

RULE OF THUMB - CENTRIFUGAL COMPRESSORS

By Neal Wikert

API Standard Conditions: 60 deg F, 14.7 PSIA, Dry (0% RH)

Sizing:	Old days, compressors 15% oversized. Today often have no rerate ability.
Terminology:	Inlet Plenum - Name for inlet Discharge Volute - Name for discharge
Seals:	On low coefficient stages, can massage labyrinth seals and balance piston seal and get 3-5% boost.

Open Wheels

Vibration:	IGVs excite the inducer portion of the blade Diffuser vanes excite the educer portion of the blade 4x and 5x running speed interferences have been problems Vane thickness distribution
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A first guess tip thickness equal to 1% of the OD should be fine. In the case of a small value you can start with a 0.040" to 0.060" thickness. A base to tip taper ratio of 2 is a start. As for thickness distribution, the general trend is to increase in thickness around the bend and then taper back down.

Impeller Repair Notes:

Impeller Bore Repair:	API687: Welding and thermal spraying are the only accepted methods. Chrome or nickel plating is strictly forbidden due to the difference in thermal growth coefficients. Thermal spray coatings have recommended finished thickness limits as follows: 7-25 mils for high velocity fuel processes and 3-10 mils for combustion processes
Gas Horsepower:	The term gas horsepower refers to the input shaft power, free of mechanical losses, which have no thermal effect on the gas. This value is attained by subtracting the (.4 root) of the Brake Horse power (BHP) from that BHP value. For example, the BHP is 5000; the .4 of BHP root is 30 hp of friction; the Gas Hp = $BHP - BHP^{0.4} = 5000 - 30 = 4970$.

For more information:

Email: RMS@rotatingmachinery.com

Tel: 484-821-0702

Headquarters

2760 Baglyos Cir.
Bethlehem, PA 18020

Houston Office

16676 Northchase Dr., Ste 400
Houston, TX 77060

rotatingmachinery.com

Tel: 484-821-0702

Parts: rms@rotatingmachinery.com



Rotating Machinery Services, Inc. | 2760 Baglyos Circle, Bethlehem, PA 18020 | Tel: 484-821-0702