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Abstract: Nine solution-ageing treatments with different solution temperatures (915ºC, 960ºC, 1010ºC) and cooling media (water quenching, oil cooling, air cooling) were firstly conducted on the rolled near-α Ti-8Al-1Mo-1V alloy. The microstrcuture evolution behavior and various mechanical properties of this alloy were studied. The results show that solution temperature can greatly influence microstructure features. By increasing solution temperature, the volume fraction of primary α phase continuously decreased, the original shapeless primary α phase was sectioned and gradually showed equiaxed shape, and the β grain kept growing until its grain boundary