

PetroSof

Chemical Engineering Softwares



Product Catalog 2022

Developed by Imran Aslam Sr. Process Engineer

Product of Petrosof

www.petrosof.com

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1- FRICTION FACTOR CALCULATIONS

Friction factor software calculates Moody and Fanning friction factors of the pipes. Users can select pipe material from a wide range of list of material that has been incorporated in the software.

Pipe size from 0.125 inch to 52 inch can be selected for various piping classes. Friction factor is calculated quickly based on the carefully selected equations to which the manual solution are laborious and time consuming. Software is very user friendly while errors and input limitations are cautioned in the message bar.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Input Friction Factor Equations	
Flow (gpm) 100 Colebrook Equation - 1 Specific Gravity 1 Colebrook Equation - 2 Viscosity (cp) 0.01 Colebrook Equation - 3 Viscosity (cp) 0.01 Serghide Equation Pipe Size (in) 3 Colebrook Equation Pipe Schedule 10 Colebrook Equation Pipe Material Carbon Steel Churchill and Usagi Equation Pipe Material Carbon Steel Colebrook Equation C Known Unknown Schacham's Equation	
Absolute Roughness (it) 0.00015 Calculate Exit Results Prepared by Imran Aslam Process Engineer imranaslam@potrosof.com Swamee and Jain Equation Moody Friction Factor (it) 0.017464915 0.017464915 Ok	

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2- NATURAL GAS COMPRESSIBILITY

Natural Gas Compressibility software is developed to calculate:

- Gas compressibility
- Gas viscosity
- Critical parameters

ve (05) empirical procedures are included application calculate to gas mpressibility. Four (04) models are given critical properties determination. Three 3) models are given for gas viscosity Iculation and two (02) methods are correction methods. ovided for gineers may find manual solution to ese equations very tedious and time nsuming. Having this software on your mputer can really make a difference. ers are cautioned about the limitations inputs for each set of calculations to tain the correct results.

An introductory demonstration of this software is available online at www.petrosof.com

3- EQUIVALENT LENGTH CALCULATIONS

Equivalent length calculation program is developed to estimate the total equivalent length of complete piping system including all the pipe fittings, manual block valves etc. Standard methods of calculation are adopted by using proven equations to help Engineers and Piping Designers to swiftly obtain the results. Manual calculations of various fittings in entire piping system may very cumbersome. Having this software on your computer can be handy tool.

An introductory demonstration of this software is available online at www.petrosof.com

Software is com	patible to install and run	on Windows 95-2	2000 Windows XP	Windows 7	7 and Windows 8
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4- CONTROL VALVE SIZING [LIQUID SERVICE]

A comprehensive and detailed valve sizing software has been developed with great care and efforts to help out Design Engineers to appropriately size the valve.

A wide range of fluids are included in the program to promptly solve for the physical properties. Together with valve sizing, program helps to select the valve and determines the suitability for the service by developing the valve characteristics and generates the complete valve travel and opening profile over the complete range of flow rate.

A very important aspect of this software is the valve's pressure drop determination which is often assumed or completely neglected leading to the incorrect valve size. To determine the correct pressure drop profile for the valve, a comprehensive valve pressure drop

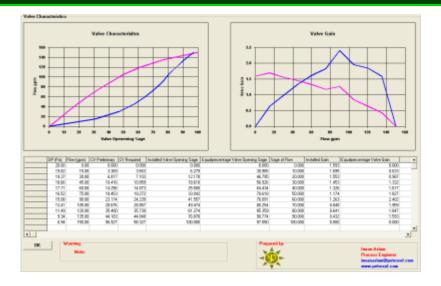
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calculation program is included in the software.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.



5- CONTROL VALVE SIZING [GAS SERVICE]

A comprehensive and detailed valve sizing software has been developed with great care and efforts to help out Design Engineers to appropriately size the valve.

A wide range of fluids are included in the program to promptly solve for the physical properties. Together with valve sizing, program helps to select the valve and determines the suitability for the service by developing the valve characteristics and generates the complete valve travel and opening profile over the complete range of flow rate.

A very important aspect of this software is the valve's pressure drop determination which is often assumed or completely neglected leading to the incorrect valve size. To determine the correct pressure drop profile for the valve, a comprehensive valve pressure drop

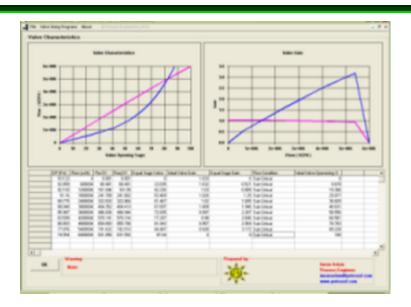
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	11.573	23.146	34.715		
Velocity in Valve Vv (PLsec)	20.414	40.828	61.242		
				Prepared by	
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calculation program is included in the software.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

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6- CONTROL VALVE [STEAM SERVICE]

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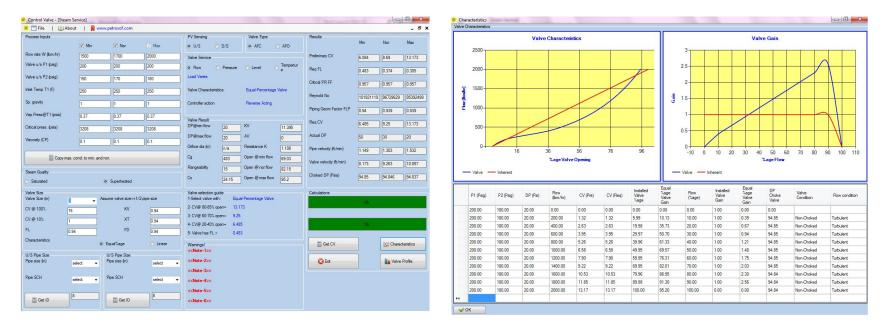
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A very important aspect of this software is the valve's pressure drop determination which is often assumed or completely neglected leading to the incorrect valve size. To determine the correct pressure drop profile for the valve, a comprehensive valve pressure drop calculation program is included in the software.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.



