       | C    |
| phiud_21 | $\left( \tilde{\varphi}^\dagger i D_\mu \varphi \right) (\bar{u}_2 \gamma^\mu d_1)$                       | C    |

| WC name  | Operator   | Type |
|----------|--|------|
| phiud_22 | $(\bar{\varphi}^\dagger i D_\mu \varphi) (\bar{u}_2 \gamma^\mu d_2)$ | C    |
| phiud_23 | $(\bar{\varphi}^\dagger i D_\mu \varphi) (\bar{u}_2 \gamma^\mu d_3)$ | C    |
| phiud_31 | $(\bar{\varphi}^\dagger i D_\mu \varphi) (\bar{u}_3 \gamma^\mu d_1)$ | C    |
| phiud_32 | $(\bar{\varphi}^\dagger i D_\mu \varphi) (\bar{u}_3 \gamma^\mu d_2)$ | C    |
| phiud_33 | $(\bar{\varphi}^\dagger i D_\mu \varphi) (\bar{u}_3 \gamma^\mu d_3)$ | C    |
| ll_1111  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_1 \gamma^\mu \ell_1)$  | R    |
| ll_1112  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_1 \gamma^\mu \ell_2)$  | C    |
| ll_1113  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_1 \gamma^\mu \ell_3)$  | C    |
| ll_1122  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_2 \gamma^\mu \ell_2)$  | R    |
| ll_1123  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_2 \gamma^\mu \ell_3)$  | C    |
| ll_1133  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | R    |
| ll_1212  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_1 \gamma^\mu \ell_2)$  | C    |
| ll_1213  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_1 \gamma^\mu \ell_3)$  | C    |
| ll_1221  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_2 \gamma^\mu \ell_1)$  | R    |
| ll_1222  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_2 \gamma^\mu \ell_2)$  | C    |
| ll_1223  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_2 \gamma^\mu \ell_3)$  | C    |
| ll_1231  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_3 \gamma^\mu \ell_1)$  | C    |
| ll_1232  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_3 \gamma^\mu \ell_2)$  | C    |
| ll_1233  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | C    |
| ll_1313  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_1 \gamma^\mu \ell_3)$  | C    |
| ll_1322  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_2 \gamma^\mu \ell_2)$  | C    |
| ll_1323  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_2 \gamma^\mu \ell_3)$  | C    |
| ll_1331  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_1)$  | R    |
| ll_1332  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_2)$  | C    |
| ll_1333  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | C    |
| ll_2222  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{\ell}_2 \gamma^\mu \ell_2)$  | R    |
| ll_2223  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{\ell}_2 \gamma^\mu \ell_3)$  | C    |
| ll_2233  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | R    |
| ll_2323  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{\ell}_2 \gamma^\mu \ell_3)$  | C    |
| ll_2332  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_2)$  | R    |
| ll_2333  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | C    |
| ll_3333  | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{\ell}_3 \gamma^\mu \ell_3)$  | R    |
| qq1_1111 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_1 \gamma^\mu q_1)$              | R    |
| qq1_1112 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_1 \gamma^\mu q_2)$              | C    |
| qq1_1113 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_1 \gamma^\mu q_3)$              | C    |
| qq1_1122 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_2 \gamma^\mu q_2)$              | R    |
| qq1_1123 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_2 \gamma^\mu q_3)$              | C    |
| qq1_1133 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{q}_3 \gamma^\mu q_3)$              | R    |
| qq1_1212 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_1 \gamma^\mu q_2)$              | C    |
| qq1_1213 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_1 \gamma^\mu q_3)$              | C    |
| qq1_1221 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_2 \gamma^\mu q_1)$              | R    |
| qq1_1222 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_2 \gamma^\mu q_2)$              | C    |
| qq1_1223 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_2 \gamma^\mu q_3)$              | C    |

| WC name  | Operator  | Type |
|----------|---|------|
| qq1_1231 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_3 \gamma^\mu q_1)$               | C    |
| qq1_1232 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_3 \gamma^\mu q_2)$               | C    |
| qq1_1233 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{q}_3 \gamma^\mu q_3)$               | C    |
| qq1_1313 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_1 \gamma^\mu q_3)$               | C    |
| qq1_1322 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_2 \gamma^\mu q_2)$               | C    |
| qq1_1323 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_2 \gamma^\mu q_3)$               | C    |
| qq1_1331 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_1)$               | R    |
| qq1_1332 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_2)$               | C    |
| qq1_1333 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_3)$               | C    |
| qq1_2222 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{q}_2 \gamma^\mu q_2)$               | R    |
| qq1_2223 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{q}_2 \gamma^\mu q_3)$               | C    |
| qq1_2233 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{q}_3 \gamma^\mu q_3)$               | R    |
| qq1_2323 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{q}_2 \gamma^\mu q_3)$               | C    |
| qq1_2332 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_2)$               | R    |
| qq1_2333 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_3)$               | C    |
| qq1_3333 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{q}_3 \gamma^\mu q_3)$               | R    |
| qq3_1111 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_1 \gamma^\mu \tau^I q_1)$ | R    |
| qq3_1112 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_1 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1113 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_1 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1122 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_2 \gamma^\mu \tau^I q_2)$ | R    |
| qq3_1123 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1133 | $(\bar{q}_1 \gamma_\mu \tau^I q_1) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | R    |
| qq3_1212 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_1 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1213 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_1 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1221 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_2 \gamma^\mu \tau^I q_1)$ | R    |
| qq3_1222 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_2 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1223 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1231 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_3 \gamma^\mu \tau^I q_1)$ | C    |
| qq3_1232 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_3 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1233 | $(\bar{q}_1 \gamma_\mu \tau^I q_2) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1313 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_1 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1322 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_2 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1323 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_1331 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_1)$ | R    |
| qq3_1332 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_2)$ | C    |
| qq3_1333 | $(\bar{q}_1 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_2222 | $(\bar{q}_2 \gamma_\mu \tau^I q_2) (\bar{q}_2 \gamma^\mu \tau^I q_2)$ | R    |
| qq3_2223 | $(\bar{q}_2 \gamma_\mu \tau^I q_2) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_2233 | $(\bar{q}_2 \gamma_\mu \tau^I q_2) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | R    |
| qq3_2323 | $(\bar{q}_2 \gamma_\mu \tau^I q_3) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_2332 | $(\bar{q}_2 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_2)$ | R    |
| qq3_2333 | $(\bar{q}_2 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | C    |
| qq3_3333 | $(\bar{q}_3 \gamma_\mu \tau^I q_3) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | R    |
| lq1_1111 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_1 \gamma^\mu q_1)$         | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| 1q1_1112 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_1113 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_1122 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_2 \gamma^\mu q_2)$ | R    |
| 1q1_1123 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_2 \gamma^\mu q_3)$ | C    |
| 1q1_1133 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{q}_3 \gamma^\mu q_3)$ | R    |
| 1q1_1211 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_1)$ | C    |
| 1q1_1212 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_1213 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_1221 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_2 \gamma^\mu q_1)$ | C    |
| 1q1_1222 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_2 \gamma^\mu q_2)$ | C    |
| 1q1_1223 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_2 \gamma^\mu q_3)$ | C    |
| 1q1_1231 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_3 \gamma^\mu q_1)$ | C    |
| 1q1_1232 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_3 \gamma^\mu q_2)$ | C    |
| 1q1_1233 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{q}_3 \gamma^\mu q_3)$ | C    |
| 1q1_1311 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_1)$ | C    |
| 1q1_1312 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_1313 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_1321 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_1)$ | C    |
| 1q1_1322 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_2)$ | C    |
| 1q1_1323 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_3)$ | C    |
| 1q1_1331 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_1)$ | C    |
| 1q1_1332 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_2)$ | C    |
| 1q1_1333 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_3)$ | C    |
| 1q1_2211 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_1)$ | R    |
| 1q1_2212 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_2213 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_2222 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_2 \gamma^\mu q_2)$ | R    |
| 1q1_2223 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_2 \gamma^\mu q_3)$ | C    |
| 1q1_2233 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{q}_3 \gamma^\mu q_3)$ | R    |
| 1q1_2311 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_1)$ | C    |
| 1q1_2312 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_2313 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_2321 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_1)$ | C    |
| 1q1_2322 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_2)$ | C    |
| 1q1_2323 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_3)$ | C    |
| 1q1_2331 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_1)$ | C    |
| 1q1_2332 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_2)$ | C    |
| 1q1_2333 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{q}_3 \gamma^\mu q_3)$ | C    |
| 1q1_3311 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_1)$ | R    |
| 1q1_3312 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_2)$ | C    |
| 1q1_3313 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{q}_1 \gamma^\mu q_3)$ | C    |
| 1q1_3322 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{q}_2 \gamma^\mu q_2)$ | R    |





