Setting in (12) $v_h = \tilde{u}_h - u_h \in \bar{V}_k(T_h)$ and using the $\bar{V}_h(T_h)$-ellipticity of $a_h(\cdot,\cdot)$, we get

$$(13)\quad \mu_3 \|\tilde{u}_h - u_h\|_h^2 \overset{(7)}{\leq} a_h(\tilde{u}_h - u_h, \tilde{u}_h - u_h) = \overset{(12)}{=} a_h(\tilde{u}_h - u, \underbrace{\tilde{u}_h - u_h}_{= w_h})$$

$$\overset{(3)}{=} \sum_\delta (\nabla(\tilde{u}_h - u), \nabla w_h)_\delta - \sum_e (\{\nabla(\tilde{u}_h - u)\}, [w_h])_e - \sum_e (\{\nabla w_h\}, \underbrace{[\tilde{u}_h - u]}_{=0})_e + \sum_e \frac{\alpha_e}{h_e} (\underbrace{[\tilde{u}_h - u]}_{=0}, [w_h])_e$$

$$= T_1 + T_2 + \underset{0}{\overset{\shortparallel}{T_3}} + \underset{0}{\overset{\shortparallel}{T_4}} \Leftarrow [\tilde{u}_h - u]_e = 0 !$$

$\tilde{u}_h = \mathrm{Int}_{\bar{V}_h}(u)$

- It remains to estimate T_1 and T_2:

$$(13)_1 \quad |T_1| = \Big| \sum_\delta (\nabla(\tilde{u}_h - u), \nabla w_h)_\delta \Big|$$

$$\leq \sum_\delta \|\nabla(\tilde{u}_h - u)\|_\delta \|\nabla w_h\|_\delta$$

$$\leq \Big(\sum_\delta \|\nabla(\tilde{u}_h - u)\|_\delta^2 \Big)^{1/2} \Big(\sum_\delta \|\nabla w_h\|_\delta^2 \Big)^{1/2}$$

$$\leq c\, h^{\min\{k+1, s\} - 1} |u|_{H^s(T_h)} \cdot \|w_h\|_h$$

↑ Approximation Theorem 3.6.