Lambda doubling in Π states:

$$\left\langle N'\Lambda SJ\pi\left|H_{ld}\right|N\Lambda SJ\pi\right\rangle = p\pi\sqrt{5}(-1)^{N+S+J+\Lambda+1}\sqrt{S(S+1)(2S+1)(2N'+1)N(N+1)}$$
$$\times(2N+1)\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & \Lambda \end{pmatrix}\begin{Bmatrix} N & S & J \\ S & N' & 1 \end{Bmatrix}\begin{Bmatrix} 1 & N & N \\ N' & 2 & 1 \end{Bmatrix}$$
$$+ p_D\left(N(N+1)+N'(N'+1)\right)\pi\frac{\sqrt{5}}{2}(-1)^{N+S+J+\Lambda+1}$$
$$\times\sqrt{S(S+1)(2S+1)(2N'+1)N(N+1)}(2N+1)\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & \Lambda \end{pmatrix}$$
$$\times\begin{Bmatrix} N & S & J \\ S & N' & 1 \end{Bmatrix}\begin{Bmatrix} 1 & N & N \\ N' & 2 & 1 \end{Bmatrix}$$
$$+\frac{q}{2\sqrt{6}}\pi\delta_{NN'}(-1)^{N'+N-\Lambda}\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & -\Lambda \end{pmatrix}\prod_{k=0}^{4}\sqrt{2N+k-1}$$
$$+\frac{q_D}{2\sqrt{6}}\pi\delta_{NN'}(-1)^{N'+N-\Lambda}N(N+1)\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & -\Lambda \end{pmatrix}\prod_{k=0}^{4}\sqrt{2N+k-1}$$

For S > ½ include:

$$\left\langle N'\Lambda SJ\pi\left|H_{ld}\right|N\Lambda SJ\pi\right\rangle = \frac{o}{2\sqrt{6}}\pi(-1)^{2N+S+J+N'-\Lambda}\sqrt{(2N'+1)(2N+1)}\prod_{k=0}^{4}\sqrt{2S+k-1}$$
$$\times\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & \Lambda \end{pmatrix}\begin{Bmatrix} S & N' & J \\ N & S & 2 \end{Bmatrix}$$
$$+\frac{o_D}{4\sqrt{6}}\left(N(N+1)+N'(N'+1)\right)\pi(-1)^{2N+S+J+N'-\Lambda}$$
$$\times\sqrt{(2N'+1)(2N+1)}\prod_{k=0}^{4}\sqrt{2S+k-1}\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & \Lambda \end{pmatrix}\begin{Bmatrix} S & N' & J \\ N & S & 2 \end{Bmatrix}$$