CLAIMS

1. A method of arc-welding hot dip Zn-based alloy coated steel sheets each of which includes a coating layer that contains Zn as a main component and that contains Al at a concentration of 1.0 % by mass to 22.0 % by mass;

- each of the hot dip Zn-based alloy coated steel sheets having a coating weight W of 15 g/m^2 to 250 g/m^2 per surface;

- the hot dip Zn-based alloy coated steel sheets being arc-welded in such a way that

(a) a current waveform formed by a welding current is a pulsed current waveform in which (i) a peak current and a base current alternate with each other at a pulse period of 1 ms to 50 ms and (ii) an average welding current is 100 A to 350 A and

(b) an average welding voltage is 20 V to 35 V;

- the hot dip Zn-based alloy coated steel sheets being arc-welded by using an Ar-CO_2 mixed gas as a shielding gas, so that transfer of a small droplet, that is, spray transfer is carried out;

- the coating layer included in the each of the hot dip Zn-based alloy coated steel sheets further contains at least one selected from the group consisting of Mg, Ti, B, Si, and Fe, the coating layer containing

  - the Mg at a concentration of 0.05 % by mass to 10.0 % by mass,
  - the Ti at a concentration of 0.002 % by mass to 0.10 % by mass,
  - the B at a concentration of 0.001 % by mass to 0.05 % by mass,
  - the Si at a concentration of 0 % by mass to 2.0 % by mass, and/or

- the Fe at a concentration of 0 % by mass to 2.5 % by mass; and

- the coating weight W (g/m^2) of the each of the hot dip Zn-based alloy coated steel sheets and an Al concentration C_{Al} (% by mass) of the coating layer included in the each of the hot dip Zn-based alloy coated steel sheets satisfying the following expression (1):

$0.0085W+0.87 \leq C_{Al} \leq 22$ ... (1).

2. The method as set forth in claim 1, wherein the hot dip Zn-based alloy coated steel sheets are arc-welded so that:

- a number of spatters adhering to a region, which has a length of 100 mm and a width of 100 mm and in which a weld bead is middled, is not more than 20; and

- a blowhole occupancy Br, which is calculated from the following expression (2), is not more than 30 %:

- $Br = (\Sigma di/L)\times 100$ ... (2)

where:

di represents a length of the i-th blowhole observed; and

L represents a length of the weld bead.

3. A method of producing a welded member by using the method of arc-welding hot dip Zn-based alloy coated as defined in claim 1 or 2.

4. A welded member comprising hot dip Zn-based alloy coated steel sheets and a weld bead joining the two sheets, the welded member obtained by welding hot dip Zn-based alloy coated steel sheets each of which includes a coating layer that contains Zn as a main component and that contains Al at a concentration of 1.0 % by mass to 22.0 % by mass;

- each of the hot dip Zn-based alloy coated steel sheets having a coating weight W of 15 g/m^2 to 250 g/m^2 per surface;
- the coating layer included in the each of the hot dip Zn-based alloy coated steel sheets further containing at least one selected from the group consisting of Mg, Ti, B, Si, and Fe, the coating layer containing
  - the Mg at a concentration of 0.05 % by mass to 10.0 % by mass,
  - the Ti at a concentration of 0.002 % by mass to 0.10 % by mass,
  - the B at a concentration of 0.001 % by mass to 0.05 % by mass,
  - the Si at a concentration of 0 % by mass to 2.0 % by mass, and/or
  - the Fe at a concentration of 0 % by mass to 2.5 % by mass;
- the coating weight W (g/m^2) of the each of the hot dip Zn-based alloy coated steel sheets and an Al concentration C_{Al} (% by mass) of the coating layer included in the each of the hot dip Zn-based alloy coated steel sheets satisfying the following expression (1):

$0.0085W+0.87 \leq C_{Al} \leq 22$ ... (1);

- a number of spatters adhering to a region, which has a length of 100 mm and a width of 100 mm and in which the weld bead is middled, being not more than 20; and
- a blowhole occupancy Br, which is calculated from the following

expression (2), being not more than 30 %:

$$Br = (\Sigma di/L)\times 100 \quad \ldots (2)$$

where:

di represents a length of the ith blowhole observed; and

L represents a length of the weld bead.