

KES

Low Pressure Casting Machine

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1. Scope of application

This standard shall be applied to a casting machine that used by supplying from light alloy technical section for producing the AL material Cylinder Head.

2. The definition of Term

(1) Stalk

The thing that used in order to supply molten metal in heat insulation path with shape of metal mold material and shall be made of cast iron. There are two kinds of shape on that. The one is for Dohc vehicles and the other is for Sohc vehicles.

(2) Transfer

It is for supporting Stalk. It shall be located at the upper part of heat insulation path and have 1 or 2 holes in order to put Stalk into it.

(3) Thermo Couple

Two kinds of metal conductor that are connected together and can know temperature through measuring heat electromotive force is generated by temperature difference

(4) Thyristor(S.C.R-Unit)

Heat insulation path of electric Heater method shall carry out temperature control by control of current amount. This is a device that carries out control by input signal contact less without added moving of current amount.

(5) Thermocouple protective pipe

This is the pipe that protects thermocouple from molten metal. The material shall be Ceramic in order to stand erosion action of molten metal and high temperature.

(6) Heat insulation Path

This is the path that boosts or maintains temperature of Aluminum molten metal.

(7) Packing

This is for preventing Air Leak. There are some kinds of Packing for Stalk and , metal mold and Stalk, Thermocouple, and hot water supplying ball. To choose a

material and a shape, consult with the person in charge of it.

3. Kinds

3.1 Kinds according to casting system plan.

(1) Low pressure casting

This is the casting system plan that pour molten metal from the lower part of metal mold to the top of it in the state of giving low pressure (0.5kg/cm^2) to the molten metal surface in the system of pouring molten metal to mold material

(2) Gravity casting

This is the system that pour molten metal by self-weight to mold material

(3) High pressure Casting

This is the system that pour molten metal to mold material in the state of giving high pressure ($250 \sim 350\text{kg/cm}^2$) in a short time.

3.2 Kinds according to heat insulation path

(1) Crucible Type

This is the type that maintains the molten metal in a crucible.

(2) Path Type

This is the type that maintains the molten metal in a path, which constructed by refractory or refractory material.

3.3 Kinds according to drive system

(1) The system of mobile path

This is a system that shifts a path to the side of an operator.

(2) The system of mobile body

This is a system that shifts a body of the equipment to the side of an operator in order to change and repair the path.

4. Constitutions and Explanation of Equipment

4.1 Body

(1) The lower part of Body

This is constituted of four Frames (Column) for an advance, a retreat, a rise and a fall of electric insulation path and the lower Frame.

(2) The upper part of Body

This is constituted of fixed Plate for mounting the lower part and movable Plate for mounting the upper part. And fixed Plate shall have an oil hydraulic Cylinder for drive forward and backward. And drive forward and backward can be fixed to the upper part or lower part depending on metal mold.

4.2 Heat insulation path

This is for maintaining and keeping molten melt warm and shall be the lower part of body. Carry out drive forward and backward by an oil hydraulic Cylinder drive. And Carry out drive up and down by Warm-jack mechanism by rotation of hydraulic Motor.

4.3 Automatic product taking Equipment

This is equipment that receives manufactured material automatically and shifts the product to the lower part of the equipment. Drive for this is a Motor drive.

4.4 Core Trimming device

This is a device that removes CB-6⁽¹⁾ and CB-7⁽²⁾ core which is attached to the product.

Note ⁽¹⁾ CB-6 : Core that makes Cam Journal figure of Cylinder Head

⁽²⁾ CB-7 : Core that makes the outer figure of Cylinder Head. It is used in the way of 2 Cavity/Mould.

4.5 Product transfer system

This is a system that transfers the material, which is transferred to the automatic product taking place, to the position of an operator and to the upper surface of product carrier device conveyer automatically. And it is an oil hydraulic system.

4.6 Metal mold exchange swing

This is a swing that shift a metal mold to the upper surface of fixed plate on the lower

part of the equipment body. And it is transferred by hand.

4.7 Air pressure device

This is a device that injects molten melt in insulation path into the inner of a metal mold.

Feed Back Control by Computer is possible. And multistage air pressure is, too.

4.8 Metal mold cooling system

This is a system that cools metal mold partially. Feed Back Control by Program is possible. Cooling method is to cool it by Air or cooling water. And On-Off by time and temperature sensor is possible.

5. Specification of design

5.1 Body

5.1.1 The lower part of Body

- (1) It shall be the system of mobile path.
- (2) Working height is FL+750mm
- (3) Level Block shall be adjusted easily.
- (4) Frame shall have rigidity enough to stand in vibration generated at the time that insulation path is transferred.
- (5) Install Cable Bear in order to prevent from wire's getting twisted and molten metal at the time that insulation path is transferred.
- (6) Put a cover for preventing molten metal adhesion on the equipment and parts that is installed on the rear of the lower part of the body.
- (7) On the left and right directions of the body, don't install the attached device and equipment if possible. (It is necessary to secure the space for equipping core supplying device and core Trimming device.)

5.1.2 The upper part of Body

(1) Fixed Die Base

- (a) Material shall be FCD 45N or SS41P and treated by heat treatment(1).

Note(1) Carry out rough cutting processing after Normalizing or Annealing.

(b) Carry out stress relieving annealing after rough cutting processing.

(c) The structure shall have enough rigidity.

(d) Take a measure to meet the situation that molten metal is leaked in order not to put it into a hole.

(e) It shall be possible to mount metal mold for two kinds of vehicles (Dohc and Sohc).

(f) Install safety Bar for repairing.

(g) Decide the relation of a Cylinder for metal mold mount after consultation separately.

(2) Cylinder specification

(a) Sohc vehicle and Dohc vehicle shall use 2 Cavity(1) in common.

Note(1) Metal mold specification. Producing system of 1shot and material 2 EA.

(b) A Limit S/W shall adjust forward stroke of Side Cylinder.

(c) The maximum pressure is 140kg/cm^2 , and The common pressure is 100kg/cm^2 .

(d) After reducing pressure, use an action (Opening metal mold action) that is too much of the metal mold. (50kg/cm^2 : The Left, Right, Front and Rear of casting type.
 35kg/cm^2 : Eject rising action)

(e) Descending action of Main Cylinder shall reduce the impact on the part of Stroke End to the minimum by constructing pressure reducing circuit.

(f) Have a Cushion device within each Cylinder.

(g) Plate a inner surface of Cylinder Tube with hard Chromium plating (0.02mm)

(h) Use Nithil as a kind of Packing for Cylinder.

(i) Use water-cooling Cylinder to the place that has a possibility of occurring a trouble to the heat endurance type of packing.

(j) Submit drawing about manufactured Cylinder, not standard Cylinder.

(k) Make a hole on the end part of each Cylinder for releasing air.

(l) It shall be possible to adjusting velocity. (Forward and backward driving)

(m) Connect Cylinder for metal mold Side Core with Flexible Hose.