| WC name  | Operator  | Type |
|----------|---|------|
| lq3_3312 | $(\bar{\ell}_3 \gamma_\mu \tau^I \ell_3) (\bar{q}_1 \gamma^\mu \tau^I q_2)$ | C    |
| lq3_3313 | $(\bar{\ell}_3 \gamma_\mu \tau^I \ell_3) (\bar{q}_1 \gamma^\mu \tau^I q_3)$ | C    |
| lq3_3322 | $(\bar{\ell}_3 \gamma_\mu \tau^I \ell_3) (\bar{q}_2 \gamma^\mu \tau^I q_2)$ | R    |
| lq3_3323 | $(\bar{\ell}_3 \gamma_\mu \tau^I \ell_3) (\bar{q}_2 \gamma^\mu \tau^I q_3)$ | C    |
| lq3_3333 | $(\bar{\ell}_3 \gamma_\mu \tau^I \ell_3) (\bar{q}_3 \gamma^\mu \tau^I q_3)$ | R    |
| ee_1111  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_1 \gamma^\mu e_1)$                     | R    |
| ee_1112  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_1 \gamma^\mu e_2)$                     | C    |
| ee_1113  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_1 \gamma^\mu e_3)$                     | C    |
| ee_1122  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_2 \gamma^\mu e_2)$                     | R    |
| ee_1123  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_2 \gamma^\mu e_3)$                     | C    |
| ee_1133  | $(\bar{e}_1 \gamma_\mu e_1) (\bar{e}_3 \gamma^\mu e_3)$                     | R    |
| ee_1212  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_1 \gamma^\mu e_2)$                     | C    |
| ee_1213  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_1 \gamma^\mu e_3)$                     | C    |
| ee_1222  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_2 \gamma^\mu e_2)$                     | C    |
| ee_1223  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_2 \gamma^\mu e_3)$                     | C    |
| ee_1232  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_3 \gamma^\mu e_2)$                     | C    |
| ee_1233  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{e}_3 \gamma^\mu e_3)$                     | C    |
| ee_1313  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{e}_1 \gamma^\mu e_3)$                     | C    |
| ee_1323  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{e}_2 \gamma^\mu e_3)$                     | C    |
| ee_1333  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{e}_3 \gamma^\mu e_3)$                     | C    |
| ee_2222  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{e}_2 \gamma^\mu e_2)$                     | R    |
| ee_2223  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{e}_2 \gamma^\mu e_3)$                     | C    |
| ee_2233  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{e}_3 \gamma^\mu e_3)$                     | R    |
| ee_2323  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{e}_2 \gamma^\mu e_3)$                     | C    |
| ee_2333  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{e}_3 \gamma^\mu e_3)$                     | C    |
| ee_3333  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{e}_3 \gamma^\mu e_3)$                     | R    |
| uu_1111  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_1 \gamma^\mu u_1)$                     | R    |
| uu_1112  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_1 \gamma^\mu u_2)$                     | C    |
| uu_1113  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_1 \gamma^\mu u_3)$                     | C    |
| uu_1122  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_2 \gamma^\mu u_2)$                     | R    |
| uu_1123  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_2 \gamma^\mu u_3)$                     | C    |
| uu_1133  | $(\bar{u}_1 \gamma_\mu u_1) (\bar{u}_3 \gamma^\mu u_3)$                     | R    |
| uu_1212  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_1 \gamma^\mu u_2)$                     | C    |
| uu_1213  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_1 \gamma^\mu u_3)$                     | C    |
| uu_1221  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_2 \gamma^\mu u_1)$                     | R    |
| uu_1222  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_2 \gamma^\mu u_2)$                     | C    |
| uu_1223  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_2 \gamma^\mu u_3)$                     | C    |
| uu_1231  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_3 \gamma^\mu u_1)$                     | C    |
| uu_1232  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_3 \gamma^\mu u_2)$                     | C    |
| uu_1233  | $(\bar{u}_1 \gamma_\mu u_2) (\bar{u}_3 \gamma^\mu u_3)$                     | C    |
| uu_1313  | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_1 \gamma^\mu u_3)$                     | C    |
| uu_1322  | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_2 \gamma^\mu u_2)$                     | C    |
| uu_1323  | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_2 \gamma^\mu u_3)$                     | C    |
| uu_1331  | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_1)$                     | R    |

| WC name | Operator  | Type |
|---------|---|------|
| uu_1332 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| uu_1333 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| uu_2222 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| uu_2223 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| uu_2233 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| uu_2323 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| uu_2332 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_2)$ | R    |
| uu_2333 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| uu_3333 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| dd_1111 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| dd_1112 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| dd_1113 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| dd_1122 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| dd_1123 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| dd_1133 | $(\bar{d}_1 \gamma_\mu d_1) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| dd_1212 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| dd_1213 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| dd_1221 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_2 \gamma^\mu d_1)$ | R    |
| dd_1222 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| dd_1223 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| dd_1231 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| dd_1232 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| dd_1233 | $(\bar{d}_1 \gamma_\mu d_2) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| dd_1313 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| dd_1322 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| dd_1323 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| dd_1331 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_1)$ | R    |
| dd_1332 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| dd_1333 | $(\bar{d}_1 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| dd_2222 | $(\bar{d}_2 \gamma_\mu d_2) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| dd_2223 | $(\bar{d}_2 \gamma_\mu d_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| dd_2233 | $(\bar{d}_2 \gamma_\mu d_2) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| dd_2323 | $(\bar{d}_2 \gamma_\mu d_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| dd_2332 | $(\bar{d}_2 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_2)$ | R    |
| dd_2333 | $(\bar{d}_2 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| dd_3333 | $(\bar{d}_3 \gamma_\mu d_3) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| eu_1111 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| eu_1112 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_1113 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_1122 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| eu_1123 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_1133 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| eu_1211 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_1)$ | C    |

| WC name | Operator  | Type |
|---------|---|------|
| eu_1212 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_1213 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_1221 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| eu_1222 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| eu_1223 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_1231 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| eu_1232 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| eu_1233 | $(\bar{e}_1 \gamma_\mu e_2) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| eu_1311 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| eu_1312 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_1313 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_1321 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| eu_1322 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| eu_1323 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_1331 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| eu_1332 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| eu_1333 | $(\bar{e}_1 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| eu_2211 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| eu_2212 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_2213 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_2222 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| eu_2223 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_2233 | $(\bar{e}_2 \gamma_\mu e_2) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| eu_2311 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| eu_2312 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_2313 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_2321 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| eu_2322 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| eu_2323 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_2331 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| eu_2332 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| eu_2333 | $(\bar{e}_2 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| eu_3311 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| eu_3312 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| eu_3313 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| eu_3322 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| eu_3323 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| eu_3333 | $(\bar{e}_3 \gamma_\mu e_3) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| ed_1111 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ed_1112 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_1113 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_1122 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ed_1123 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_1133 | $(\bar{e}_1 \gamma_\mu e_1) (\bar{d}_3 \gamma^\mu d_3)$ | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| ed_1211  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ed_1212  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_1213  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_1221  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ed_1222  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ed_1223  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_1231  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ed_1232  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ed_1233  | $(\bar{e}_1 \gamma_\mu e_2) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ed_1311  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ed_1312  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_1313  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_1321  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ed_1322  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ed_1323  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_1331  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ed_1332  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ed_1333  | $(\bar{e}_1 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ed_2211  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ed_2212  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_2213  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_2222  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ed_2223  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_2233  | $(\bar{e}_2 \gamma_\mu e_2) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| ed_2311  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ed_2312  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_2313  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_2321  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ed_2322  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ed_2323  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_2331  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ed_2332  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ed_2333  | $(\bar{e}_2 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ed_3311  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ed_3312  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ed_3313  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ed_3322  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ed_3323  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ed_3333  | $(\bar{e}_3 \gamma_\mu e_3) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| ud1_1111 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ud1_1112 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_1113 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_1 \gamma^\mu d_3)$ | C    |

| WC name  | Operator  | Type |
|----------|---|------|
| ud1_1122 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ud1_1123 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_1133 | $(\bar{u}_1 \gamma_\mu u_1) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| ud1_1211 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ud1_1212 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_1213 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ud1_1221 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ud1_1222 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ud1_1223 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_1231 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ud1_1232 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ud1_1233 | $(\bar{u}_1 \gamma_\mu u_2) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ud1_1311 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ud1_1312 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_1313 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ud1_1321 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ud1_1322 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ud1_1323 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_1331 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ud1_1332 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ud1_1333 | $(\bar{u}_1 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ud1_2211 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ud1_2212 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_2213 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ud1_2222 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ud1_2223 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_2233 | $(\bar{u}_2 \gamma_\mu u_2) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| ud1_2311 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| ud1_2312 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_2313 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ud1_2321 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| ud1_2322 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| ud1_2323 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_2331 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| ud1_2332 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| ud1_2333 | $(\bar{u}_2 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| ud1_3311 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| ud1_3312 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| ud1_3313 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| ud1_3322 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| ud1_3323 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| ud1_3333 | $(\bar{u}_3 \gamma_\mu u_3) (\bar{d}_3 \gamma^\mu d_3)$ | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| ud8_1111 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_1 \gamma^\mu T^A d_1)$ | R    |
| ud8_1112 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_1113 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| ud8_1122 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_2 \gamma^\mu T^A d_2)$ | R    |
| ud8_1123 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_1133 | $(\bar{u}_1 \gamma_\mu T^A u_1) (\bar{d}_3 \gamma^\mu T^A d_3)$ | R    |
| ud8_1211 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_1)$ | C    |
| ud8_1212 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_1213 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| ud8_1221 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_2 \gamma^\mu T^A d_1)$ | C    |
| ud8_1222 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_2 \gamma^\mu T^A d_2)$ | C    |
| ud8_1223 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_1231 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_3 \gamma^\mu T^A d_1)$ | C    |
| ud8_1232 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_3 \gamma^\mu T^A d_2)$ | C    |
| ud8_1233 | $(\bar{u}_1 \gamma_\mu T^A u_2) (\bar{d}_3 \gamma^\mu T^A d_3)$ | C    |
| ud8_1311 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_1)$ | C    |
| ud8_1312 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_1313 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| ud8_1321 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_1)$ | C    |
| ud8_1322 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_2)$ | C    |
| ud8_1323 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_1331 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_1)$ | C    |
| ud8_1332 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_2)$ | C    |
| ud8_1333 | $(\bar{u}_1 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_3)$ | C    |
| ud8_2211 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_1)$ | R    |
| ud8_2212 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_2213 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| ud8_2222 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_2 \gamma^\mu T^A d_2)$ | R    |
| ud8_2223 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_2233 | $(\bar{u}_2 \gamma_\mu T^A u_2) (\bar{d}_3 \gamma^\mu T^A d_3)$ | R    |
| ud8_2311 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_1)$ | C    |
| ud8_2312 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_2313 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| ud8_2321 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_1)$ | C    |
| ud8_2322 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_2)$ | C    |
| ud8_2323 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_2331 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_1)$ | C    |
| ud8_2332 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_2)$ | C    |
| ud8_2333 | $(\bar{u}_2 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_3)$ | C    |
| ud8_3311 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_1)$ | R    |
| ud8_3312 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| ud8_3313 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |

