

Flexware®

Turbomachinery Engineers

A Veteran & Employee Owned Small Business

Flexware, Inc.

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Compressor Performance Web Calculator

Use the Flexware web calculator to do your compressor performance analysis. It's simple to do. Just follow the directions below. Contact Flexware® to obtain your user name and password.

FLEXWARE® TURBOMACHINERY ENGINEERS

Head, ft-lb/lb 12438/11912/ 18928/18948 pt1,pt2
Steam Flow Rate, #/hr T=128,000, R=94,300

ing Seminars, Information, Performance Analysis, Books, Gas Path Design, Inspect

Welcome to Flexware

Flexware provides consulting services, software and training for Turbomachinery along with temp services for the petrochemical and power industries worldwide.

Flexware software provides an easy and very accurate means of determining equipment efficiency for steam turbines and compressors.

Engineering services include design of aero path for compressors and steam turbines along with site efficiency analysis of equipment and aerodynamic and mechanical troubleshooting of equipment and operational problems.

On site training programs are available for compressors and steam turbines.

Temporary employees are available for technical assistance for the petrochemical and power industries including engineers, site tech/project managers, drafting and other technical personnel.

A Veteran & Employee Owned Company

Remote Monitoring (Click for more information)

Designed by [Jannco Solutions, Inc.](http://www.jannco.com)

Monitor it All From your Computer in Real Time Dakota Gasification Does

User Name
Password
Remember Me
Log in
[Forgot your password?](#)
[Forgot your username?](#)

Enter your user name and password on the Flexware® website main page, then click on "Log in".



FLEXWARE® TURBOMACHINERY ENGINEERS

Head, ft-lb/lb 12438/11912 18928/18348 pt1.pt2
 Steam Flow Rate, #/hr T=128,000, R=94,300



- Home
- Software
- Compressor Sleeve Seals
- Consulting
- Training Programs
- Books
- Employee Services
- Tech library
- Free Software
- Customers
- Offices and Distributors
- Quote Request
- SteadyTrack System

Assistance, Seals, Troubleshooting Services, Rerates & Retrofits, Performance Software

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Monitor it All From your Computer in Real Time
Dakota Gasification Does



[Log out](#)


[Calculator](#)

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[Remote Monitoring](#) (Click for more information)


Designed by [Jenno Solutions, Inc.](#)

Now click on “Calculator”



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Set Gas
Set Units
Calculate
Show Report

Inputs

Inlet Pressure	14.5	psia
Inlet Temperature	40	°F
Inlet Flow	3212	ft ³ /min
Discharge Pressure	305	psia
Discharge Temperature	312	°F
Speed	5500	RPM


Results

Work	0.0000	ft lb/lb
Head	0.0000	ft lb/lb
Polytropic Efficiency	0.0000	%
Power	0.0000	HP

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Designed by [Jenno Solutions, Inc.](#)

Click on “Set Gas” and identify the gas analysis in the compressor/



FLEXWARE® TURBOMACHINERY ENGINEERS


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 Steam Flow Rate, #/hr T=128,000, R=94,300

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Available Gases	Chosen Gases	Mol
1 Butene 56.108 C4H8 1BUE	Propane 44.083 C3H8 C3H8	1
1 Butyne 54.092 CH:CCH2:CH3 1BYN		
1 Pentene 70.135 C5H10 1PNE		
1,2 Butadiene 54.092 C4H6 12BU		
1,3 Butadiene 54.092 C4H6 C4H6		
1,4 Pentadiene 68.119 C5H8 14PD		
2 Butyne 54.092 CH3C:CCH3 2BYN		
2 Methyl 1 Butene 70.135 C5H10 2M1B		
2 Methylhexane 100.205 C7H16 2MH		
2 Methylpentane 86.178 C6H14 2MP		
2,2 Dimethylpentane 100.205 C7H16 22DP		
2,3 Dichlorobutane 127.014 C4H8Cl2 23DI		
2,3 Dimethyl Butane 86.178 C6H14 23DB		
2,4 Dimethylpentane 100.205 C7H16 24DP		
3 Ethylpentane 100.205 C7H16 3EP		
3 Methyl 1 Butene 70.135 C5H10 3M1B		
3 Methylhexane 100.205 C7H16 3MH		
3 Methylpentane 86.178 C6H14 3MP		
3,3 Dimethylpentane 100.205 C7H16 33DP		
Acetone 58.081 C3H6O ACE		
Acetonitrile 41.05 C2H3N ANTL		
Acetylene 26.038 C2H2 C2H2		
Air 28.964 N2 + O2 AIR		
Ammonia 17.031 NH3 NH3		
Argon 39.948 A A		
Benzene 78.114 C6H6 C6H6		
Carbon Dioxide 44.01 CO2 CO2		
Carbon Monoxide 28.01 CO CO		