7- CONTROL VALVE SIZING [TWO PHASE]

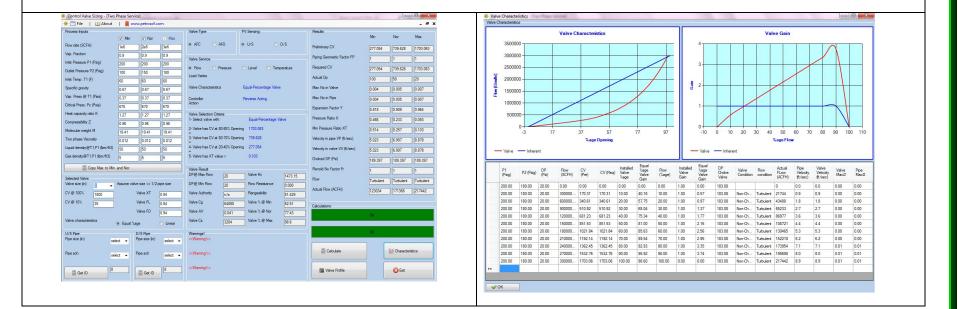
A comprehensive and detailed valve sizing software has been developed with great care and efforts to help out Design Engineers to appropriately size the valve.

A wide range of fluids are included in the program to promptly solve for the physical properties. Together with valve sizing, program helps to select the valve and determines the suitability for the service by developing the valve characteristics and generates the complete valve travel and opening profile over the complete range of flow rate.

A very important aspect of this software is the valve's pressure drop determination which is often assumed or completely neglected leading to the incorrect valve size. To determine the correct pressure drop profile for the valve, a comprehensive valve pressure drop calculation program is included in the software.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



8- CONTROL VALVE VAPOR BREAK THROUGH CALCULATION

Many times a situation arises in operation where high pressure equipment are connected to low pressure system like flare headers and level control valves on high pressure separators. Engineers have to make repetitive and laborious manual calculations to predict the situation.

This software is developed with high precision to step by step evaluate all of the above scenarios and size the restriction orifice, determine mass flow rate and calculate rise in downstream piping pressure.

A list of ANSI piping class is incorporated in the program to assist the users and minimize the inputs required. Having this smart tool on computers can be of time saving and efficient.

Users are prompted about the limitations and given direction on how to apply correct inputs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

por Break Through Calculation	۱ ——	Sunday Feb-10-2013 1	1:45:14 em
Inputs		Calculations	in a second part
Vessel Pressure P1 (Prig) Downstream Vessel Pressure P3 (Prig) Ppe Material Ppe Pressure Rating ANSI Class Drain Line Design Pressure P2 (Prig) @ 100 F Lenght of Ripe L (FT) Liquid Drain Pipe Size 000 (in) Liquid Drain Pipe Size 000 (in) Display of Vegets @ P2 (Ibm/R3) Density of Vegets @ P2 (Ibm/R3)	S81.3245 0 Carbon Steel 150 285 164 2 10 2 20 77 2.065 0.051045	Skystem Analysis Actual DP Ratio Linting DP Ratio Linting DP Ratio Actual Differential Pressure (Psig) D/S Pipe Pressure (Psig) Choked Flow, Restriction Orific Results Calculated Differential Pressure (Psig) Calculated DP Ratio Calculated DP Ratio	0.975 0.832 496.106 581.334 469.194 ee Required 471.396 0.791 109.939 0.75 0.75
Orlice Material Calculate Exit Reset Prepared by Instan Asla Process Ex	316 SS	Calculated Expansion Factor (Yeal) Expansion Factor (Difference (% age) Recommended Onlice Size (in) 12.me Bata Ratia (d/D) Coefficient of Discharge (CD) Resistance Coefficient (K) Gas Flow Rate Through Onlice (Lbm/hr) Gas Flow Rate Through Onlice (R*3/hr) Ok	0.75 0.050 % 0.457 0.229 0.6516 20.401 4601.939 24.499

9- TANK BLANKET GAS CALCULATION

http://www.petrosof.com/

Many times a situation arises in operation hiah pressure equipment are where connected to low pressure system like flare headers and level control valves on high pressure separators. Engineers have to make repetitive and laborious manual calculations to predict the situation.

This software is developed with high precision to step by step evaluate all of the above scenarios and size the orifice, vapors mass flow rate, downstream piping pressure. A list of ANSI piping class is incorporated in the program to assist the users and minimize the inputs required. Having this smart tool on computers can be of time saving and efficient.

Users are prompted about the limitations and gives direction on how to make correction in the message bar on the screen.

