Claims

1. A extra thick hot rolled H section steel, containing, by mass, the following chemical components: 0.04-0.11% of C, 0.10-0.40% of Si, 0.40-1.00% of Mn, 0.40-1.00% of Cr, 0.10-0.40% of Cu, 0.020-0.060% of Nb, 0.040-0.100% of V, 0.010-0.025% of Ti, 0.010-0.030% of Al, 0.0060-0.0120% of N, not more than 0.015% of P, not more than 0.005% of S, not more than 0.0060% of O, and the balance Fe and trace residual elements, wherein $0.090\% \leq Nb+V+Ti \leq 0.170\%$, $6.5 \leq (V+Ti)/N \leq 10.5$, and the chemical components satisfy the condition of $0.30\% \leq CEV \leq 0.48\%$ according to a calculation equation $CEV=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15$;

wherein at the part, one sixth of the width distance from an end portion and one quarter of the thickness from outer surface, of a flange of the H section steel, a microstructure contains, by area, 85-98% of acicular ferrite and the balance bainite or retained austenite, wherein the bainite content is not more than 2%, the ferrite has a grain width size of not more than 40 μm, and the difference of acicular ferrite contents in different zonesthrough thickness of the flange is not more than 16%;

wherein at the part, one sixth of the width distance from the end portion and one quarter of the thickness from outer surface, of the flange of the H section steel, the tensile yield strength at the room temperature measured according to GB/T 228.1 is not less than 460 MPa, the tensile strength measured according to GB/T 228.1 is not less than 540 MPa, an elongation after fracture measured according to GB/T 228.1 is not less than 24.0%, the impact energy value at -20ºC measured according to GB/T 229 is not less than 80 J, and the thickness-direction properties measured according to the standard GB/T 5313 reach grade Z35; and

wherein the H section steel has a flange thickness of 90 mm-150 mm.

2. The extra thick hot rolled H section steel according to claim 1, wherein the H section steel contains, by mass, the chemical components: 0.04-0.07% of C, 0.10-0.30% of Si, 0.80-1.00% of Mn, 0.40-0.90% of Cr, 0.10-0.25% of Cu, 0.040-0.060% of Nb, 0.040-0.080% of V, 0.010-0.015% of Ti, 0.010-0.020% of Al, 0.0060-0.0100% of N, not more than 0.015% of P, not more than 0.005% of S, not more than 0.0060% of O, and the balance Fe and trace residual elements, wherein $0.090\% \leq Nb+V+Ti \leq 0.130\%$, $6.5 \leq (V+Ti)/N \leq 8.5$, and the chemical components satisfy the condition of $0.30\% \leq CEV \leq 0.43\%$ according to the calculation equation $CEV=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15$.

3. The extra thick hot rolled H section steel according to claim 1, wherein the H section steel contains, by mass, the chemical components: 0.07-0.11% of C, 0.30-0.40% of Si, 0.40-0.80% of Mn,

0.90-1.00% of Cr, 0.25-0.40% of Cu, 0.020-0.040% of Nb, 0.080-0.100% of V, 0.015-0.025% of Ti, 0.020-0.030% of Al, 0.0100-0.0120% of N, not more than 0.015% of P, not more than 0.005% of S, not more than 0.0040% of O, and the balance Fe and trace residual elements, wherein $0.130\%<Nb+V+Ti\leq 0.170\%$, $8.5\leq(V+Ti)/N\leq 10.5$, and the chemical components satisfy the condition of $0.40\%\leq CEV\leq 0.48\%$ according to the calculation equation $CEV=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15$.

4. The extra thick hot rolled H section steel according to any one of claims 1 to 3, wherein at the part, one sixth of the width distance from the end portion and one quarter of the thickness from outer surface, of the flange of the H section steel, the microstructure contains, by area, 85-91% of acicular ferrite and the balance bainite or retained austenite, wherein the bainite content is not more than 2%, the ferrite has a grain width size of not more than 20 μm, and the difference of acicular ferrite contents in different zones through thickness of the flange is not more than 9%.

5. The extra thick hot rolled H section steel according to any one of claims 1 to 3, wherein at the part, one sixth of the width distance from the end portion and one quarter of the thickness from outer surface, of the flange of the H section steel, the microstructure contains, by area, 91-98% of acicular ferrite and the balance bainite or retained austenite, wherein the bainite content is not more than 1%, the ferrite has a grain width size of 20 μm-40 μm, and the difference of acicular ferrite contents in different zones through thickness of the flange is 9-16%.

6. A production method for the extra thick hot rolled H section steel according to any one of claims 1-5, comprising the following steps:

heating a beam blank at a heating temperature of 1200ºC-1350ºC for a heating time of 120 min-180 min;

break down rolling, wherein the surface temperature of the flange after rolling is not lower than 1000ºC; cooling with spray water at a cooling rate of not lower than 20ºC/s, and rapidly cooling a flange surface to 700ºC-800ºC, and then rolling with a universal rolling mill; and

after the universal rolling, rapidly cooling, by spraying water, the flange surface to 480ºC-530ºC at a cooling rate of 5ºC/s-13ºC/s, then performing air cooling.

7. The production method for the extra thick hot rolled H section steel according to claim 6, wherein a beam blank undergoes the break down rolling, and the surface temperature of the flange is not lower than 1020ºC after rolling.