



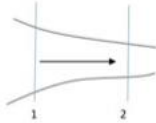
Find solutions for your homework

Search

home / study / math / other math / other math questions and answers / 6. air flows in a steady flow manner through a converging tube. at the inle...

Question: 6. Air flows in a steady flow manner through a converging tub...

6. Air flows in a steady flow manner through a converging tube. At the inlet the pressure is 690kPaa and the density is 0.838 kg/m^3 . If $125 \text{ m}^3/\text{min}$ of air enters at the rate of 94 m/min and the exit section has a diameter of 350 mm, determine a) the mass flow rate (kg/min); b) the diameter of the entrance section (mm); c) the exit velocity(m/min). Assume that the density is constant.



Show transcribed image text

Expert Answer



Anonymous answered this
330 answers

Was this answer helpful?



Post a question

Answers from our experts for your toughest homework questions

Enter question

Continue to post

18 questions remaining



Snap a photo from your phone to post a question

We'll send you a one-time download link

888-888-8888

Text me

By providing your phone number, you agree to receive a one-time automated text message with a link to get the app. Standard messaging rates may apply.

My Textbook Solutions



Marketing Channels
8th Edition



Environmental Science
15th Edition



Cengage Advantage Learning
9th Edition

[View all solutions](#)



$$\Rightarrow \text{Discharge } (Q) = (\text{Area}) \times (\text{velocity})$$

$$Q = Av$$

Discharge = Volumetric flow rate

$$\Rightarrow \text{mass flow rate} = (\text{density}) \times (\text{volumetric flow rate})$$

$$\dot{m} = \rho Q$$

Problem:-

the density of air (ρ) = 0.838 kg/m^3

volumetric flow rate (Q) = $125 \text{ m}^3/\text{min}$

② So, mass flow rate (\dot{m}) = ρQ

$$= 0.838 \times 125$$

$$(\dot{m}) = 104.75 \text{ kg/min}$$

The mass flow rate (\dot{m}) = 104.75 kg/min

③ we know discharge (Q) = (Area) \times (velocity)

Given, velocity of air at entrance (v) = 9.4

$$v = 9.4 \text{ m/min}$$

The cross section of entrance is circular.

Let "d" is diameter of the entrance section.

So, Area of the entrance section is given

$$\text{by } A = \frac{\pi d^2}{4}$$

We know, $Q = A \times v$

$$125 = \frac{\pi d^2}{4} \times 9.4$$

$$\frac{125 \times 4}{9.4 \times \pi} = d^2$$



$$d = 1301.2 \text{ mm}$$

Diameter of the entrance section (d) = 1301.2 mm

Given, diameter of exit cross section is

$$d = 350 \text{ mm}$$

$$d = 0.35 \text{ m}$$

Discharge (Q) = (Area) × (velocity)

$$125 = \left(\frac{\pi \times d^2}{4} \right) \times v$$

$$\frac{125 \times 4}{\pi \times (0.35)^2} = v$$

$$v = 1559.06 \text{ m/min}$$

So, exit velocity (v) = 1559.06 m/min

(a) Mass flow rate (kg/min) = 104.75

(b) Diameter of the entrance section (mm) = 1301.2

(c) exit velocity (m/min) = 1559.06

If you have any doubt leave comment.

If you like my explanation please give rating. Thank you.

Comment >

Questions viewed by other students

Q: undefined

A: [See answer](#)

Q: Consider a 40-L evacuated rigid bottle that is surrounded by atmospheric air at 101 kPa and 25°C. The bottle is now open and air flows into the bottle. At the final state, air in the bottle is in equilibrium with the atmospheric air. During this process, heat is transferred from the bottle to surrounding air. Please answer the following. Air a. Create a schematic representation of...

A: [See answer](#)

COMPANY

LEGAL & POLICIES



© 2003-2021 Chegg Inc. All rights reserved.