Transversely isotropic material

The direction of fibers at a point '***X***' in the undeformed co-ordinate system is $\boldsymbol{a_o}$. Strain energy density, ψ, is expressed in terms of right Cauchy-Green tensor, ***C***, and also $\boldsymbol{a_o}$. The following is the function

$$\psi = \psi\left(C, a_o \otimes a_o \right)$$

I have the following doubts.

1. $\boldsymbol{a_o}$ is a vector, but, this is expressed as a second order tensor. Why? Is it to make the function, ψ, uniform in terms of its arguments? When do we convert a first order tensor into a second order (or above) tensors?
2. ψ is expressed in terms of five invariants. Among five, three are regular invariants as we see in case of isotropic materials. Rest of the two are (I_4 and I_5) in terms of ***C*** and $\boldsymbol{a_o}$. What is the basis for these two (why only two?) invariants and how do we get the expressions for I_4 and I_5 in variants.