

CLEMENTSON Pipe Sizing Slide Rule WATER PATTERN

Designed by S. P. Clementson, A.M.I.H.V.E.

DIRECTIONS FOR USE

SCALES:



A.—Temperature Drop between boiler flow and return connections.

B.—Head divided by travel.

For Gravity Circulations Head is actual height in feet from centre line of boiler connections to centre line of Index heating surface.

For accelerated circulations Head is Pump Head in feet.

In each case Travel is the total length of Flow and Return Pipe in circuit plus an allowance for obstructions, in fittings and radiator. For approximate sizing allow for obstructions 50 per cent of travel for gravity and 33½ per cent for pump circulations.

C.—Carrying capacity of pipes in B.T.U.s. per hour.

D.—Diameter of pipe in inches.

FORMULA BASIS

The Slide Rule is based on the Rietschel Formula but, by using the red markings on scale D, results will be obtained closely following the Meier Formula.

SIZING GRAVITY CIRCULATIONS

Approximate or Preliminary Sizing.

Values known. (1) Index value of height divided by travel, (2) Temperature Drop, (3) total B.T.U.s., the latter should include a percentage for pipe losses. (See footnotes.)

TO OBTAIN PIPE SIZE

Set value of height divided by travel under Temperature Drop-“Gravity” and read off diameter opposite B.T.U.s., e.g., when A=40° Drop, B=.01 and C=10,000, then D or nearest commercial size=1½”.

Final Balancing.

Values known for particular circuit. (1) Temperature Drop, (2) B.T.U.s., (3) Actual Height, (4) Pipe Lengths, (5) Provisional Diameters, (6) Obstructions in terms of pipe length (see back of rule).

TO OBTAIN TOTAL HEIGHT.

Set diameter opposite B.T.U. and read required height per foot of travel opposite Temperature Drop. Then proceed as in example.

EXAMPLE.

For circuit having available or actual height of 8' 4". Provisional sizes to be retained or modified to make total height equal to actual height.

Dia.	Length	Obstructions	Total Length				
2½	30	15	45	×	.05	=	2.25
1½	45	12	57	×	.07	=	3.99
¾	20	14	34	×	.06	=	2.04
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					Total height	=	8.28'
					Available do.	=	8' 4"

SIZING PUMP CIRCULATIONS

Approximate or Preliminary Sizing.

Values known. (1) Index value of Head divided by travel, (2) Temperature Drop, (3) B.T.U.s. as explained under Gravity.

TO OBTAIN PIPE SIZE set value of Head divided by travel under Temperature Drop "Pump" and read off diameter opposite B.T.U.s., e.g., when A=20° drop; B=.01 and C=50,000, then D or nearest commercial size is 1½".

Final Balancing.

Values known for particular circuit. (1) Temperature Drop, (2) B.T.U.s., (3) desired Pump Head, (4) Pipe Lengths, (5) Provisional Diameters, (6) Obstructions in terms of pipe length (see back of rule). Provisional sizes to be retained or modified to bring Total Head to equal desired Pump Head. Proceed as example for Gravity Balancing.

APPROXIMATE SIZING FROM SQUARE FEET OF RADIATOR SURFACE

To size by this method it is necessary to adjust the B.T.U. scale to read in terms of square feet radiating surface. 1,000,000 B.T.U.s. should be taken as representing 1,000 square feet.

TO OBTAIN THE CORRECT SETTING OF THE RULE.

Determine the B.T.U.s. for 1,000 square feet of heating surface based on the average radiator transmission and add the necessary percentage of pipe losses. Note the position of this value on the Diameter scale when the value of Height divided by travel is set under Temperature Drop. Then move the Slide so that 1,000,000 B.T.U.s. lies opposite the previously noted position on the Diameter scale.

The rule will then be set so that, without further movement of the Slide, diameters can be read off opposite the respective values of heating surface on the B.T.U. scale, where 1,000 B.T.U.s. now represent one square foot of heating surface, e.g. 30,000 B.T.U.s. represent 30 square feet, etc.