An introductory demonstration of this software available online is at www.petrosof.com

por Break Through Calculatio	0	Sunday Feb-10-2013 1	1:45:14 pm
nputs		Calculations	
Vessel Pressure P1 (Psig) Downstream Vessel Pressure P3 (Psig) Ppe Material Ppe Pressure Rating ANSI Class Dasin Line Design Pressure P2 (Psig) @ 100 F Lenghi of Pipe L (FT) Lenghi of Pipe L (FT) Liquid Drain Pipe Size OD (in) Liquid Drain Pipe Size OD (in) Liquid Drain Pipe Scheckule SDH <u>Giet Pipe ID</u> Molecular Weight of Vapors M Operating Temperature of Vapors T (deg F) Density of Vapors @ P1 (bm/H3) Density of Vapors @ P2 (bm/H3) Odice Material	S01.3245 0 Carbon Steel 150 205 164 2 10 2 20 77 2.065 0.051045 316 5:5	System Analysis Actual DP Ratio Linking DP Ratio Linking DP Ratio Linking Differential Pressure (Psig) Actual Differential Pressure (Psig) D/S Pipe Pressure (Psig) Chocked Flow, Restriction Orific Results Educated Differential Pressure (Psig) Calculated DP Ratio Calculated DP Ratio Calculated DP Ratio Calculated DP Ratio Calculated DP Satio Calculated DP Satio Calculated DP Satio Calculated DP Satio Calculated Expansion Factor (Yasume) Calculated Expansion Factor (Yasume) Calculated Expansion Factor (Yasume) Calculated Expansion Factor (Yasume) Recommended Onlice Size (in) <u>12 mm</u> Beta Ratio (200)	0.975 0.932 496.106 501.334 469.134 469.134 se Required 471.396 0.791 109.939 0.75 0.75 0.75 0.950 % 0.657 0.228
Coloulate Exit Reset		Coefficient of Discharge (CD.) Resistance Coefficient (K.) Gas Row Rate Through Onlice (Lbm/hr.) Gas Row Rate Through Onlice (LCm/hr.)	0.6516 20.401 4501.939 24.499

10- SQUARE EDGE FLANGE TAP ORIFICE SIZING [ISO 5167-1, ASME & API]

Flow measurement is one of the essential elements of process design and most important part in plant operation for controlling and optimizing the process.

Engineers often required sizing the orifice and specifying correct range of flow transmitter for display and control on the DCS. Sizing the orifice based on assumptions often leads to incorrect design and poorly specified transmitter which gives erratic measurement and cause poor process control.

This software is developed based on widely accepted oil and gas flow measurement standard using correct orifice sizing equation and recommended method of calculating the Reynold number. Added advantage of this software is to size the correct range of transmitter and evaluate the calibration constants. This software can also be used to validate the existing transmitter for its adequacy.

Ne Sizing Programes About		es: Design @ 2011			
lange Tap Orifice IS	N 0101-1	Monday Fieb-11-2013 12:34:	22 am		
T-og B		Transmitter Data	Input Meter Br	seding	
Site Conditions		Transmitter & Water Managemeter, C. Nercury Managemeter	Disaster an Trans	@ UpShaam C DownS	
Base Temperature TB (deg F)	50 -	······································	Priesovie indp	e uponeam e uowno	cosam
Base Pressure Pb (Psia)	14.65 *	Pressue Range Pt (Psig) 370	10 M C 1 M		
Latitude L (decrees)		Differential Pressue Range Iw [in] 50	Differential Press	ee (Sqhw) 10	
	3	Temperature Bange TI(F)	Temperature (Sq	T) 10	_
ElevationEL (FT.)	76		Pressee (Sig P)	10	_
Avg/w/ater Temperature Tw [F]	95	E-valuate Transmitter Calibration Constants		1.0	
AvgAmbient Temperature To [F	100	Bezultz	Units		
	. 1.44	Static Pressure	Pt (Psia 1	384,730000	
Pipe and OnFice Dimension		Pressue Loss PLoss	Plass (Psia)	1,316233	-
	101	Temperature	Tt (deg B)	524.670000	
Pipe Dianeter 0D (in)	8 💌	Expansion Factor	Y	0.990441	
Pipe Schedule	40 -	Velocity Approach Factor	EA.	1.033123	
Pipe Material		Super Compressibility Factor	FF-r	0.999934	
Pipe Material	Carbon Ster -	Coefficient of Discharge	CD	0.603011	
Get ID (in)	7.981	Reynold Number in Pipe	ReD	2046781.484360	
Onition Diameter of Fin 1		Reynold Number in Orifice Velocity in Pipe	Red Vpl Ft/sec)	4083878.124849 18.526221	
	4 -	Velocity in The	Vo (Fusec)	73,754653	
Orifice Material	316 55 👻	Beta Ralio	b1 b/0 1	0.501186	
Fluid Properties		Onlice Plate Thickness	in	0.250000	
	Liquid 🔅 Gas	Differential Pressure Ratio	dp./P	0.00469	
		Water Manometer Leg Connection Factor	Fam	0.999309	
Specific Gravity @ PI, TF	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	
Viscosity @ Pt. Tr(CP)	0.0102067	Local Gravitational Correction Factor	Fwl	0.998668	
Heat Capacity Ratio (CP/CV)		Local Gravitational Dead Weight Conection Factor	Fpaul	0.997339	
	1.3	Morcury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
Fluid Corprecibility @ PL, TF(2	0.997971	Mercury Manometer Temp. Correction Factor	Fhgt	1.000000	
Fluid Compressibility @ Pb. Tb()	Zb 1 0 992839	Flow Rate @ Flowing Cond. Flow Rate @ Standard Cond.	Q+ (MMCFD) Q+ (MMSCFD)	0.570900	
		Flow Rate @ Standard Cond.	Q5 (MMSCFD)	14.077800	
Fluid Compressibility (P STP (Zz	0.951308	Mass Flow Bate	Qm (Lbm/Hr)	25960.307300	_
	1	1			
Calculate Bese	t <u>E</u> xit				
Prepared by					
	n Aslan Jess Engineer				

