SCOPE OF CLAIM

[Claim 1]

A method for producing an arc-welded structural member comprising a step of joining steel members by gas-shielded arc-welding to manufacture a welded structural member, at least one of the members to be joined being a hot dip Zn-Al-Mg based alloy coated steel plate member, and a shielding gas being a gas that is based on an Ar gas, a He gas or an Ar-He mixed gas and has a CO_2 concentration satisfying the following expression (2) in relation to a welding heat input Q (J/cm) shown by the following expression (1):

$$Q = (I \times V) / v \quad (1)$$

$$0 \leq C_{CO2} \leq 2900Q^{-0.68} \quad (2)$$

wherein I represents a welding current (A), V represents an arc voltage (V), v represents a welding speed (cm/sec), and C_{CO2} represents a CO_2 concentration in the shielding gas (% by volume).

[Claim 2]

The method for producing an arc-welded structural member according to claim 1, wherein the welding heat input Q is in a range of from 2,000 to 12,000 J/cm.

[Claim 3]

A method for producing an arc-welded structural member comprising a step of joining steel members by gas-shielded arc-welding to manufacture a welded structural member, at

least one of the members to be joined being a hot dip Zn-Al-Mg based alloy coated steel plate member using a base steel for coating having a thickness of 2.6 mm or less, and a shielding gas being a gas that is based on an Ar gas, a He gas or an Ar-He mixed gas and has a CO_2 concentration satisfying the following expression (3) in relation to a welding heat input Q (J/cm) shown by the following expression (1):

$$Q = (I \times V) / v \qquad (1)$$

$$0 \leq C_{CO2} \leq 205Q^{-0.32} \qquad (3)$$

wherein I represents a welding current (A), V represents an arc voltage (V), v represents a welding speed (cm/sec), and C_{CO2} represents a CO_2 concentration in the shielding gas (% by volume).

[Claim 4]

The method for producing an arc-welded structural member according to claim 3, wherein the welding heat input Q is in a range of from 2,000 to 4,500 J/cm.

[Claim 5]

The method for producing an arc-welded structural member according to any one of claims 1 to 4, wherein the hot dip Zn-Al-Mg based alloy coated steel plate has a coated layer that contains: from 1.0 to 22.0% of Al; from 0.05 to 10.0% of Mg; from 0 to 0.10% of Ti; from 0 to 0.05% of B; from 0 to 2.0% of Si; from 0 to 2.5% of Fe; the balance of Zn; and unavoidable impurities, all in terms of % by mass.

[Claim 6]

The method for producing an arc-welded structural member according to any one of claims 1 to 5, wherein the hot dip Zn-Al-Mg based alloy coated steel plate has a coating weight of from 20 to 250 g/m^2 per one surface.

CLAIMS

[Claim 1] A method for producing an arc-welded structural member comprising a step of joining steel members by gas-shielded arc-welding to manufacture a welded structural member, at least one of the members to be joined being a hot dip Zn-Al-Mg based alloy coated steel plate member, wherein the hot dip Zn-Al-Mg based alloy coated steel plate member to be joined uses a base steel for coating having a thickness of 3.2 mm or more and 6 mm or less, and a shielding gas being a gas that is based on an Ar gas, a He gas or an Ar-He mixed gas, wherein a welding heat input Q expressed by the following formula (1) is set in the range of 2000 to 12000 J/cm, and the shielding gas has a CO_2 concentration satisfying the following expression (2) in relation to the welding heat input Q (J/cm):

$$Q = (I \times V) / v \qquad (1)$$

$$0 \leq C_{CO2} \leq 2900Q^{-0.68} \qquad (2)$$

wherein I represents a welding current (A), V represents an arc voltage (V), v represents a welding speed (cm/sec), and C_{CO2} represents a CO_2 concentration in the shielding gas (% by volume).

[Claim 2] A method for producing an arc-welded structural member comprising a step of joining steel members by gas-shielded arc-welding to manufacture a welded structural member, at least one of the members to be joined being a hot dip Zn-Al-Mg based alloy coated steel plate member, wherein the hot dip Zn-Al-Mg based alloy coated steel plate member to be joined uses a base steel for coating having a thickness of 1.6 mm or more and 2.6 mm or less, and a shielding gas being a gas that is based on an Ar gas, a He gas or an Ar-He mixed gas, wherein a welding heat input Q expressed by the following formula (1) is set in the range of 2000 to 4500 J/cm and a weld bead does not become discontinuous, and the shielding gas has a CO_2 concentration satisfying the following expression (2) in relation to a the welding heat input Q (J/cm):

$$Q = (I \times V) / v \qquad (1)$$

$$C_{CO2} \leq 2900Q^{-0.68} \qquad (2)$$

wherein I represents a welding current (A), V represents an arc voltage (V), v represents a welding speed (cm/sec), and C_{CO2} represents a CO_2 concentration in the shielding gas (% by volume).

[Claim 3] The method for producing an arc-welded structural member according to claim 1 or 2, wherein the hot dip Zn-Al-Mg based alloy coated steel plate has a coated layer that contains: from 1.0 to 22.0% of Al; from 0.05 to 10.0% of Mg; from 0 to 0.10% of Ti; from 0 to 0.05% of B; from 0 to 2.0% of Si; from 0 to 2.5% of Fe; the balance of Zn; and unavoidable impurities, all in terms of % by mass.

[Claim 4] The method for producing an arc-welded structural member according to any one of claims 1 to 3, wherein the hot dip Zn-Al-Mg based alloy coated steel plate has a coating weight of from 20 to 250 g/m^2 per one surface.