$$L'_{g,d,k} = \int_{(2,d+1)} \sigma_1^g \sigma_{k-1} \left(\sum_{i+j=2d-g-k-1} \sigma_i \sigma_j \right) - \int_{(2,d)} \sigma_1^g \sigma_{k-2} \left(\sum_{i+j=2d-g-k-2} \sigma_i \sigma_j \right).$$