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

11- SQUARE EDGE CORNER TAP ORIFICE SIZING [ISO 5167-1, ASME & BS 1042]

Another orifice sizing software as per ISO 5167-1 standard.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

orner Tap Orifice ISO	5167-1	Tuesday Feb/12/2013 01:14:07			
Tag #		Transmitter Data	Input Meter Re	ading	
Site Conditions Base Temperature TB (deg F)	50 *	Transmitter @ Water Manometer @ Nercury Manometer	Pressure Tap	Up Stream C Doven S	iteam
Base Pressure Pb (Psia)	14.65 *	Pressure Range PI (Psig) 370			
		Differential Pressure Range her (in) 50	Differential Precou	ne Sq.hwi 10	_
Latitude L (degrees)	3	Temperature Bange TI (F) 65	Temperature [Sq	T] 10	_
Elevation EL (FT)	76	100	Pressure (So P)	10	_
AvgWaterTemperature Tw [F]	95	Evaluate Transmitter Calibration Constants		110	
Avg Anbient Temperature Ta (F)	100	Results	Units		
	100	Static Pressure	Pf (Psia)	384.730000	
Pipe and Onifice Dimensions		Pressure Loss PLoss	Ploss [Psia]	1.316391	
		Temperature	Tf (deg R)	524.670000	
Pipe Dianeter 0D (in)	8 -	Expansion Factor	Y	0.998441	
Pipe Schedule	40 *	Velocity Approach Factor Super Compressibility Factor	EV FPv	1.033123	
Pipe Material		Coefficient of Discharge	CD	0.602785	
Pipe Material	Carbon Ster +	Reynold Number in Pipe	ReD	2028656.102394	
Get ID (in)	7.981	Reynold Number in Online	Red	4047713.125565	
Orifice Diameter d [in]	4 *	Velocity in Pipe	Vp[Ft/sec]	18.519283	
Drilice Material		Velocity in Throat	Vo [Ft/sec]	73.727031	
Unitice Material	316 55 🛛 🕶	Beta Ratio	b (b/D)	0.501186	
Fluid Properties		Onlice Plate Thickness	in	0.250000	
CU	iquid 🕫 Gas	Differential Pressure Ratio Water Manometer Leg Correction Factor	dp/P Fam	0.00469	
		Water Manometer Leg Correction Factor Water Manometer Temp. Correction Factor	Fan	0.995013	
Specific Gravity @ Pt. Tr	0.57	Local Gravitational Correction Factor	Fuel	0.333613	
Viscosity @ Pt. TI [CP]	0.0102067	Local Gravitational Dead Weight Correction Factor	Fpwl	0.997339	
Heat Capacity Ratio (CP/CV)	13	Mercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
		Mercury Manometer Temp. Correction Factor	Fhgt	1.000000	
Fluid Compressibility @ Pt. T1 [21]	10.000.001	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.570700	
Fluid Compressibility (@ Pb, Tb (2b)	0.997839	Flow Bate @ Standard Cond.	Q2 (MMSCFD)	14.072600	
Fluid Compressibility @ STP (Zo)	0.951308	Flow Rate @ Base Cond. Mass Flow Rate	Qb (MNCFD) Qn (Lbn/Hr)	14.555900 25950.585000	
	10.251200	Mass Flow Flate	Gin (Conver)	29350.585000	
<u>Calculate</u> <u>B</u> eset	Exit				
Prepared by	slam				

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

12- SQUARE EDGE RADIUS TAP ORIFICE SIZING [ISO 5167-1 & ASME]

Another orifice sizing software as per ISO 5167-1 standard.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