| WC name  | Operator  | Type |
|----------|---|------|
| ud8_3322 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_2)$ | R    |
| ud8_3323 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| ud8_3333 | $(\bar{u}_3 \gamma_\mu T^A u_3) (\bar{d}_3 \gamma^\mu T^A d_3)$ | R    |
| 1e_1111  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_1 \gamma^\mu e_1)$   | R    |
| 1e_1112  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_1 \gamma^\mu e_2)$   | C    |
| 1e_1113  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_1 \gamma^\mu e_3)$   | C    |
| 1e_1122  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_2 \gamma^\mu e_2)$   | R    |
| 1e_1123  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_2 \gamma^\mu e_3)$   | C    |
| 1e_1133  | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{e}_3 \gamma^\mu e_3)$   | R    |
| 1e_1211  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_1)$   | C    |
| 1e_1212  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_2)$   | C    |
| 1e_1213  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_3)$   | C    |
| 1e_1221  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_2 \gamma^\mu e_1)$   | C    |
| 1e_1222  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_2 \gamma^\mu e_2)$   | C    |
| 1e_1223  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_2 \gamma^\mu e_3)$   | C    |
| 1e_1231  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_3 \gamma^\mu e_1)$   | C    |
| 1e_1232  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_3 \gamma^\mu e_2)$   | C    |
| 1e_1233  | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{e}_3 \gamma^\mu e_3)$   | C    |
| 1e_1311  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_1)$   | C    |
| 1e_1312  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_2)$   | C    |
| 1e_1313  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_3)$   | C    |
| 1e_1321  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_1)$   | C    |
| 1e_1322  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_2)$   | C    |
| 1e_1323  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_3)$   | C    |
| 1e_1331  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_1)$   | C    |
| 1e_1332  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_2)$   | C    |
| 1e_1333  | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_3)$   | C    |
| 1e_2211  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_1)$   | R    |
| 1e_2212  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_2)$   | C    |
| 1e_2213  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_1 \gamma^\mu e_3)$   | C    |
| 1e_2222  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_2 \gamma^\mu e_2)$   | R    |
| 1e_2223  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_2 \gamma^\mu e_3)$   | C    |
| 1e_2233  | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{e}_3 \gamma^\mu e_3)$   | R    |
| 1e_2311  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_1)$   | C    |
| 1e_2312  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_2)$   | C    |
| 1e_2313  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_3)$   | C    |
| 1e_2321  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_1)$   | C    |
| 1e_2322  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_2)$   | C    |
| 1e_2323  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_3)$   | C    |
| 1e_2331  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_1)$   | C    |
| 1e_2332  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_2)$   | C    |
| 1e_2333  | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_3)$   | C    |



| WC name | Operator  | Type |
|---------|---|------|
| 1e_3311 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_1)$ | R    |
| 1e_3312 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_2)$ | C    |
| 1e_3313 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_1 \gamma^\mu e_3)$ | C    |
| 1e_3322 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_2)$ | R    |
| 1e_3323 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_2 \gamma^\mu e_3)$ | C    |
| 1e_3333 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{e}_3 \gamma^\mu e_3)$ | R    |
| 1u_1111 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| 1u_1112 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_1113 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_1122 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| 1u_1123 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| 1u_1133 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| 1u_1211 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| 1u_1212 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_1213 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_1221 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| 1u_1222 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| 1u_1223 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| 1u_1231 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| 1u_1232 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| 1u_1233 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| 1u_1311 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| 1u_1312 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_1313 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_1321 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| 1u_1322 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| 1u_1323 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| 1u_1331 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| 1u_1332 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| 1u_1333 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| 1u_2211 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| 1u_2212 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_2213 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_2222 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| 1u_2223 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| 1u_2233 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| 1u_2311 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| 1u_2312 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_2313 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_2321 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| 1u_2322 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| 1u_2323 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |

| WC name | Operator  | Type |
|---------|---|------|
| 1u_2331 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| 1u_2332 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| 1u_2333 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| 1u_3311 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| 1u_3312 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| 1u_3313 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| 1u_3322 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| 1u_3323 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| 1u_3333 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| 1d_1111 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| 1d_1112 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_1113 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| 1d_1122 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| 1d_1123 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_1133 | $(\bar{\ell}_1 \gamma_\mu \ell_1) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| 1d_1211 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| 1d_1212 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_1213 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| 1d_1221 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| 1d_1222 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| 1d_1223 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_1231 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| 1d_1232 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| 1d_1233 | $(\bar{\ell}_1 \gamma_\mu \ell_2) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| 1d_1311 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| 1d_1312 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_1313 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| 1d_1321 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| 1d_1322 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| 1d_1323 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_1331 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| 1d_1332 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| 1d_1333 | $(\bar{\ell}_1 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| 1d_2211 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| 1d_2212 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_2213 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| 1d_2222 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| 1d_2223 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_2233 | $(\bar{\ell}_2 \gamma_\mu \ell_2) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| 1d_2311 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| 1d_2312 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_2313 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |

| WC name | Operator  | Type |
|---------|---|------|
| 1d_2321 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| 1d_2322 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| 1d_2323 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_2331 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| 1d_2332 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| 1d_2333 | $(\bar{\ell}_2 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| 1d_3311 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| 1d_3312 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| 1d_3313 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| 1d_3322 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| 1d_3323 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| 1d_3333 | $(\bar{\ell}_3 \gamma_\mu \ell_3) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| qe_1111 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_1 \gamma^\mu e_1)$       | R    |
| qe_1112 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_1 \gamma^\mu e_2)$       | C    |
| qe_1113 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_1 \gamma^\mu e_3)$       | C    |
| qe_1122 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_2 \gamma^\mu e_2)$       | R    |
| qe_1123 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_2 \gamma^\mu e_3)$       | C    |
| qe_1133 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{e}_3 \gamma^\mu e_3)$       | R    |
| qe_1211 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_1)$       | C    |
| qe_1212 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_2)$       | C    |
| qe_1213 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_3)$       | C    |
| qe_1221 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_2 \gamma^\mu e_1)$       | C    |
| qe_1222 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_2 \gamma^\mu e_2)$       | C    |
| qe_1223 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_2 \gamma^\mu e_3)$       | C    |
| qe_1231 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_3 \gamma^\mu e_1)$       | C    |
| qe_1232 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_3 \gamma^\mu e_2)$       | C    |
| qe_1233 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{e}_3 \gamma^\mu e_3)$       | C    |
| qe_1311 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_1)$       | C    |
| qe_1312 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_2)$       | C    |
| qe_1313 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_3)$       | C    |
| qe_1321 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_1)$       | C    |
| qe_1322 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_2)$       | C    |
| qe_1323 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_3)$       | C    |
| qe_1331 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_1)$       | C    |
| qe_1332 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_2)$       | C    |
| qe_1333 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_3)$       | C    |
| qe_2211 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_1)$       | R    |
| qe_2212 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_2)$       | C    |
| qe_2213 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_1 \gamma^\mu e_3)$       | C    |
| qe_2222 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_2 \gamma^\mu e_2)$       | R    |
| qe_2223 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_2 \gamma^\mu e_3)$       | C    |
| qe_2233 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{e}_3 \gamma^\mu e_3)$       | R    |
| qe_2311 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_1)$       | C    |

| WC name  | Operator  | Type |
|----------|---|------|
| qe_2312  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_2)$ | C    |
| qe_2313  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_3)$ | C    |
| qe_2321  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_1)$ | C    |
| qe_2322  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_2)$ | C    |
| qe_2323  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_3)$ | C    |
| qe_2331  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_1)$ | C    |
| qe_2332  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_2)$ | C    |
| qe_2333  | $(\bar{q}_2 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_3)$ | C    |
| qe_3311  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_1)$ | R    |
| qe_3312  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_2)$ | C    |
| qe_3313  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_1 \gamma^\mu e_3)$ | C    |
| qe_3322  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_2)$ | R    |
| qe_3323  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_2 \gamma^\mu e_3)$ | C    |
| qe_3333  | $(\bar{q}_3 \gamma_\mu q_3) (\bar{e}_3 \gamma^\mu e_3)$ | R    |
| qu1_1111 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| qu1_1112 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_1113 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_1122 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| qu1_1123 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_1133 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| qu1_1211 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| qu1_1212 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_1213 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_1221 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| qu1_1222 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| qu1_1223 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_1231 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| qu1_1232 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| qu1_1233 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| qu1_1311 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| qu1_1312 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_1313 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_1321 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| qu1_1322 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| qu1_1323 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_1331 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| qu1_1332 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| qu1_1333 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| qu1_2211 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| qu1_2212 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_2213 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_2222 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| qu1_2223 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_2233 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{u}_3 \gamma^\mu u_3)$ | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| qu1_2311 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_1)$ | C    |
| qu1_2312 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_2313 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_2321 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_1)$ | C    |
| qu1_2322 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_2)$ | C    |
| qu1_2323 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_2331 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_1)$ | C    |
| qu1_2332 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_2)$ | C    |
| qu1_2333 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_3)$ | C    |
| qu1_3311 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_1)$ | R    |
| qu1_3312 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_2)$ | C    |
| qu1_3313 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_1 \gamma^\mu u_3)$ | C    |
| qu1_3322 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_2)$ | R    |
| qu1_3323 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_2 \gamma^\mu u_3)$ | C    |
| qu1_3333 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{u}_3 \gamma^\mu u_3)$ | R    |
| qd1_1111 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| qd1_1112 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| qd1_1113 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| qd1_1122 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_2 \gamma^\mu d_2)$ | R    |
| qd1_1123 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| qd1_1133 | $(\bar{q}_1 \gamma_\mu q_1) (\bar{d}_3 \gamma^\mu d_3)$ | R    |
| qd1_1211 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| qd1_1212 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| qd1_1213 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| qd1_1221 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| qd1_1222 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| qd1_1223 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| qd1_1231 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| qd1_1232 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| qd1_1233 | $(\bar{q}_1 \gamma_\mu q_2) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| qd1_1311 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_1)$ | C    |
| qd1_1312 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| qd1_1313 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| qd1_1321 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_1)$ | C    |
| qd1_1322 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_2)$ | C    |
| qd1_1323 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_3)$ | C    |
| qd1_1331 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_1)$ | C    |
| qd1_1332 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_2)$ | C    |
| qd1_1333 | $(\bar{q}_1 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_3)$ | C    |
| qd1_2211 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_1)$ | R    |
| qd1_2212 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_2)$ | C    |
| qd1_2213 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_1 \gamma^\mu d_3)$ | C    |
| qd1_2222 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_2 \gamma^\mu d_2)$ | R    |

