

Nomogram datum characteristics.

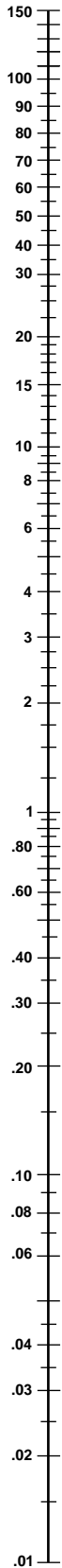
Michigan industrial propeller. General description.

The accompanying Nomogram provides a simple method for the direct approximation of the probable power and other characteristics of a standard Michigan M/P Propeller when used in the agitation or blending of liquids or slurries.

Necessarily computed to certain appropriate averages, its solutions are more 'typical' than specific and, in application to a chosen assembly, may require intelligent qualification for conditions peculiar thereto. This is particularly true of Liquid Movement (Q) which, in practice, may register from Plus-20% to Minus -30% of the Scale Values — (with or without effect upon SHP or N) — depending upon diverse, usually inherent, frequently quite obscure, operative reactions.

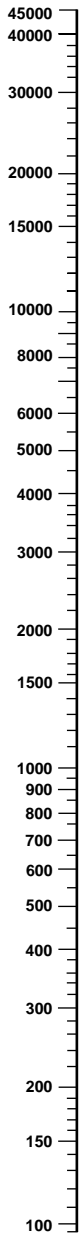
Nevertheless, applied with discretion to a solvable problem within its scope, it is a reliable index— (excluding abnormalities)— to the powering and rating of such propellers when used strictly for stirring or agitation within the confine of a single vessel.

It does not extend to, and must not be used on, directional movements through pipes orifices, filters, etc., or other condition of specific, resistance requiring a definite pressure or 'head'.



NET SHAFT HORSEPOWER - (SHP)

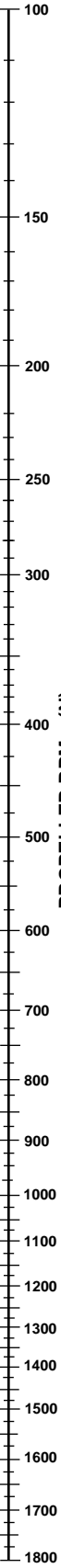
(For Gross Horsepower add Appropriate percentage for Transmission Losses & Overload)



LIQUID MOVEMENT - (Q)
(U.S. Gallons Per Minute)



PROPELLER DIAMETER - (D)
(Inches)



PROPELLER RPM - (N)

Datum Characteristics
MICHIGAN
INDUSTRIAL PROPELLER
Applied to Agitation & Stirring of Liquids
in the Confine of a Single Vessel.

LEGEND

PROPELLER: Type..... M/P
3 Blade or 2 Blade
Effective Area (A₁).....36D²
Pitch Ratio.....1
Hub Ratio (d/D).....0.2

LIQUID:
Water.....Suspension Free
Temperature (t).....68.4°F
Specific Gravity (SpG).....0.998
Viscosity - Centipoise (CP).....1
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Modification factors.

Operation. For simplicity, all Scales are based upon a standard, 'square' MICHIGAN M/P PROPELLER operating in suspension-free water, per Legend. For other practicable combinations of the basic variables see Direct Modification Factor Table and Notes below.

TO RUN A DETERMINATION - connect, with suitable straight-edge, chosen values in any two Scales and read corresponding values on other two Scales at intersections therewith. The resultant combinational values predict, within practical error, the characteristics of a 'typical' basic assembly.

TO MODIFY SCALE READINGS - for possible variations for Legend Values, proceed as follows:

NOTE A - In interest of standardization and availability use P/D=1 unless prohibited by insurmountable mechanical interferences;

NOTE B - Correct for Density only in absence of Viscosity adjustments; NOTE C - Viscous liquids are too diverse, variable under temperature, complex, and otherwise without sufficient dynamic similarity to water to permit of any mathematically-derived modification factors. The SHP Factor listed, therefore, is wholly empirical and, though usually adequate for most practical and broad estimation purposes, is not conclusive for close determinations especially in the higher ranges. Where precise rating is required, all viscous liquids and slurries must be individually plotted for exact behavior by direct experimentation therewith under conditions simulating proposed operation.

NOTE D - Slurries of liquids loaded with suspended solids, being of both greater Density and Viscosity than the clear vehicles, may sometimes be rated by SP.G. and/or CP. corrections alone. Such modifications do not always hold, however, in face of the diverse friction, matting, congelation and other characteristics of the possible suspended constituents. Without previous experience therewith, exacting on any slurry is wholly a matter of experimentation. Congelation and matting in particular, frequently induce unpredictable and erratic power demands which sometimes can be moderated by special "self-clearing" spiroidally-contoured blades.

DIRECT MODIFICATION FACTORS			
To Modify to	Retaining Scale Values	Multiply Scale	by Factor
P/D ₂ :1 (Note A)	D, SHP, Q	N	D/P
	D & N	SHP	(P/D) ²
d/D>0.2	D, SHP, Q	N	$4579 \sqrt[3]{\frac{1}{1-(d/D)^2}}$
	D & N	SHP & Q	1.0416 [1-(d-D) ²]
SpG ₂ :0.998 (Note B)	D,N,Q	SHP	SpG
CP ₂ :1 (Note C)	D & N (Q by trail)	SHP	1+ $\frac{\text{Centipoises}}{1000}$
$\frac{1}{2}$ 68.4°F Slurries	Convert to Specific Gravity or Viscosity		Note D

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