

(2)

4.

가.

1)

가

$$\rho_1 V_1 S_1 = \rho_2 V_2 S_2$$

$$, V_1 S_1 = V_2 S_2$$

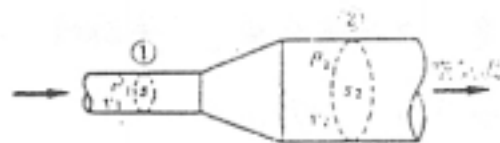
$$\rho : \quad (\text{Kg/m}^3)$$

$$v : \quad (\text{m/s})$$

$$s : \quad (\text{m}^2)$$

,

가 duct



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2)

가 duct

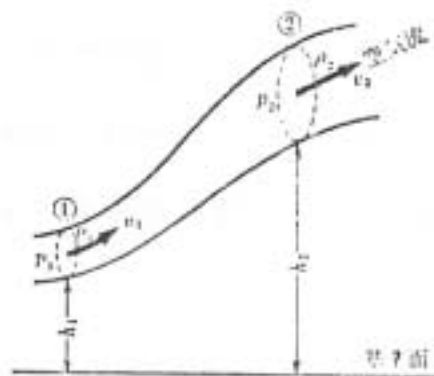
$$p_1 + \frac{v_1^2}{2g} r + r_1 h_1 = p_2 + \frac{v_2^2}{2g} r_2 + r_2 h_2$$

$$p + \frac{v^2}{2g} r \quad (\quad), r h$$

$$(\quad) + ($$

$$) + (\quad) =$$

가



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$$, \quad \Delta P_e$$

$$p_1 + \frac{v_1^2}{2g} r_1 + r_1 h_1 = p_2 + \frac{v_2^2}{2g} r_2 + r_2 h_2 + \Delta P_e$$

가

$$p_1 + \frac{v_1^2}{2g} r_1 = p_2 + \frac{v_2^2}{2g} r_2 + \Delta P_e$$

$$P \quad (\text{static pressure})$$

$$\frac{v^2}{2g}r \quad (\text{velocity pressure})$$

$g : 9.8\text{m/s}^2, r : 1.2\text{Kg/m}^3 (20^\circ\text{C})$

$$\frac{v^2}{2g}r = \left(\frac{v}{4.03}\right)^2$$

$$p + \frac{v^2}{2g}r = \quad (\text{total pressure})$$

$$, (\quad) + (\quad) =$$

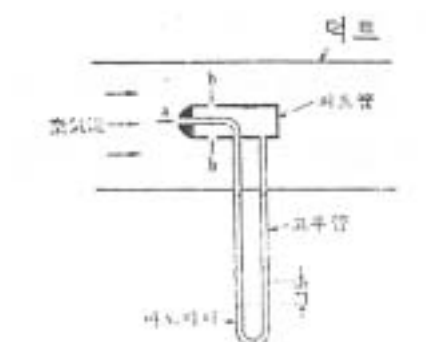
ΔP_e

ΔP_f

$$, \quad , \quad \Delta P_d \quad .$$

3)

Δh



(water column) = mmAq = mmH₂O = mmWG

$$1\text{mmAq} = 1\text{Kg/m}^2 = \frac{1}{10,000}\text{Kg/Cm}^2$$

() (pito tube) 3mmAq .

?

()

$$P_v = \frac{v^2}{2g}r$$

$$3\text{Kg/m}^2 = \frac{v^2}{2 \times 9.8\text{m/s}^2} \times 1.2\text{Kg/m}^3$$

$$v^2 = \frac{3\text{Kg/m}^2 \times 19.6\text{m/s}^2}{1.2\text{Kg/m}^3}$$

$$v^2 = 19\text{m}^2/\text{s}^2$$

$$v = 7\text{m/s}$$

. Duct

1) (ΔP_f)