| WC name  | Operator  | Type |
|----------|---|------|
| qd1_2223 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_2 \gamma^\mu d_3)$         | C    |
| qd1_2233 | $(\bar{q}_2 \gamma_\mu q_2) (\bar{d}_3 \gamma^\mu d_3)$         | R    |
| qd1_2311 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_1)$         | C    |
| qd1_2312 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_2)$         | C    |
| qd1_2313 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_3)$         | C    |
| qd1_2321 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_1)$         | C    |
| qd1_2322 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_2)$         | C    |
| qd1_2323 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_3)$         | C    |
| qd1_2331 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_1)$         | C    |
| qd1_2332 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_2)$         | C    |
| qd1_2333 | $(\bar{q}_2 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_3)$         | C    |
| qd1_3311 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_1)$         | R    |
| qd1_3312 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_2)$         | C    |
| qd1_3313 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_1 \gamma^\mu d_3)$         | C    |
| qd1_3322 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_2)$         | R    |
| qd1_3323 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_2 \gamma^\mu d_3)$         | C    |
| qd1_3333 | $(\bar{q}_3 \gamma_\mu q_3) (\bar{d}_3 \gamma^\mu d_3)$         | R    |
| qu8_1111 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_1 \gamma^\mu T^A u_1)$ | R    |
| qu8_1112 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_1 \gamma^\mu T^A u_2)$ | C    |
| qu8_1113 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_1 \gamma^\mu T^A u_3)$ | C    |
| qu8_1122 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_2 \gamma^\mu T^A u_2)$ | R    |
| qu8_1123 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_2 \gamma^\mu T^A u_3)$ | C    |
| qu8_1133 | $(\bar{q}_1 \gamma_\mu T^A q_1) (\bar{u}_3 \gamma^\mu T^A u_3)$ | R    |
| qu8_1211 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_1 \gamma^\mu T^A u_1)$ | C    |
| qu8_1212 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_1 \gamma^\mu T^A u_2)$ | C    |
| qu8_1213 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_1 \gamma^\mu T^A u_3)$ | C    |
| qu8_1221 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_2 \gamma^\mu T^A u_1)$ | C    |
| qu8_1222 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_2 \gamma^\mu T^A u_2)$ | C    |
| qu8_1223 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_2 \gamma^\mu T^A u_3)$ | C    |
| qu8_1231 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_3 \gamma^\mu T^A u_1)$ | C    |
| qu8_1232 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_3 \gamma^\mu T^A u_2)$ | C    |
| qu8_1233 | $(\bar{q}_1 \gamma_\mu T^A q_2) (\bar{u}_3 \gamma^\mu T^A u_3)$ | C    |
| qu8_1311 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_1 \gamma^\mu T^A u_1)$ | C    |
| qu8_1312 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_1 \gamma^\mu T^A u_2)$ | C    |
| qu8_1313 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_1 \gamma^\mu T^A u_3)$ | C    |
| qu8_1321 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_2 \gamma^\mu T^A u_1)$ | C    |
| qu8_1322 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_2 \gamma^\mu T^A u_2)$ | C    |
| qu8_1323 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_2 \gamma^\mu T^A u_3)$ | C    |
| qu8_1331 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_3 \gamma^\mu T^A u_1)$ | C    |
| qu8_1332 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_3 \gamma^\mu T^A u_2)$ | C    |
| qu8_1333 | $(\bar{q}_1 \gamma_\mu T^A q_3) (\bar{u}_3 \gamma^\mu T^A u_3)$ | C    |
| qu8_2211 | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{u}_1 \gamma^\mu T^A u_1)$ | R    |
| qu8_2212 | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{u}_1 \gamma^\mu T^A u_2)$ | C    |

| WC name  | Operator                         | Type |
|----------|----------------------------------|------|
| qu8_2213 | $(\bar{q}_2 \gamma_\mu T^A q_2)$ | C    |
| qu8_2222 | $(\bar{q}_2 \gamma_\mu T^A q_2)$ | R    |
| qu8_2223 | $(\bar{q}_2 \gamma_\mu T^A q_2)$ | C    |
| qu8_2233 | $(\bar{q}_2 \gamma_\mu T^A q_2)$ | R    |
| qu8_2311 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2312 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2313 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2321 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2322 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2323 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2331 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2332 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_2333 | $(\bar{q}_2 \gamma_\mu T^A q_3)$ | C    |
| qu8_3311 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | R    |
| qu8_3312 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | C    |
| qu8_3313 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | C    |
| qu8_3322 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | R    |
| qu8_3323 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | C    |
| qu8_3333 | $(\bar{q}_3 \gamma_\mu T^A q_3)$ | R    |
| qd8_1111 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | R    |
| qd8_1112 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | C    |
| qd8_1113 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | C    |
| qd8_1122 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | R    |
| qd8_1123 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | C    |
| qd8_1133 | $(\bar{q}_1 \gamma_\mu T^A q_1)$ | R    |
| qd8_1211 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1212 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1213 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1221 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1222 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1223 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1231 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1232 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1233 | $(\bar{q}_1 \gamma_\mu T^A q_2)$ | C    |
| qd8_1311 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1312 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1313 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1321 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1322 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1323 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1331 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1332 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |
| qd8_1333 | $(\bar{q}_1 \gamma_\mu T^A q_3)$ | C    |

| WC name   | Operator  | Type |
|-----------|---|------|
| qd8_2211  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_1 \gamma^\mu T^A d_1)$ | R    |
| qd8_2212  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| qd8_2213  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| qd8_2222  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_2 \gamma^\mu T^A d_2)$ | R    |
| qd8_2223  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| qd8_2233  | $(\bar{q}_2 \gamma_\mu T^A q_2) (\bar{d}_3 \gamma^\mu T^A d_3)$ | R    |
| qd8_2311  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_1)$ | C    |
| qd8_2312  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| qd8_2313  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| qd8_2321  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_2 \gamma^\mu T^A d_1)$ | C    |
| qd8_2322  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_2 \gamma^\mu T^A d_2)$ | C    |
| qd8_2323  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| qd8_2331  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_3 \gamma^\mu T^A d_1)$ | C    |
| qd8_2332  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_3 \gamma^\mu T^A d_2)$ | C    |
| qd8_2333  | $(\bar{q}_2 \gamma_\mu T^A q_3) (\bar{d}_3 \gamma^\mu T^A d_3)$ | C    |
| qd8_3311  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_1)$ | R    |
| qd8_3312  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_2)$ | C    |
| qd8_3313  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_1 \gamma^\mu T^A d_3)$ | C    |
| qd8_3322  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_2 \gamma^\mu T^A d_2)$ | R    |
| qd8_3323  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_2 \gamma^\mu T^A d_3)$ | C    |
| qd8_3333  | $(\bar{q}_3 \gamma_\mu T^A q_3) (\bar{d}_3 \gamma^\mu T^A d_3)$ | R    |
| ledq_1111 | $(\bar{\ell}_1 e_1) (\bar{d}_1 q_1)$                            | C    |
| ledq_1112 | $(\bar{\ell}_1 e_1) (\bar{d}_1 q_2)$                            | C    |
| ledq_1113 | $(\bar{\ell}_1 e_1) (\bar{d}_1 q_3)$                            | C    |
| ledq_1121 | $(\bar{\ell}_1 e_1) (\bar{d}_2 q_1)$                            | C    |
| ledq_1122 | $(\bar{\ell}_1 e_1) (\bar{d}_2 q_2)$                            | C    |
| ledq_1123 | $(\bar{\ell}_1 e_1) (\bar{d}_2 q_3)$                            | C    |
| ledq_1131 | $(\bar{\ell}_1 e_1) (\bar{d}_3 q_1)$                            | C    |
| ledq_1132 | $(\bar{\ell}_1 e_1) (\bar{d}_3 q_2)$                            | C    |
| ledq_1133 | $(\bar{\ell}_1 e_1) (\bar{d}_3 q_3)$                            | C    |
| ledq_1211 | $(\bar{\ell}_1 e_2) (\bar{d}_1 q_1)$                            | C    |
| ledq_1212 | $(\bar{\ell}_1 e_2) (\bar{d}_1 q_2)$                            | C    |
| ledq_1213 | $(\bar{\ell}_1 e_2) (\bar{d}_1 q_3)$                            | C    |
| ledq_1221 | $(\bar{\ell}_1 e_2) (\bar{d}_2 q_1)$                            | C    |
| ledq_1222 | $(\bar{\ell}_1 e_2) (\bar{d}_2 q_2)$                            | C    |
| ledq_1223 | $(\bar{\ell}_1 e_2) (\bar{d}_2 q_3)$                            | C    |
| ledq_1231 | $(\bar{\ell}_1 e_2) (\bar{d}_3 q_1)$                            | C    |
| ledq_1232 | $(\bar{\ell}_1 e_2) (\bar{d}_3 q_2)$                            | C    |
| ledq_1233 | $(\bar{\ell}_1 e_2) (\bar{d}_3 q_3)$                            | C    |
| ledq_1311 | $(\bar{\ell}_1 e_3) (\bar{d}_1 q_1)$                            | C    |
| ledq_1312 | $(\bar{\ell}_1 e_3) (\bar{d}_1 q_2)$                            | C    |
| ledq_1313 | $(\bar{\ell}_1 e_3) (\bar{d}_1 q_3)$                            | C    |