juuro Edge Radius Tap - (Sc		s Tap Orities 600 51 67-11]			
e StringPrograms About Help	2				-
adius Tap Orifice ISC) 5167-1				
		Tuesday Feb-12-2013 01:40:14 - Teanamilter Date			
Tog # Site Conditions		Frenomitter Diete	Input Meter F	eading	
aler Longelations Laire Temperature TB (deg F)		Transmitter 🔅 Water Manameter C Mencury Manameter	Precoure Tap	🔅 Up Steam 🔅 Down	1 Stream
	50 🔹	Pressure Barge P1 (Psig.) 370			
Lase Pressure Pb Pisia	14.65 -		Differential Para	rune (Sighwi) 10	
atitude I. Ildecrees:	3	Differential Precoure Ranger hv (in) 50			_
Sevalian EL (FT)	-	Temperature Range T/TFT gs	Temperature (S	a 1 10	
sevalari EL (FII)	76		Pressure (Sq P	10	
wgWater Temperature Tex (F)	35	Evaluate Transmitter Calibration Constants			
wpAnbient Temperature Ta (F)	100	Results	Units		
	198	Static Pressure	Pf (Psia)	384.730000	
		Pressure Loss PLoss	Plose (Paia)	1.313550	
Pipe and Orifice Dimensions		Tenperature	Tf (deg B)	524.670000	
"pe Dianeter 00 (in)	8 💌	Expansion Factor	Y	0.990441	
fice Schedule		Velocity Approvach Factor	EV	1.033123	
	40 -	Super Compressibility Factor	FPv	0.999934	
ipe Material	Carbon Ster +	Coefficient of Discharge	CD	0.606845	
Set ID (in)	7.981	Reynold Number in Pipe	ReD	2000620.344205	
	7.981	Reynold Number in Driffice	Red	4167373.836114	
Difice Diameter d [in]	4 +	Velocity in Pipe Velocity in Throat	Vp[Ft/nec]	18.644030 74.223663	
hilice Meterial	316 55 -	Reta Flatio	Vo[Ft/sec] b[b/0]	0.501106	
	1916 35 M	Dete mato Initice Plate Thickness	in I I I I I I I I I I I I I I I I I I I	0.250000	
Tuid Properties		Differential Pressure Batio	de/P	0.20000	
CL	liquid 🕫 Gas	Water Managerier Leg Correction Factor	Ean	0.999309	
		Water Manopeter Leng. Conection Factor	Feet	0.995013	
ipeolic Gravity (9 Pt. Tr	0.57	Local Gravitational Correction Factor	Fed	0.398668	
Facesity @ PI, TI CP	0.0102067	Local Gravitational Dead Weight Correction Factor	Foul	0.997339	
feet Capacity Ratio (ICP/CV)		Mercury Manometer Factor Log Correction Factor	Fhan	1.000000	
	1.3	Mercury Manameter Temp. Correction Factor	Fligt	1,000000	
Nid Compressibility (2) Pf. Tr ((2))	0.997971	Flow Rate @ Flowing Cond.	OV (MINICED)	0.574500	
luid Compremibility @ Pb, Tb Zb	1 In concession	Flow Rate @ Standard Cond.	Q: IMM SCED1	14.167400	
		Flow Rate @ Base Cond.	Q5 (MMCFD)	14.653900	
Nid Compressibility @ STP (Zs)	0.951308	Mass Flow Rate	Qm (Lbm/Hr)	26125.390600	
Colculate Reset	Exit				
	East				
Prepared by Imran a	Aslam				
Proces	a Engineer	1			
- incana	dan@petressi.com				<u> </u>
	etrosof.com	Ok			

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

13- SQUARE EDGE PIPE TAP ORIFICE SIZING [API 14.3 & API 2530]

Another orifice sizing software as per API 14.3 and API 2530 standard.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

Sking Programs About Help)			1
e Tap Orifice API 14	1.3			
		Tuesday Feb-12-2013 10:55:35		
Tag II [Transmitter Data	Input Neter Rea	iding
		Transmitter @ Water Manometer C Nercusy Manometer	Pressure Tap	🕫 Up Stream 🛛 🔿 Down Stream
ase Temperature TB (deg F)	60 -	D D D D D D D D D D D D D D D D D D D		
ace Precoure Pb [Psia]	14.73 •	Pressure Range Pf (Psig) 370	Differential Pressure	(Rehall Inc
alitude L (degrees)		Differential Pressure Range hw (in) 50	Unterential Precium	e[Sq.her] 10
aninge r. (gebieer)	3	Temperature Bange TI (F) (5	Temperature [Sq T	10
levation EL (FT)	76		Pressure (Sq.P.)	1.0
vg Water Temperature Ter (F)	last .	Evaluate Transmitter Calibration Constants	Literine [2di.]	10
	95	(m	In a	
vg Ambient Temperature Ta (F)	100	Results	Units	201 220000
		Static Pressure Pressure Loss PLoss	PI (Psia)	384.730000
ipe and Orifice Dimensions		Tenperature	Ploss (Psia)	1.749682
			Tf (deg R) Y	524.670000
ipe Diameter OD (in)	8 +	Expansion Factor Super Compressibility Factor	FPv	0.997663
ipe Schedule	40 -	Super Compressibility Factor Basic Drifice Factor	Fb	3957.050450
		Reynold Number Factor	Fr	1.000203
ipe Material	Carbon Ster +	Base Pressure Factor	FPb	1.000000
Get ID (in 1	7.981	Base Temperature Factor	FTb	1.000000
	1.001	Flowing Temperature Factor	FTE	0.995224
itilice Dianieter d [in]	4 💌	Specific Gravity Factor	For	1.324532
vilice Material	316 55 •	Drifice Flow Constant	C	5204.729730
	010 00 -	Coefficient of Discharge	CD	0.708015
luid Properties		Reynold Number in Pipe	ReD	2376887.288095
	iquid 🛞 Bac	Reynold Number in Orifice	Bed	4742527.756507
		Velocity in Pipe	Vp(Fl/sec)	21.227715
pecific Gravity @ PI, TI	0.57	Velocity in Theoat	Vo (Ft/sec)	84.509558
iscosity @ Pf, Tf [CP]	0.0102067	Beta Ratio	b [b/D]	0.501186
		Onlice Plate Thickness	in	0.250000
eat Capacity Ratio (DP/DV)	1.3	Differential Pressure Ratio	dp/P	0.00469
luid Compressibility @ Pf, TH [21]	0.997971	Water Manometer Leg Correction Factor	Fan	0.999309
of Community in the The U.S.	,	Water Manometer Temp, Correction Factor	Fait	0.995013
luid Compressibility @ Pb. Tb [2b	1	Local Gravitational Correction Factor	Ful	0.998668
luid Compressibility @ STP (Zz)	0.951308	Local Gravitational Dead Weight Correction Factor	Fpwl	0.997339
		Nercury Manometer Factor Leg Correction Factor	Fhom	1.000000
alculate Reset	Exit	Mercury Manometer Temp. Correction Factor	Fhot	1.000000
alculate Heset	Dat	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.663300
		Flow Bate @ Standard Cond.	Qz (MMSCFD)	16.357800
repared by Imran /	Lelan	Flow Rate @ Base Cond.	Qb (MMCFD)	17.157900
	s Engineer	Mass Flow Rate	Qm (Lbm/Hr)	29675.538800
	slam@petrosof.com			

