

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	
							<hr/>	
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.

HOT AND COLD WATER SERVICES

For a guide in the design of Hot and Cold Water Services, obtain a value of available Height divided by travel. Travel to include a percentage for obstructions and, when this is set under the separate line marked on the Temperature Drop scale, diameters can be read off opposite the respective values of gallons/minute on the B.T.U. scale, where 1,000 B.T.U.s. represent one gallon/minute, e.g. 6,000 B.T.U.s. represent 6 gallons/minute, etc.

Explanatory Note.

For those requiring a guide to values for Temperature drop, the following may be used as being representative of the values used in practice.

Gravity Circulations	180° F. Flow.	140° F. Return.	Temp. Drop 40° F.
Pump	180° F. Flow.	160° F. Return.	Temp. Drop 20° F.

The Index Radiator is that which is the least favourably placed in the installation. For Gravity circulations it is the radiator which has the lowest value of Head divided by travel.

For Pump circulations the Index Radiator is that which has the longest travel.

In either case the value of Index height divided by travel may be used throughout for approximate or preliminary sizing. This means that, by one setting of the slide, i.e., Index under Temperature Drop, it is possible to read off approximate diameters for all pipes in the system without any further adjustment of the rule.

It will be obvious that, when the B.T.U. value lies between two diameters, it is advisable to use the larger size.

For pipe loss allowances the following percentages may be used as a guide. These percentages should be added to B.T.U. required for radiators.

GRAVITY CIRCULATIONS

All Pipes exposed, long circuits with few radiators 75—120%
Ditto, short circuits with many radiators 30— 50%
Ditto, covered, long circuits with few radiators 30— 60%
Ditto, short circuits with many radiators 20— 40%

PUMP CIRCULATIONS

All Pipes, exposed, long circuits with few radiators 40— 70%
Ditto, short circuits with many radiators... 20— 50%
Ditto, covered, long circuits with few radiators 20— 50%
Ditto, short circuits with many radiators 10— 30%

Full instructions for the use of the Clementson Pipe Sizing Slide Rule, Steam Pattern, are found on the back of each rule.

*The Clementson Pipe Sizing Slide Rules
form part of the 'P.I.C.' Slide Rule range.
Particulars and price can be obtained
from the Manufacturers—*

A. G. THORNTON LTD.
P. O. BOX 3, WYTHENSHAW,
MANCHESTER, 22