| WC name   | Operator                             | Type |
|-----------|--------------------------------------|------|
| ledq_1321 | $(\bar{\ell}_1 e_3) (\bar{d}_2 q_1)$ | C    |
| ledq_1322 | $(\bar{\ell}_1 e_3) (\bar{d}_2 q_2)$ | C    |
| ledq_1323 | $(\bar{\ell}_1 e_3) (\bar{d}_2 q_3)$ | C    |
| ledq_1331 | $(\bar{\ell}_1 e_3) (\bar{d}_3 q_1)$ | C    |
| ledq_1332 | $(\bar{\ell}_1 e_3) (\bar{d}_3 q_2)$ | C    |
| ledq_1333 | $(\bar{\ell}_1 e_3) (\bar{d}_3 q_3)$ | C    |
| ledq_2111 | $(\bar{\ell}_2 e_1) (\bar{d}_1 q_1)$ | C    |
| ledq_2112 | $(\bar{\ell}_2 e_1) (\bar{d}_1 q_2)$ | C    |
| ledq_2113 | $(\bar{\ell}_2 e_1) (\bar{d}_1 q_3)$ | C    |
| ledq_2121 | $(\bar{\ell}_2 e_1) (\bar{d}_2 q_1)$ | C    |
| ledq_2122 | $(\bar{\ell}_2 e_1) (\bar{d}_2 q_2)$ | C    |
| ledq_2123 | $(\bar{\ell}_2 e_1) (\bar{d}_2 q_3)$ | C    |
| ledq_2131 | $(\bar{\ell}_2 e_1) (\bar{d}_3 q_1)$ | C    |
| ledq_2132 | $(\bar{\ell}_2 e_1) (\bar{d}_3 q_2)$ | C    |
| ledq_2133 | $(\bar{\ell}_2 e_1) (\bar{d}_3 q_3)$ | C    |
| ledq_2211 | $(\bar{\ell}_2 e_2) (\bar{d}_1 q_1)$ | C    |
| ledq_2212 | $(\bar{\ell}_2 e_2) (\bar{d}_1 q_2)$ | C    |
| ledq_2213 | $(\bar{\ell}_2 e_2) (\bar{d}_1 q_3)$ | C    |
| ledq_2221 | $(\bar{\ell}_2 e_2) (\bar{d}_2 q_1)$ | C    |
| ledq_2222 | $(\bar{\ell}_2 e_2) (\bar{d}_2 q_2)$ | C    |
| ledq_2223 | $(\bar{\ell}_2 e_2) (\bar{d}_2 q_3)$ | C    |
| ledq_2231 | $(\bar{\ell}_2 e_2) (\bar{d}_3 q_1)$ | C    |
| ledq_2232 | $(\bar{\ell}_2 e_2) (\bar{d}_3 q_2)$ | C    |
| ledq_2233 | $(\bar{\ell}_2 e_2) (\bar{d}_3 q_3)$ | C    |
| ledq_2311 | $(\bar{\ell}_2 e_3) (\bar{d}_1 q_1)$ | C    |
| ledq_2312 | $(\bar{\ell}_2 e_3) (\bar{d}_1 q_2)$ | C    |
| ledq_2313 | $(\bar{\ell}_2 e_3) (\bar{d}_1 q_3)$ | C    |
| ledq_2321 | $(\bar{\ell}_2 e_3) (\bar{d}_2 q_1)$ | C    |
| ledq_2322 | $(\bar{\ell}_2 e_3) (\bar{d}_2 q_2)$ | C    |
| ledq_2323 | $(\bar{\ell}_2 e_3) (\bar{d}_2 q_3)$ | C    |
| ledq_2331 | $(\bar{\ell}_2 e_3) (\bar{d}_3 q_1)$ | C    |
| ledq_2332 | $(\bar{\ell}_2 e_3) (\bar{d}_3 q_2)$ | C    |
| ledq_2333 | $(\bar{\ell}_2 e_3) (\bar{d}_3 q_3)$ | C    |
| ledq_3111 | $(\bar{\ell}_3 e_1) (\bar{d}_1 q_1)$ | C    |
| ledq_3112 | $(\bar{\ell}_3 e_1) (\bar{d}_1 q_2)$ | C    |
| ledq_3113 | $(\bar{\ell}_3 e_1) (\bar{d}_1 q_3)$ | C    |
| ledq_3121 | $(\bar{\ell}_3 e_1) (\bar{d}_2 q_1)$ | C    |
| ledq_3122 | $(\bar{\ell}_3 e_1) (\bar{d}_2 q_2)$ | C    |
| ledq_3123 | $(\bar{\ell}_3 e_1) (\bar{d}_2 q_3)$ | C    |
| ledq_3131 | $(\bar{\ell}_3 e_1) (\bar{d}_3 q_1)$ | C    |
| ledq_3132 | $(\bar{\ell}_3 e_1) (\bar{d}_3 q_2)$ | C    |
| ledq_3133 | $(\bar{\ell}_3 e_1) (\bar{d}_3 q_3)$ | C    |

| WC name    | Operator  | Type |
|------------|---|------|
| ledq_3211  | $(\bar{\ell}_3 e_2) (\bar{d}_1 q_1)$            | C    |
| ledq_3212  | $(\bar{\ell}_3 e_2) (\bar{d}_1 q_2)$            | C    |
| ledq_3213  | $(\bar{\ell}_3 e_2) (\bar{d}_1 q_3)$            | C    |
| ledq_3221  | $(\bar{\ell}_3 e_2) (\bar{d}_2 q_1)$            | C    |
| ledq_3222  | $(\bar{\ell}_3 e_2) (\bar{d}_2 q_2)$            | C    |
| ledq_3223  | $(\bar{\ell}_3 e_2) (\bar{d}_2 q_3)$            | C    |
| ledq_3231  | $(\bar{\ell}_3 e_2) (\bar{d}_3 q_1)$            | C    |
| ledq_3232  | $(\bar{\ell}_3 e_2) (\bar{d}_3 q_2)$            | C    |
| ledq_3233  | $(\bar{\ell}_3 e_2) (\bar{d}_3 q_3)$            | C    |
| ledq_3311  | $(\bar{\ell}_3 e_3) (\bar{d}_1 q_1)$            | C    |
| ledq_3312  | $(\bar{\ell}_3 e_3) (\bar{d}_1 q_2)$            | C    |
| ledq_3313  | $(\bar{\ell}_3 e_3) (\bar{d}_1 q_3)$            | C    |
| ledq_3321  | $(\bar{\ell}_3 e_3) (\bar{d}_2 q_1)$            | C    |
| ledq_3322  | $(\bar{\ell}_3 e_3) (\bar{d}_2 q_2)$            | C    |
| ledq_3323  | $(\bar{\ell}_3 e_3) (\bar{d}_2 q_3)$            | C    |
| ledq_3331  | $(\bar{\ell}_3 e_3) (\bar{d}_3 q_1)$            | C    |
| ledq_3332  | $(\bar{\ell}_3 e_3) (\bar{d}_3 q_2)$            | C    |
| ledq_3333  | $(\bar{\ell}_3 e_3) (\bar{d}_3 q_3)$            | C    |
| quqd1_1111 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_1112 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_1113 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_1121 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_1122 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_1123 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_1131 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_1132 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_1133 | $(\bar{q}_1 u_1) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_1211 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_1212 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_1213 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_1221 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_1222 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_1223 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_1231 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_1232 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_1233 | $(\bar{q}_1 u_2) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_1311 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_1312 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_1313 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_1321 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_1322 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_1323 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_1331 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |

| WC name    | Operator  | Type |
|------------|---|------|
| quqd1_1332 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_1333 | $(\bar{q}_1 u_3) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_2111 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_2112 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_2113 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_2121 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_2122 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_2123 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_2131 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_2132 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_2133 | $(\bar{q}_2 u_1) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_2211 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_2212 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_2213 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_2221 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_2222 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_2223 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_2231 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_2232 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_2233 | $(\bar{q}_2 u_2) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_2311 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_2312 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_2313 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_2321 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_2322 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_2323 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_2331 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_2332 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_2333 | $(\bar{q}_2 u_3) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_3111 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_3112 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_3113 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_3121 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_3122 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_3123 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |
| quqd1_3131 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_3 d_1)$ | C    |
| quqd1_3132 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_3 d_2)$ | C    |
| quqd1_3133 | $(\bar{q}_3 u_1) \epsilon_{jk} (\bar{q}_3 d_3)$ | C    |
| quqd1_3211 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_1 d_1)$ | C    |
| quqd1_3212 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_1 d_2)$ | C    |
| quqd1_3213 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_1 d_3)$ | C    |
| quqd1_3221 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_2 d_1)$ | C    |
| quqd1_3222 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_2 d_2)$ | C    |
| quqd1_3223 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_2 d_3)$ | C    |

| WC name    | Operator  | Type |
|------------|---|------|
| quqd1_3231 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_3 d_1)$         | C    |
| quqd1_3232 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_3 d_2)$         | C    |
| quqd1_3233 | $(\bar{q}_3 u_2) \epsilon_{jk} (\bar{q}_3 d_3)$         | C    |
| quqd1_3311 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_1 d_1)$         | C    |
| quqd1_3312 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_1 d_2)$         | C    |
| quqd1_3313 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_1 d_3)$         | C    |
| quqd1_3321 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_2 d_1)$         | C    |
| quqd1_3322 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_2 d_2)$         | C    |
| quqd1_3323 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_2 d_3)$         | C    |
| quqd1_3331 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_3 d_1)$         | C    |
| quqd1_3332 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_3 d_2)$         | C    |
| quqd1_3333 | $(\bar{q}_3 u_3) \epsilon_{jk} (\bar{q}_3 d_3)$         | C    |
| quqd8_1111 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_1112 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_1113 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_1121 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_1122 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_1123 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_1131 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_1132 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_1133 | $(\bar{q}_1 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_1211 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_1212 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_1213 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_1221 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_1222 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_1223 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_1231 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_1232 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_1233 | $(\bar{q}_1 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_1311 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_1312 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_1313 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_1321 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_1322 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_1323 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_1331 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_1332 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_1333 | $(\bar{q}_1 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_2111 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_2112 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_2113 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_2121 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_2122 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |

| WC name    | Operator  | Type |
|------------|---|------|
| quqd8_2123 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_2131 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_2132 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_2133 | $(\bar{q}_2 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_2211 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_2212 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_2213 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_2221 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_2222 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_2223 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_2231 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_2232 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_2233 | $(\bar{q}_2 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_2311 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_2312 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_2313 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_2321 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_2322 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_2323 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_2331 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_2332 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_2333 | $(\bar{q}_2 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_3111 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_3112 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_3113 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_3121 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_3122 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_3123 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_3131 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_3132 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_3133 | $(\bar{q}_3 T^A u_1) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_3211 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_3212 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_3213 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_3221 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |
| quqd8_3222 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_3223 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_3231 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_3232 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_3233 | $(\bar{q}_3 T^A u_2) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| quqd8_3311 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_1)$ | C    |
| quqd8_3312 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_2)$ | C    |
| quqd8_3313 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_1 T^A d_3)$ | C    |
| quqd8_3321 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_1)$ | C    |