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Highlight the gas and click on “Add” to add the gas to the list. Be sure the total mole fraction is equal to 1.00



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1,3 Butadiene 54.092 C4H6 C4H6		
1,4 Pentadiene 68.119 C5H8 14PD		
2 Butyne 54.092 CH3C:CCH3 2BYN		
2 Methyl 1 Butene 70.135 C5H10 2M1B		
2 Methylhexane 100.205 C7H16 2MH		
2 Methylpentane 86.178 C6H14 2MP		
2,2 Dimethylpentane 100.205 C7H16 22DP		
2,3 Dichlorobutane 127.014 C4H8Cl2 23DI		
2,3 Dimethyl Butane 86.178 C6H14 23DB		
2,4 Dimethylpentane 100.205 C7H16 24DP		
3 Ethylpentane 100.205 C7H16 3EP		
3 Methyl 1 Butene 70.135 C5H10 3M1B		
3 Methylhexane 100.205 C7H16 3MH		
3 Methylpentane 86.178 C6H14 3MP		
3,3 Dimethylpentane 100.205 C7H16 33DP		
Acetone 58.081 C3H6O ACE		
Acetonitrile 41.05 C2H3N ANTL		
Acetylene 26.038 C2H2 C2H2		
Air 28.964 N2 + O2 AIR		
Ammonia 17.031 NH3 NH3		
Argon 39.948 A A		
Benzene 78.114 C6H6 C6H6		
Carbon Dioxide 44.01 CO2 CO2		
Carbon Monoxide 28.01 CO CO		
Chlorine 70.906 Cl2 Cl2		
Cis 2 Butene 56.108 C4H8 C2BN		
Cyclohexane 84.162 C6H12 CYH		

Add
Remove

Back to Calculation

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Once you have all the gases selected and the total mole fraction is equal to one, click on “Back to Calculation”.

Now enter the operating conditions, pressures, temperatures, flow rate and speed.

Field Data Analysis

To help understand the field data you collect from your equipment, it is best to plot the data against the manufacturers predicted performance curves. If you do not have a Gas Flex® Excel worksheet, you can download it from the Flexware® web page at:

<http://www.flexwareinc.com>

Go to “Free Software” and click on “Excel Worksheet” or use the link below.

<http://www.flexwareinc.com/index.php/free-software/9-uncategorised/99-contact-information-work-sheet>

With this spreadsheet, you can plot data as shown attached. Select a speed line from the manufacturers curves close to the speed you normally operate and following the instructions, input 5 points into the spread sheet. Input impeller diameters if you want to plot coefficient curves. Then input the data from Gas Flex® output for the data you collected. The data will be fan law corrected for any speed for comparison to the speed line you selected from the manufacturers curve.

A. Gas Flex Excel Worksheet

Values from Manufacturer's Predicted Performance Curves

Instructions: **A)** Insert 5 data points (type over underlined values) from the compressor head and efficiency curves. Note that **point # 3 is the design point**. Use the curves for **design** speed. As in example, Point #1 is the lowest flow while point #5 is the highest. Enter values in order of increasing flow rate.

	<u>Flow</u>	<u>Rated Efficiency</u>	<u>Rated Head</u>	<u>Rated Work</u>
Point #1	<u>610</u>	<u>72.0</u>	<u>72625</u>	100868
Point #2	<u>700</u>	<u>73.5</u>	<u>72340</u>	98489
Point #3	<u>817</u>	<u>74.7</u>	<u>69867</u>	93530
Point #4	<u>950</u>	<u>73.8</u>	<u>63750</u>	86382
Point #5	<u>1040</u>	<u>70.8</u>	<u>57500</u>	81215

B) Insert the value for the **Design Speed**: 13533

C) Insert the impeller diameter(s), inches

Impeller #1	<u>#2</u>	<u>#3</u>	<u>#4</u>	<u>#5</u>	<u>#6</u>
<u>11.29</u>	<u>11.29</u>	<u>11.29</u>	<u>11.29</u>	<u>11.29</u>	<u>11.29</u>