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

14- CONICAL CORNER TAP ORIFICE SIZING [BS1042]

Orifice sizing program for Conical Style Corner tap orifice according to British Standard BS 1042.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

smisal Corner Tay Brilles -		2 · · · · · · · · · · · · · · · · · · ·		
	Process Engineering 20	=1		-
onical Corner Tap Ori	fice BS 1042-	Tuesday Feb-12/2013 11:47:50 (_	
Teo 🖶 🗍		Transmitter Data	i nout Meter I	licading
Site Conditions				-
Blase Temperature TB (deg F	50 •	Trenomiter 🖉 Water Manometer C Newcuy Manometer	Pressure Tap	@ Up Stream C Down Stream
Blace Pressure Pb (Poia)		Pressure Range PI (Psig) 50		
		Differential Prezzue Range Ivs [in]	Differential Pres	sure (Sig hav) 10
Latitude L (Idegrees)	3		Temperature [S	iqT) [19
Elevation EL (FT)	76		Pressure (So P	10
AvgWater Temperature Ter (F.)	95	Evaluate Transmitter Calibration Constants	i restare (a d i	
Awg Ambient Temperature Tail Fil	100	Besults	Units	
magnesses av policidade rol r i	Tinn	Static Pressure	PI (Psi-a)	64.730000
		Pressure Loss PLoss	Plazz [Paia]	0.165651
Pipe and Onlice Dimensions		Tenperature	Ti (deg R)	524.670000
PipeDiameter0D (im)	2 -	Expansion Factor	Y	0.999118
Pipe Schedule	40 -	Velocity Appro-ach Factor	EV	1.001716
		Super Compressibility Factor Coefficient of Discharge	FPv CD	0.999934
Pipe Material	Carbon Stex •	Remold Number in Pipe	ReD	15323.939056
Get ID (in)	2.067	Remold Number in Orifice	Bed	63349.743717
Drifice Diameter d (in)		Velocity in Piece	Vp[Ft/sec]	3.907964
	0.5 💽	Velocity in Threat	Ye [FMsec]	66.700162
Evilice Material	316 55 💌	Beta Flatio	b (b/D)	0.241894
Fluid Properties		Onlice Plate Thickness	in	0.125000
Fluid Properties C L	iouid 🗇 Gao	Differential Pressure Biatio	dp/P	0.00279
	iquia (* can	Water Manometer Leg Correction Factor	Fam	0.999377
Sipecific Gravity (@ Ptl. T1	0.57	Water Manometer Temp. Correction Factor Local Gravitational Correction Factor	Fet Ful	0.995013
Viscanity (P. Pl. TH CP.)	0.0102057	Local Gravitational Dead Weight Correction Factor	Fowl	0.998668
		Local Gravitational Dead Weight Correction Factor Heroury Manometer Factor Leg Correction Factor	Fhom	1.000000
Heat Capacity Ratio (CP/CV)	1.3	Mercury Manometer Farth Cog Conscion Factor	Fhat	1 00000
Fluid Compremibility (© Pl, TH (2H)	0.997971	Flow Bate @ Flowing Cond.	Qv (MHCFD)	0.008100
Fluid Compressibility (2) Pb. Tb (2b		Flow Flate @ Standard Cond.	Q: (MMISCFD)	0.033500
		Flow Rate @ Base Cond.	Q5 (HHCFD)	0.034700
Fluid Compressibility @ STP (Zs)	0.951308	Nass Flow Rate	Qe (Lbe/Hr)	61.804400
Calculate Reset	Exit			
Prepared by Income				
	s Engineer			
	stingmeer slan@petrosof.com	4		•
	chosel.com	04		

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

15- QUARTER CORNER TAP ORIFICE SIZING [BS1042]