| WC name    | Operator  | Type |
|------------|---|------|
| quqd8_3322 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_2)$ | C    |
| quqd8_3323 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_2 T^A d_3)$ | C    |
| quqd8_3331 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_1)$ | C    |
| quqd8_3332 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_2)$ | C    |
| quqd8_3333 | $(\bar{q}_3 T^A u_3) \epsilon_{jk} (\bar{q}_3 T^A d_3)$ | C    |
| lequ1_1111 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_1 u_1)$      | C    |
| lequ1_1112 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_1 u_2)$      | C    |
| lequ1_1113 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_1 u_3)$      | C    |
| lequ1_1121 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_2 u_1)$      | C    |
| lequ1_1122 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_2 u_2)$      | C    |
| lequ1_1123 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_2 u_3)$      | C    |
| lequ1_1131 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_3 u_1)$      | C    |
| lequ1_1132 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_3 u_2)$      | C    |
| lequ1_1133 | $(\bar{\ell}_1 e_1) \epsilon_{jk} (\bar{q}_3 u_3)$      | C    |
| lequ1_1211 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_1 u_1)$      | C    |
| lequ1_1212 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_1 u_2)$      | C    |
| lequ1_1213 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_1 u_3)$      | C    |
| lequ1_1221 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_2 u_1)$      | C    |
| lequ1_1222 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_2 u_2)$      | C    |
| lequ1_1223 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_2 u_3)$      | C    |
| lequ1_1231 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_3 u_1)$      | C    |
| lequ1_1232 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_3 u_2)$      | C    |
| lequ1_1233 | $(\bar{\ell}_1 e_2) \epsilon_{jk} (\bar{q}_3 u_3)$      | C    |
| lequ1_1311 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_1 u_1)$      | C    |
| lequ1_1312 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_1 u_2)$      | C    |
| lequ1_1313 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_1 u_3)$      | C    |
| lequ1_1321 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_2 u_1)$      | C    |
| lequ1_1322 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_2 u_2)$      | C    |
| lequ1_1323 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_2 u_3)$      | C    |
| lequ1_1331 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_3 u_1)$      | C    |
| lequ1_1332 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_3 u_2)$      | C    |
| lequ1_1333 | $(\bar{\ell}_1 e_3) \epsilon_{jk} (\bar{q}_3 u_3)$      | C    |
| lequ1_2111 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_1 u_1)$      | C    |
| lequ1_2112 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_1 u_2)$      | C    |
| lequ1_2113 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_1 u_3)$      | C    |
| lequ1_2121 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_2 u_1)$      | C    |
| lequ1_2122 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_2 u_2)$      | C    |
| lequ1_2123 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_2 u_3)$      | C    |
| lequ1_2131 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_3 u_1)$      | C    |
| lequ1_2132 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_3 u_2)$      | C    |
| lequ1_2133 | $(\bar{\ell}_2 e_1) \epsilon_{jk} (\bar{q}_3 u_3)$      | C    |
| lequ1_2211 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_1 u_1)$      | C    |

| WC name    | Operator   | Type |
|------------|--|------|
| lequ1_2212 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_1 u_2)$ | C    |
| lequ1_2213 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_1 u_3)$ | C    |
| lequ1_2221 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_2 u_1)$ | C    |
| lequ1_2222 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_2 u_2)$ | C    |
| lequ1_2223 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_2 u_3)$ | C    |
| lequ1_2231 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_3 u_1)$ | C    |
| lequ1_2232 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_3 u_2)$ | C    |
| lequ1_2233 | $(\bar{\ell}_2 e_2) \epsilon_{jk} (\bar{q}_3 u_3)$ | C    |
| lequ1_2311 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_1 u_1)$ | C    |
| lequ1_2312 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_1 u_2)$ | C    |
| lequ1_2313 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_1 u_3)$ | C    |
| lequ1_2321 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_2 u_1)$ | C    |
| lequ1_2322 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_2 u_2)$ | C    |
| lequ1_2323 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_2 u_3)$ | C    |
| lequ1_2331 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_3 u_1)$ | C    |
| lequ1_2332 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_3 u_2)$ | C    |
| lequ1_2333 | $(\bar{\ell}_2 e_3) \epsilon_{jk} (\bar{q}_3 u_3)$ | C    |
| lequ1_3111 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_1 u_1)$ | C    |
| lequ1_3112 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_1 u_2)$ | C    |
| lequ1_3113 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_1 u_3)$ | C    |
| lequ1_3121 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_2 u_1)$ | C    |
| lequ1_3122 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_2 u_2)$ | C    |
| lequ1_3123 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_2 u_3)$ | C    |
| lequ1_3131 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_3 u_1)$ | C    |
| lequ1_3132 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_3 u_2)$ | C    |
| lequ1_3133 | $(\bar{\ell}_3 e_1) \epsilon_{jk} (\bar{q}_3 u_3)$ | C    |
| lequ1_3211 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_1 u_1)$ | C    |
| lequ1_3212 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_1 u_2)$ | C    |
| lequ1_3213 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_1 u_3)$ | C    |
| lequ1_3221 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_2 u_1)$ | C    |
| lequ1_3222 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_2 u_2)$ | C    |
| lequ1_3223 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_2 u_3)$ | C    |
| lequ1_3231 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_3 u_1)$ | C    |
| lequ1_3232 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_3 u_2)$ | C    |
| lequ1_3233 | $(\bar{\ell}_3 e_2) \epsilon_{jk} (\bar{q}_3 u_3)$ | C    |
| lequ1_3311 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_1 u_1)$ | C    |
| lequ1_3312 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_1 u_2)$ | C    |
| lequ1_3313 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_1 u_3)$ | C    |
| lequ1_3321 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_2 u_1)$ | C    |
| lequ1_3322 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_2 u_2)$ | C    |
| lequ1_3323 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_2 u_3)$ | C    |
| lequ1_3331 | $(\bar{\ell}_3 e_3) \epsilon_{jk} (\bar{q}_3 u_1)$ | C    |







dB=dL=1

| WC name   | Operator             | Type |
|-----------|----------------------|------|
| duql_1111 | $(d_1Cu_1)(q_1Cl_1)$ | C    |
| duql_1112 | $(d_1Cu_1)(q_1Cl_2)$ | C    |
| duql_1113 | $(d_1Cu_1)(q_1Cl_3)$ | C    |
| duql_1121 | $(d_1Cu_1)(q_2Cl_1)$ | C    |
| duql_1122 | $(d_1Cu_1)(q_2Cl_2)$ | C    |
| duql_1123 | $(d_1Cu_1)(q_2Cl_3)$ | C    |
| duql_1131 | $(d_1Cu_1)(q_3Cl_1)$ | C    |
| duql_1132 | $(d_1Cu_1)(q_3Cl_2)$ | C    |
| duql_1133 | $(d_1Cu_1)(q_3Cl_3)$ | C    |
| duql_1211 | $(d_1Cu_2)(q_1Cl_1)$ | C    |
| duql_1212 | $(d_1Cu_2)(q_1Cl_2)$ | C    |
| duql_1213 | $(d_1Cu_2)(q_1Cl_3)$ | C    |
| duql_1221 | $(d_1Cu_2)(q_2Cl_1)$ | C    |
| duql_1222 | $(d_1Cu_2)(q_2Cl_2)$ | C    |
| duql_1223 | $(d_1Cu_2)(q_2Cl_3)$ | C    |
| duql_1231 | $(d_1Cu_2)(q_3Cl_1)$ | C    |
| duql_1232 | $(d_1Cu_2)(q_3Cl_2)$ | C    |
| duql_1233 | $(d_1Cu_2)(q_3Cl_3)$ | C    |
| duql_1311 | $(d_1Cu_3)(q_1Cl_1)$ | C    |
| duql_1312 | $(d_1Cu_3)(q_1Cl_2)$ | C    |
| duql_1313 | $(d_1Cu_3)(q_1Cl_3)$ | C    |
| duql_1321 | $(d_1Cu_3)(q_2Cl_1)$ | C    |
| duql_1322 | $(d_1Cu_3)(q_2Cl_2)$ | C    |
| duql_1323 | $(d_1Cu_3)(q_2Cl_3)$ | C    |
| duql_1331 | $(d_1Cu_3)(q_3Cl_1)$ | C    |
| duql_1332 | $(d_1Cu_3)(q_3Cl_2)$ | C    |
| duql_1333 | $(d_1Cu_3)(q_3Cl_3)$ | C    |
| duql_2111 | $(d_2Cu_1)(q_1Cl_1)$ | C    |
| duql_2112 | $(d_2Cu_1)(q_1Cl_2)$ | C    |
| duql_2113 | $(d_2Cu_1)(q_1Cl_3)$ | C    |
| duql_2121 | $(d_2Cu_1)(q_2Cl_1)$ | C    |
| duql_2122 | $(d_2Cu_1)(q_2Cl_2)$ | C    |
| duql_2123 | $(d_2Cu_1)(q_2Cl_3)$ | C    |
| duql_2131 | $(d_2Cu_1)(q_3Cl_1)$ | C    |
| duql_2132 | $(d_2Cu_1)(q_3Cl_2)$ | C    |
| duql_2133 | $(d_2Cu_1)(q_3Cl_3)$ | C    |
| duql_2211 | $(d_2Cu_2)(q_1Cl_1)$ | C    |
| duql_2212 | $(d_2Cu_2)(q_1Cl_2)$ | C    |
| duql_2213 | $(d_2Cu_2)(q_1Cl_3)$ | C    |
| duql_2221 | $(d_2Cu_2)(q_2Cl_1)$ | C    |
| duql_2222 | $(d_2Cu_2)(q_2Cl_2)$ | C    |
| duql_2223 | $(d_2Cu_2)(q_2Cl_3)$ | C    |