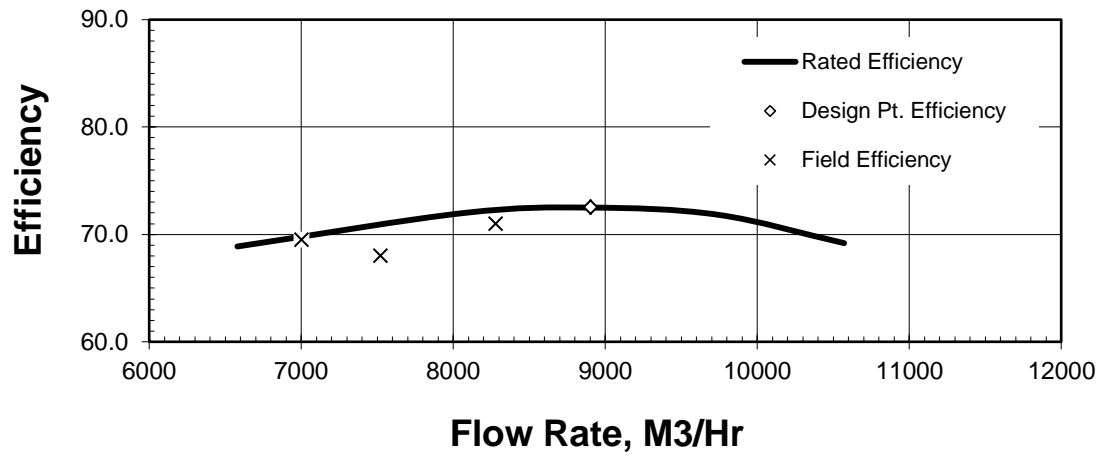
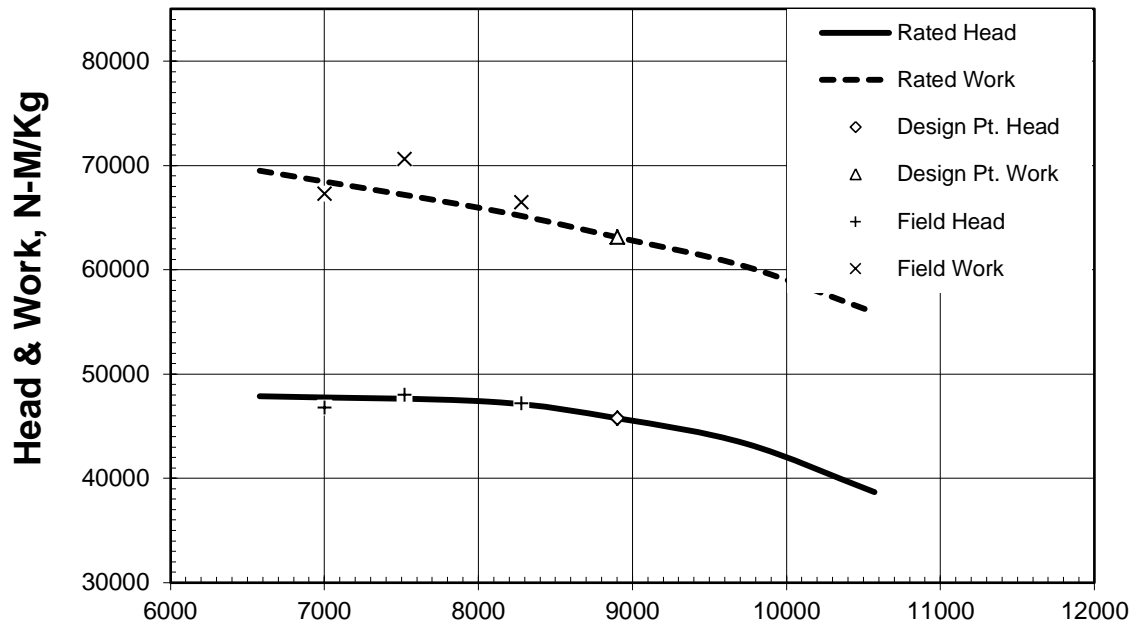
Test Data Values from Gas Flex Printout