Orifice sizing program for Quarter type Corner tap orifice according to British Standard BS 1042.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

arter Corner Tay Orifles -				
				-
iarter Corner Tap Ori	fice BS 1042			
		Tuesday Feb-12-2013 11:58:48		F
Tag # Site Constitions		Transmitter D-ata	Input Meter R	seading
site Conditions Lass Terrosatus TB (dep F)		Transmitter (= Water Manometer)C Nescus Manometer	Precoure Tep	🧭 Up Stream 🔿 Down Stream
Late Lencerature IIII (deg P (50 -	Pressure Barge P1 (Psig.)		
Lase Pressure Pb (Psia)	14.65 👻		Differential Press	and Radian I. Date
		Differential Prezouse Range her (in) 0.001		in in
	3	Temperature Range TH F [65	Temperature [S	qT) 10
Sevation EL (FT)	76	100	Pressure (Sq P	10
wgWater Temperature Tw (F)	35	Evaluate Transmitter Calibration Constants	riestore (od r.	i jiu
wo Ambient Temperature Tail Fil		Results	Units	
wg Andient Temperature Tal (F)	100	Static Pressure	Pf [Piia]	29,73000
		Pressure Loss PLoss	Plass Psia 1	0.000024
² ipe and Onlice Dimensions		Temperature	Tif deg B 1	524.670000
Spe Diapeter 0D (in)		Expansion Factor	Y	1.000000
	2 💌	Velocity Approach Factor	EV	1.029569
lipe Schedule	40 -	Super Conorcusibility Factor	FPy	0.999934
ice Material	Carbon Ster -	Coefficient of Discharge	CD	0.797263
	Carbon Ster -	Reynold Number in Pipe	ReD	12688.344982
Get ID (in)	2.067	Reynold Number in Briffice	Red	26227.049060
Dritos Diameter d f in 1		Velocity in Pipe	Vp[Ft/sec]	0.316716
	1 -	Velocity in Throat	Vo (Ft/sec)	1.353190
Drilice Material	316 55 🔹	Beta Ratio	b(b/D)	0.483789
		Onition Plate Thickness	in	0.1.25000
Fluid Properties	iquid 🕫 Gas	Differential Pressure B atio	dp/P	0.00000
	iqual (e can	Water Manometer Leg Correction Factor	Fam	1.000000
ipecific Gravity @ Pt. Tr	0.57	Water Manometer Temp. Connection Factor	Fut	1.000000
		Local Gravitational Correction Factor	Fel	1.000000
Facesity 🐵 Pt. TF (CP)	0.0102067	Local Gravitational De-ad Weight Correction Factor	Fpwl	1,000000
feat Capacity Ratio (CP/CV)	1.3	Mercury Manometer Factor Leg Correction Factor	Fhgm	1.00000
		Mercury Manameter Temp. Connection Factor	Fhgt	1.000000
Tuid Corpressibility (⊜ Pt. TF(Z))		Flow Bate @ Flowing Cond.	Qv (MMCFD)	0.000700
Ruid Compressibility (\$ Pb. Tb (2b	0.997839	Flow Rate @ Standard Cond.	Q+ (MMSCFD)	0.001700
luid Concessibility (P STP (Zz)		Flow Rate @ Base Cond.	Q5 (MINCED)	0.001700
rud compressibility (# STP (22))	0.951308	Mass Flow Bate	Qn (Lbn/Hr)	3.104100
	1	1		
Salculate <u>B</u> eset	Exit			
Presared by				
A Incen /				
	s Engineer			
ar 🚺 🚺 🛌 🛛 inn ana	dam@petrosol.com			-

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

16- ECCENTRIC CORNER TAP ORIFICE SIZING [BS1042]

Orifice sizing program for Eccentric Corner tap orifice according to British Standard BS 1042.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

Recentric Corner Top Griftes File About Help ©	Process Engineering				
Eccentric Corner Tap O	rifice BS 104	2			
		Wednesday Feb-13-2013 12:10:			
Tag #		Transmitter Data	Input Meter Re	sading	
Base Temperature TB (deg F)	50 🔹	Transmitter (# Water Manometer C Mercusy Manometer	Pressure Tap	🕫 Up Steam 🔿 Down	Sheam
Base Pressure Pb (Psia)	14.65 💌	Pressure Range Pf (Psig) 370	Differential Press	e(Sqhw) 10	_
Latitude L (degrees)	3	Differential Prezzure Range hvs [in] 50	Temperature (Sq	1.0	
Elevation EL (FT)	76	Temperature Range TF(F) 65	Pressure (Sq.P.)	10	_
Avg/Water Temperature Tw [F]	95	Evaluate Transmitter Calibration Constants 🖉		lie	
Avg Ambient Temperature Ta (F)	100	Results	Units		-
	100	Static Pressure	Pf [Psia]	384.730000	
		Pressure Loss PLoss	Ploss (Psia)	1.743443	_
Pipe and Onlice Dimensions		Temperature	Tf (deg R)	524.670000	
Pipe Dianeter 0D [in]	14 *	Expansion Factor	Y	0.998520	
	14 💌	Velocity Approach Factor	EV	1.000270	
Pipe Schedule	40 -	Super Compressibility Factor	FPv	0.999934	
Pipe Material	Carbon Ster -	Coefficient of Discharge	CD	0.742005	
		Reynold Number in Pipe	ReD	1704450.463338	
Get ID [in]	13.124	Reynold Number in Orifice	Red	11184706.282391	
Onlice Diameter d (in)	2 -	Velocity in Pipe	Vp[Ft/sec]	2.040753	
	2 •	Velocity in Throat	Vo [Ft/sec]	87.876102	
Drilice Material	304 SS 🛛 🕶	Beta Ratio	b (b/D)	0.152391	
		Onlice Plate Thickness	in	0.250000	
Fluid Properties		Differential Pressure Ratio	de/P	0.00469	
	quid 🔍 Ges	Water Manometer Leg Correction Factor	Fan	0.999309	
Specific Gravity @ Pf, Tr	-	Water Manometer Temp. Connection Factor	Fwt	0.995013	
specific crawly (2011) IT	0.57	Local Gravitational Correction Factor	Ewi	0.998668	
Viscosity @ Pt. Tr(CP)	0.0102067	Local Gravitational Dead Weight Correction Factor	Foul	0.997339	
Heat Capacity Ratio (CP/CV)		Mexcury Manometer Factor Log Correction Factor	Fhan	1.000000	
	1.3	Mexcury Manometer Temp. Conection Factor	Fhgt	1.000000	
Fluid Compressibility (8 Pt. TF (21)	0.997971	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.170000	
Fluid Compressibility (@ Pb, Tb (2b)	0.017010	Flow Rate @ Standard Cond.	Q: (MMSCFD)	4.193300	
	0.337839	Flow Rate @ Base Cond.	Q6 (MMCFD)	4.337300	
Fluid Compressibility ⊕ STP (Zs)	0.951308	Mass Flow Rate	Qm (Lbm/Hr)	7732.700700	
Calculate Beset	Exit				
Manager 1	Exit				
Prepared by Imran A	stam	1			
	Engineer	-1-1			
	lan@petrosof.com	•			•
and distant	trosof.com	0	-		100 C

