For high temperature applications, 9–12 wt.%Cr steels in fossil fired power plants rely upon precipitate strengthening from (V,Nb)N MX nitrides for long term creep strength. During prolonged exposure at service temperature, another nitride precipitates: Cr(V,Nb)NZ phase. The Z phases slowly replace MX, eventually causing a breakdown in creep strength. The present paper reviews the Z phase and its behaviour in 9–12 wt.%Cr steels including thermodynamic modelling, crystal structure, nucleation process and precipitation rate as a function of chemical composition. The influence of Z phase precipitation upon long term creep strength is assessed from several different 9–12 wt.%Cr steel grades and alloy design philosophies.