()

$$\Delta P_f = \lambda \frac{\ell}{d} \frac{v^2}{2g} r$$

$$= \lambda \frac{\ell}{d} \cdot p d$$

ΔP : (mmAq) g : 가 (9.8m/s²)

λ : v : (m/s)

l : (m) Pd : (mmAq)

d : (m) r : (Kg/m³)

$$\lambda = 0.0055 \left[1 + (20,000 \frac{\varepsilon}{d} + \frac{10^6}{\text{Re}})^{1/3} \right]$$

ε : 凹凸 (m)

$$\text{Re} : \frac{Vd}{\nu}$$

)

. ()

$$\varepsilon = 0.18\text{mm} \quad (\quad \quad \quad)$$

$$1\text{m} \quad \quad \quad (\text{mmAq}) \quad \quad \quad (\text{m}^3/\text{H})$$

(d) (m/s) .

가 , .

		Cm/s			
		5	10	15	20
	,	1.7	1.8	1.85	1.9
		1.3	1.35	1.35	1.37
		0.92	0.85	0.82	0.8

$$1.2 \quad \quad \quad r(\text{Kg/m}^3) \quad \quad \quad .$$

$$K = \frac{r}{1.2}$$

) (長方型) (a, b)

(de) .

$$de = 1.3 \left[\frac{(ab)^5}{(a+b)^2} \right]^{1/8}$$

[]

. ()

2) (局部抵抗) (Pd)

가) , , , (渦流)

$$\Delta P d$$

$$\Delta P d = \zeta \frac{v^2}{2g} r = \zeta \left(\frac{v}{4.05} \right)^2 \text{mmAq}$$

ζ :

r : (Kg/m³)

v : (m/s)

)

()

$l'(m)$

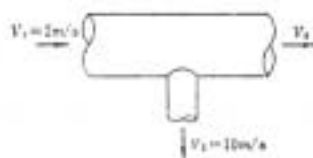
$d,$

a

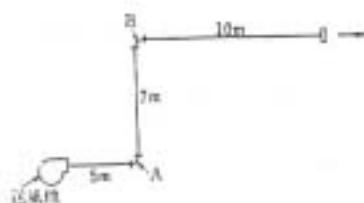
l'/d l'/a

$$P d = \zeta \frac{v^2}{2g} r = \lambda \frac{\ell'}{d} \frac{v^2}{2g} r$$

$$\frac{\ell'}{d} = \frac{\zeta}{\lambda}$$



(1)



(2)

$$(1) < 26 > (1) \quad 90^\circ$$

$$() \frac{v_2}{v_1} = \frac{10}{2} = 5 \quad \zeta = 1.5$$

$$P_d = \zeta \frac{v^2}{2g} r = 1.5 \times \frac{(10)^2}{2 \times 9.8} \times 1.2 = 9.183 \text{ mmAq}$$

$$(2) < 26 > (2) \quad D = 50 \text{ Cm A.B}$$

$$R = 75 \text{ Cm} \quad . (,$$

$$0.1 \text{ mmH}_2\text{O} \quad .)$$

$$()$$

$$R/D = \frac{75}{50} = 1.5$$

$$R/D = 1.5 \quad l'/D = 12$$

$$l' = 12 \times 0.5 = 6 \text{ m}$$

$$l' = 5 + 7 + 10 + (6 \times 2) = 34 \text{ m}$$

$$34 \text{ m} \times 0.1 \text{ mmAq/m} = 3.4 \text{ mmAq}$$

1) Duct

2)

) ,

duct diffuser .

) duct .

)

, (R) , R/D가

1.5 (guide vane)

가 20°

45°

(aspect ratio) , 가 (a), (b) a/b = 3

(天井) 6

.

1

150mm 가

duct

() ()

가

2)

가)

15m/s . (

)

a) 가 가 . ()

b) .

c) .

d)

, 가 .

e)

.

)

15m/s

,

.

a)

가

가

.

b)

.

c)

(

)

가

.

d)

.

e)

가

.