D) Insert (Type over underlined values) test data values below

E) To print curve (chart), reset X and Y axis by clicking on the curve then on the individual axis and

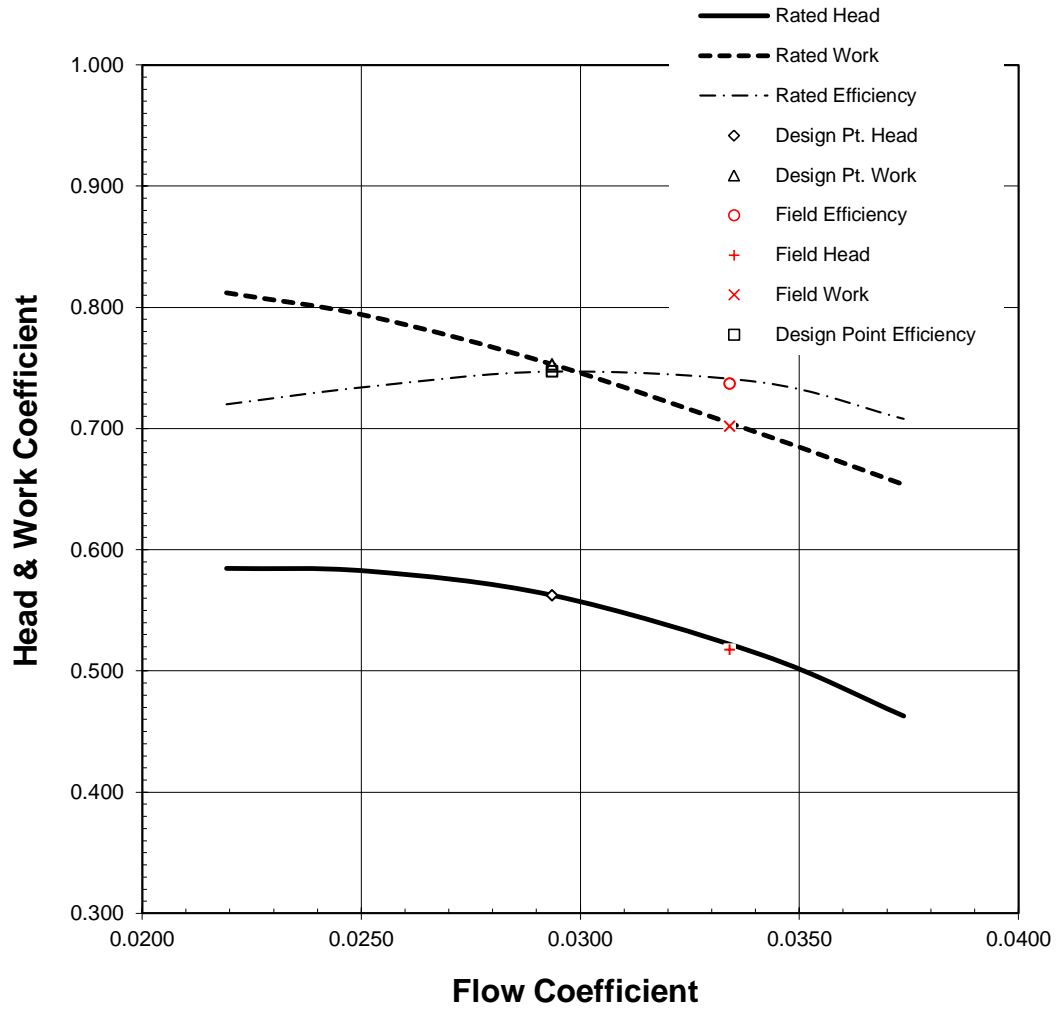
then on Scale to reset the values. Reposition the Legend as necessary by clicking on it and dragging it. Once you have reset the various elements to the appropriate settings for your data, click on the chart and then print.

	<u>Test Flow</u>	<u>Test Efficiency</u>	<u>Test Head</u>	<u>Test Speed</u>
Test Point #1	<u>820</u>	<u>73.7</u>	<u>50000</u>	<u>11938</u>
Test Point #2	<u>0</u>	<u>69.6</u>	<u>3122</u>	<u>3962</u>
Test Point #3	<u>0</u>	<u>68.7</u>	<u>3205</u>	<u>3750</u>



Data Fan Law Corrected to Design Speed

Compressor Head, Work & Efficiency



Coefficient Curve