| WC name   | Operator             | Type |
|-----------|----------------------|------|
| duql_2231 | $(d_2Cu_2)(q_3Cl_1)$ | C    |
| duql_2232 | $(d_2Cu_2)(q_3Cl_2)$ | C    |
| duql_2233 | $(d_2Cu_2)(q_3Cl_3)$ | C    |
| duql_2311 | $(d_2Cu_3)(q_1Cl_1)$ | C    |
| duql_2312 | $(d_2Cu_3)(q_1Cl_2)$ | C    |
| duql_2313 | $(d_2Cu_3)(q_1Cl_3)$ | C    |
| duql_2321 | $(d_2Cu_3)(q_2Cl_1)$ | C    |
| duql_2322 | $(d_2Cu_3)(q_2Cl_2)$ | C    |
| duql_2323 | $(d_2Cu_3)(q_2Cl_3)$ | C    |
| duql_2331 | $(d_2Cu_3)(q_3Cl_1)$ | C    |
| duql_2332 | $(d_2Cu_3)(q_3Cl_2)$ | C    |
| duql_2333 | $(d_2Cu_3)(q_3Cl_3)$ | C    |
| duql_3111 | $(d_3Cu_1)(q_1Cl_1)$ | C    |
| duql_3112 | $(d_3Cu_1)(q_1Cl_2)$ | C    |
| duql_3113 | $(d_3Cu_1)(q_1Cl_3)$ | C    |
| duql_3121 | $(d_3Cu_1)(q_2Cl_1)$ | C    |
| duql_3122 | $(d_3Cu_1)(q_2Cl_2)$ | C    |
| duql_3123 | $(d_3Cu_1)(q_2Cl_3)$ | C    |
| duql_3131 | $(d_3Cu_1)(q_3Cl_1)$ | C    |
| duql_3132 | $(d_3Cu_1)(q_3Cl_2)$ | C    |
| duql_3133 | $(d_3Cu_1)(q_3Cl_3)$ | C    |
| duql_3211 | $(d_3Cu_2)(q_1Cl_1)$ | C    |
| duql_3212 | $(d_3Cu_2)(q_1Cl_2)$ | C    |
| duql_3213 | $(d_3Cu_2)(q_1Cl_3)$ | C    |
| duql_3221 | $(d_3Cu_2)(q_2Cl_1)$ | C    |
| duql_3222 | $(d_3Cu_2)(q_2Cl_2)$ | C    |
| duql_3223 | $(d_3Cu_2)(q_2Cl_3)$ | C    |
| duql_3231 | $(d_3Cu_2)(q_3Cl_1)$ | C    |
| duql_3232 | $(d_3Cu_2)(q_3Cl_2)$ | C    |
| duql_3233 | $(d_3Cu_2)(q_3Cl_3)$ | C    |
| duql_3311 | $(d_3Cu_3)(q_1Cl_1)$ | C    |
| duql_3312 | $(d_3Cu_3)(q_1Cl_2)$ | C    |
| duql_3313 | $(d_3Cu_3)(q_1Cl_3)$ | C    |
| duql_3321 | $(d_3Cu_3)(q_2Cl_1)$ | C    |
| duql_3322 | $(d_3Cu_3)(q_2Cl_2)$ | C    |
| duql_3323 | $(d_3Cu_3)(q_2Cl_3)$ | C    |
| duql_3331 | $(d_3Cu_3)(q_3Cl_1)$ | C    |
| duql_3332 | $(d_3Cu_3)(q_3Cl_2)$ | C    |
| duql_3333 | $(d_3Cu_3)(q_3Cl_3)$ | C    |
| qqe_1111  | $(q_1Cq_1)(u_1Ce_1)$ | C    |
| qqe_1112  | $(q_1Cq_1)(u_1Ce_2)$ | C    |
| qqe_1113  | $(q_1Cq_1)(u_1Ce_3)$ | C    |
| qqe_1121  | $(q_1Cq_1)(u_2Ce_1)$ | C    |
| qqe_1122  | $(q_1Cq_1)(u_2Ce_2)$ | C    |

| WC name   | Operator                  | Type |
|-----------|---------------------------|------|
| qque_1123 | $(q_1 C q_1) (u_2 C e_3)$ | C    |
| qque_1131 | $(q_1 C q_1) (u_3 C e_1)$ | C    |
| qque_1132 | $(q_1 C q_1) (u_3 C e_2)$ | C    |
| qque_1133 | $(q_1 C q_1) (u_3 C e_3)$ | C    |
| qque_1211 | $(q_1 C q_2) (u_1 C e_1)$ | C    |
| qque_1212 | $(q_1 C q_2) (u_1 C e_2)$ | C    |
| qque_1213 | $(q_1 C q_2) (u_1 C e_3)$ | C    |
| qque_1221 | $(q_1 C q_2) (u_2 C e_1)$ | C    |
| qque_1222 | $(q_1 C q_2) (u_2 C e_2)$ | C    |
| qque_1223 | $(q_1 C q_2) (u_2 C e_3)$ | C    |
| qque_1231 | $(q_1 C q_2) (u_3 C e_1)$ | C    |
| qque_1232 | $(q_1 C q_2) (u_3 C e_2)$ | C    |
| qque_1233 | $(q_1 C q_2) (u_3 C e_3)$ | C    |
| qque_1311 | $(q_1 C q_3) (u_1 C e_1)$ | C    |
| qque_1312 | $(q_1 C q_3) (u_1 C e_2)$ | C    |
| qque_1313 | $(q_1 C q_3) (u_1 C e_3)$ | C    |
| qque_1321 | $(q_1 C q_3) (u_2 C e_1)$ | C    |
| qque_1322 | $(q_1 C q_3) (u_2 C e_2)$ | C    |
| qque_1323 | $(q_1 C q_3) (u_2 C e_3)$ | C    |
| qque_1331 | $(q_1 C q_3) (u_3 C e_1)$ | C    |
| qque_1332 | $(q_1 C q_3) (u_3 C e_2)$ | C    |
| qque_1333 | $(q_1 C q_3) (u_3 C e_3)$ | C    |
| qque_2211 | $(q_2 C q_2) (u_1 C e_1)$ | C    |
| qque_2212 | $(q_2 C q_2) (u_1 C e_2)$ | C    |
| qque_2213 | $(q_2 C q_2) (u_1 C e_3)$ | C    |
| qque_2221 | $(q_2 C q_2) (u_2 C e_1)$ | C    |
| qque_2222 | $(q_2 C q_2) (u_2 C e_2)$ | C    |
| qque_2223 | $(q_2 C q_2) (u_2 C e_3)$ | C    |
| qque_2231 | $(q_2 C q_2) (u_3 C e_1)$ | C    |
| qque_2232 | $(q_2 C q_2) (u_3 C e_2)$ | C    |
| qque_2233 | $(q_2 C q_2) (u_3 C e_3)$ | C    |
| qque_2311 | $(q_2 C q_3) (u_1 C e_1)$ | C    |
| qque_2312 | $(q_2 C q_3) (u_1 C e_2)$ | C    |
| qque_2313 | $(q_2 C q_3) (u_1 C e_3)$ | C    |
| qque_2321 | $(q_2 C q_3) (u_2 C e_1)$ | C    |
| qque_2322 | $(q_2 C q_3) (u_2 C e_2)$ | C    |
| qque_2323 | $(q_2 C q_3) (u_2 C e_3)$ | C    |
| qque_2331 | $(q_2 C q_3) (u_3 C e_1)$ | C    |
| qque_2332 | $(q_2 C q_3) (u_3 C e_2)$ | C    |
| qque_2333 | $(q_2 C q_3) (u_3 C e_3)$ | C    |
| qque_3311 | $(q_3 C q_3) (u_1 C e_1)$ | C    |
| qque_3312 | $(q_3 C q_3) (u_1 C e_2)$ | C    |
| qque_3313 | $(q_3 C q_3) (u_1 C e_3)$ | C    |
| qque_3321 | $(q_3 C q_3) (u_2 C e_1)$ | C    |

| WC name   | Operator  | Type |
|-----------|---|------|
| qque_3322 | $(q_3 C q_3) (u_2 C e_2)$                             | C    |
| qque_3323 | $(q_3 C q_3) (u_2 C e_3)$                             | C    |
| qque_3331 | $(q_3 C q_3) (u_3 C e_1)$                             | C    |
| qque_3332 | $(q_3 C q_3) (u_3 C e_2)$                             | C    |
| qque_3333 | $(q_3 C q_3) (u_3 C e_3)$                             | C    |
| qqql_1111 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_1 C l_1)$ | C    |
| qqql_1112 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_1 C l_2)$ | C    |
| qqql_1113 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_1 C l_3)$ | C    |
| qqql_1121 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_2 C l_1)$ | C    |
| qqql_1122 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_2 C l_2)$ | C    |
| qqql_1123 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_2 C l_3)$ | C    |
| qqql_1131 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_3 C l_1)$ | C    |
| qqql_1132 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_3 C l_2)$ | C    |
| qqql_1133 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_1) (q_3 C l_3)$ | C    |
| qqql_1211 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_1 C l_1)$ | C    |
| qqql_1212 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_1 C l_2)$ | C    |
| qqql_1213 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_1 C l_3)$ | C    |
| qqql_1221 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_2 C l_1)$ | C    |
| qqql_1222 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_2 C l_2)$ | C    |
| qqql_1223 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_2 C l_3)$ | C    |
| qqql_1231 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_3 C l_1)$ | C    |
| qqql_1232 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_3 C l_2)$ | C    |
| qqql_1233 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_2) (q_3 C l_3)$ | C    |
| qqql_1311 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_1 C l_1)$ | C    |
| qqql_1312 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_1 C l_2)$ | C    |
| qqql_1313 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_1 C l_3)$ | C    |
| qqql_1321 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_2 C l_1)$ | C    |
| qqql_1322 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_2 C l_2)$ | C    |
| qqql_1323 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_2 C l_3)$ | C    |
| qqql_1331 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_3 C l_1)$ | C    |
| qqql_1332 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_3 C l_2)$ | C    |
| qqql_1333 | $\epsilon_{il} \epsilon_{jk} (q_1 C q_3) (q_3 C l_3)$ | C    |
| qqql_2121 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_2 C l_1)$ | C    |
| qqql_2122 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_2 C l_2)$ | C    |
| qqql_2123 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_2 C l_3)$ | C    |
| qqql_2131 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_3 C l_1)$ | C    |
| qqql_2132 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_3 C l_2)$ | C    |
| qqql_2133 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_1) (q_3 C l_3)$ | C    |
| qqql_2221 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_2 C l_1)$ | C    |
| qqql_2222 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_2 C l_2)$ | C    |
| qqql_2223 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_2 C l_3)$ | C    |
| qqql_2231 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_3 C l_1)$ | C    |
| qqql_2232 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_3 C l_2)$ | C    |
| qqql_2233 | $\epsilon_{il} \epsilon_{jk} (q_2 C q_2) (q_3 C l_3)$ | C    |

