

Tundish Metering Nozzle Diameter

Question

We are operating a billet caster making 200 mm by 150 mm billets. Our nominal cast speed is 1.80 m/min. We operate with a tundish head height of 760 mm. What size metering nozzle opening is needed in the tundish? D.R. USA

Answer

The formula you are looking for is as follows:

$$G = (0.97) F (7.2) (0.06) \sqrt{(2) (9.81) (h/1000)}$$

Where,

- G = nozzle throughput in kg/min
- F = area of metering nozzle bore in mm²
- h = total ferrostatic height in mm.

Based on the information given and using a liquid steel specific gravity of 7200 kg/m³, the nozzle throughput, G is 389 kg/min. Solving for F gives a metering nozzle bore area of 240 mm². In the tundish, you need a metering nozzle with a diameter of 17.5 mm.

Many casters around the world use slightly larger diameter nozzles on the outermost strands in the belief that there is a more homogeneous heat distribution in the tundish. For the most part, simpler is better so the same nozzle diameter for all strands should always be your first choice. You may also want to consider using 80 % of the maximum tundish head height in the calculation to allow for cast strand velocity increases due to nozzle wear.