| WC name   | Operator                                       | Type |
|-----------|--|------|
| qqql_2311 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_1Cl_1)$ | C    |
| qqql_2312 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_1Cl_2)$ | C    |
| qqql_2313 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_1Cl_3)$ | C    |
| qqql_2321 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_2Cl_1)$ | C    |
| qqql_2322 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_2Cl_2)$ | C    |
| qqql_2323 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_2Cl_3)$ | C    |
| qqql_2331 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_3Cl_1)$ | C    |
| qqql_2332 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_3Cl_2)$ | C    |
| qqql_2333 | $\epsilon_{il}\epsilon_{jk}(q_2Cq_3)(q_3Cl_3)$ | C    |
| qqql_3131 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_1)(q_3Cl_1)$ | C    |
| qqql_3132 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_1)(q_3Cl_2)$ | C    |
| qqql_3133 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_1)(q_3Cl_3)$ | C    |
| qqql_3231 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_2)(q_3Cl_1)$ | C    |
| qqql_3232 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_2)(q_3Cl_2)$ | C    |
| qqql_3233 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_2)(q_3Cl_3)$ | C    |
| qqql_3331 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_3)(q_3Cl_1)$ | C    |
| qqql_3332 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_3)(q_3Cl_2)$ | C    |
| qqql_3333 | $\epsilon_{il}\epsilon_{jk}(q_3Cq_3)(q_3Cl_3)$ | C    |
| duue_1111 | $(d_1Cu_1)(u_1Ce_1)$                           | C    |
| duue_1112 | $(d_1Cu_1)(u_1Ce_2)$                           | C    |
| duue_1113 | $(d_1Cu_1)(u_1Ce_3)$                           | C    |
| duue_1121 | $(d_1Cu_1)(u_2Ce_1)$                           | C    |
| duue_1122 | $(d_1Cu_1)(u_2Ce_2)$                           | C    |
| duue_1123 | $(d_1Cu_1)(u_2Ce_3)$                           | C    |
| duue_1131 | $(d_1Cu_1)(u_3Ce_1)$                           | C    |
| duue_1132 | $(d_1Cu_1)(u_3Ce_2)$                           | C    |
| duue_1133 | $(d_1Cu_1)(u_3Ce_3)$                           | C    |
| duue_1211 | $(d_1Cu_2)(u_1Ce_1)$                           | C    |
| duue_1212 | $(d_1Cu_2)(u_1Ce_2)$                           | C    |
| duue_1213 | $(d_1Cu_2)(u_1Ce_3)$                           | C    |
| duue_1221 | $(d_1Cu_2)(u_2Ce_1)$                           | C    |
| duue_1222 | $(d_1Cu_2)(u_2Ce_2)$                           | C    |
| duue_1223 | $(d_1Cu_2)(u_2Ce_3)$                           | C    |
| duue_1231 | $(d_1Cu_2)(u_3Ce_1)$                           | C    |
| duue_1232 | $(d_1Cu_2)(u_3Ce_2)$                           | C    |
| duue_1233 | $(d_1Cu_2)(u_3Ce_3)$                           | C    |
| duue_1311 | $(d_1Cu_3)(u_1Ce_1)$                           | C    |
| duue_1312 | $(d_1Cu_3)(u_1Ce_2)$                           | C    |
| duue_1313 | $(d_1Cu_3)(u_1Ce_3)$                           | C    |
| duue_1321 | $(d_1Cu_3)(u_2Ce_1)$                           | C    |
| duue_1322 | $(d_1Cu_3)(u_2Ce_2)$                           | C    |
| duue_1323 | $(d_1Cu_3)(u_2Ce_3)$                           | C    |
| duue_1331 | $(d_1Cu_3)(u_3Ce_1)$                           | C    |
| duue_1332 | $(d_1Cu_3)(u_3Ce_2)$                           | C    |

| WC name   | Operator             | Type |
|-----------|----------------------|------|
| duue_1333 | $(d_1Cu_3)(u_3Ce_3)$ | C    |
| duue_2111 | $(d_2Cu_1)(u_1Ce_1)$ | C    |
| duue_2112 | $(d_2Cu_1)(u_1Ce_2)$ | C    |
| duue_2113 | $(d_2Cu_1)(u_1Ce_3)$ | C    |
| duue_2121 | $(d_2Cu_1)(u_2Ce_1)$ | C    |
| duue_2122 | $(d_2Cu_1)(u_2Ce_2)$ | C    |
| duue_2123 | $(d_2Cu_1)(u_2Ce_3)$ | C    |
| duue_2131 | $(d_2Cu_1)(u_3Ce_1)$ | C    |
| duue_2132 | $(d_2Cu_1)(u_3Ce_2)$ | C    |
| duue_2133 | $(d_2Cu_1)(u_3Ce_3)$ | C    |
| duue_2211 | $(d_2Cu_2)(u_1Ce_1)$ | C    |
| duue_2212 | $(d_2Cu_2)(u_1Ce_2)$ | C    |
| duue_2213 | $(d_2Cu_2)(u_1Ce_3)$ | C    |
| duue_2221 | $(d_2Cu_2)(u_2Ce_1)$ | C    |
| duue_2222 | $(d_2Cu_2)(u_2Ce_2)$ | C    |
| duue_2223 | $(d_2Cu_2)(u_2Ce_3)$ | C    |
| duue_2231 | $(d_2Cu_2)(u_3Ce_1)$ | C    |
| duue_2232 | $(d_2Cu_2)(u_3Ce_2)$ | C    |
| duue_2233 | $(d_2Cu_2)(u_3Ce_3)$ | C    |
| duue_2311 | $(d_2Cu_3)(u_1Ce_1)$ | C    |
| duue_2312 | $(d_2Cu_3)(u_1Ce_2)$ | C    |
| duue_2313 | $(d_2Cu_3)(u_1Ce_3)$ | C    |
| duue_2321 | $(d_2Cu_3)(u_2Ce_1)$ | C    |
| duue_2322 | $(d_2Cu_3)(u_2Ce_2)$ | C    |
| duue_2323 | $(d_2Cu_3)(u_2Ce_3)$ | C    |
| duue_2331 | $(d_2Cu_3)(u_3Ce_1)$ | C    |
| duue_2332 | $(d_2Cu_3)(u_3Ce_2)$ | C    |
| duue_2333 | $(d_2Cu_3)(u_3Ce_3)$ | C    |
| duue_3111 | $(d_3Cu_1)(u_1Ce_1)$ | C    |
| duue_3112 | $(d_3Cu_1)(u_1Ce_2)$ | C    |
| duue_3113 | $(d_3Cu_1)(u_1Ce_3)$ | C    |
| duue_3121 | $(d_3Cu_1)(u_2Ce_1)$ | C    |
| duue_3122 | $(d_3Cu_1)(u_2Ce_2)$ | C    |
| duue_3123 | $(d_3Cu_1)(u_2Ce_3)$ | C    |
| duue_3131 | $(d_3Cu_1)(u_3Ce_1)$ | C    |
| duue_3132 | $(d_3Cu_1)(u_3Ce_2)$ | C    |
| duue_3133 | $(d_3Cu_1)(u_3Ce_3)$ | C    |
| duue_3211 | $(d_3Cu_2)(u_1Ce_1)$ | C    |
| duue_3212 | $(d_3Cu_2)(u_1Ce_2)$ | C    |
| duue_3213 | $(d_3Cu_2)(u_1Ce_3)$ | C    |
| duue_3221 | $(d_3Cu_2)(u_2Ce_1)$ | C    |
| duue_3222 | $(d_3Cu_2)(u_2Ce_2)$ | C    |
| duue_3223 | $(d_3Cu_2)(u_2Ce_3)$ | C    |
| duue_3231 | $(d_3Cu_2)(u_3Ce_1)$ | C    |

| WC name   | Operator                  | Type |
|-----------|---------------------------|------|
| duue_3232 | $(d_3 C u_2) (u_3 C e_2)$ | C    |
| duue_3233 | $(d_3 C u_2) (u_3 C e_3)$ | C    |
| duue_3311 | $(d_3 C u_3) (u_1 C e_1)$ | C    |
| duue_3312 | $(d_3 C u_3) (u_1 C e_2)$ | C    |
| duue_3313 | $(d_3 C u_3) (u_1 C e_3)$ | C    |
| duue_3321 | $(d_3 C u_3) (u_2 C e_1)$ | C    |
| duue_3322 | $(d_3 C u_3) (u_2 C e_2)$ | C    |
| duue_3323 | $(d_3 C u_3) (u_2 C e_3)$ | C    |
| duue_3331 | $(d_3 C u_3) (u_3 C e_1)$ | C    |
| duue_3332 | $(d_3 C u_3) (u_3 C e_2)$ | C    |
| duue_3333 | $(d_3 C u_3) (u_3 C e_3)$ | C    |

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| WC name     | Operator  | Type |
|-------------|---|------|
| llphiphi_11 | $(\tilde{\varphi}^\dagger l_1)^T C (\tilde{\varphi}^\dagger l_1)$ | C    |
| llphiphi_12 | $(\tilde{\varphi}^\dagger l_1)^T C (\tilde{\varphi}^\dagger l_2)$ | C    |
| llphiphi_13 | $(\tilde{\varphi}^\dagger l_1)^T C (\tilde{\varphi}^\dagger l_3)$ | C    |
| llphiphi_22 | $(\tilde{\varphi}^\dagger l_2)^T C (\tilde{\varphi}^\dagger l_2)$ | C    |
| llphiphi_23 | $(\tilde{\varphi}^\dagger l_2)^T C (\tilde{\varphi}^\dagger l_3)$ | C    |
| llphiphi_33 | $(\tilde{\varphi}^\dagger l_3)^T C (\tilde{\varphi}^\dagger l_3)$ | C    |