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

17- ECCENTRIC FLANGE TAP ORIFICE SIZING [BS1042]

Orifice sizing program for Eccentric Flange tap orifice according to British Standard BS 1042.

Main features are as follows:

- Site condition section to define base temperature, pressure, base latitude and site elevation.
- A section to define the pipe size, schedule and material. Orifice size and material.
- A section to define fluid properties and type of fluid (liquid or gas).
- A section to define the transmitter range.
- A section to define the pipe tapping location and transmitter readings.
- A result section to display the calculated orifice sizing factor, coefficient of discharge and flow rate along with other useful parameters.
- A message bar to display the warnings and program orifice sizing limitations.

Base Temperature IB (dog F1 50 • Base Pressure Pb (Psis) 14.65 • Latitude L (dog Pc) 3 • Base Pressure Pb (Psis) 3 • Differential Pressure Range P1 (Psis) 3 • Differential Pressure Range P1 (F1) 65 • Ang Andriert Temperature Ta (F1) 100 • • Pipe and Onlice Dimensions Pressure (Sq P) 10 • Pipe Connection D0 (in) • • • • Pipe Schedule 40 • • • • Pipe Matesial Carbon Ster * Pipe • • • • Pipe Matesial 116 • <	ccentric Flange Tap O		Wednesday Feb-13-2013 12:13:4		
Base Temperature TB (deg F) 50 Transmiter © Water Manometer © Mexcup Manometer Pressure Tap © Up Stream © Down Pressure Tap © Up Stream © Differential Pressure (Sq T1) Differential Pressure (Sq P) Tomperature Tar (F) Pressure Tap or Up Stream © Down Pressure Tap or Up Stream © Down Differential Pressure (Sq T1) Tomperature Tar (F) Pressure Tap or Up Stream © Down Pressure Tap or Up Stream © Down Differential Pressure (Sq T1) Tomperature Tar (F) Pressure Tap or Up Stream © Differential Pressure (Sq T1) Tomperature Tar (F) Pressure Tap or Up Stream © Down Pressure Tap or Up Stream © Down			Transmitter Data	Input Meter R	eading
Environ LL[F1] 76 Pressure (Sq P) Pressure (Sq P) Ang Water Temperature Ta [F] 95 Evaluate Transmitter Calibration Constants Pressure (Sq P) 10 Pipe and Otifice Dimensions Pressure Cost PLoss Pf (Pin) 364.720000 Pipe Convector D1 (n) Image: Pressure Cost PLoss Pf (Pin) 1.657742 Pipe Standsde 40 Pressure Cost PLoss Pf (Pin) 1.657742 Pipe Standsde 40 Pressure Cost PLoss Pf (Pin) 1.657742 Pipe Matexial Carbon Start Expansion Factor Pf (Pin) 1.057742 Super Comparesshifty Factor Pf (Pin) 0.077313 Regnoid Number in Pipe Red 11259322.394056 Get ID (in) 2 V Pipe Starter Pipe Pipe Vp (Privec) 73.947024 Wolce University Factor Pipe Vp (Privec) 73.947024 Pipe Starter Pipe Starter Pipe Pipe Pipe Starter	Base Temperature TB (deg F) Base Pressure Pb Psia Latitude L (degrees)	14.65 •	Precure Range PI (Psig) 370 Differential Pressure Range hw (in) 50	Differential Press	ue (Sqhw)
Ang Antherit Temperature Ta { F } Toto Pipe and Onlice Dimensions Pipe Schedule				Pressure (Sq P)	10
Static Pressues Pri (Paia) 364.73000 Pipe and Onlice Dimensions Pressues Loss Plass Pless (Paia) 1.657712 Pipe Schedule 40 Pressues Loss Plass Pless (Paia) 1.657712 Pipe Schedule 40 Pless Schedule Y 0.998516 0.998516 Pipe Schedule 40 Pless Schedule Y 0.998516 0.998516 Pipe Matexial Carbon Star Expansion Factor EV 1.001578 Pipe Matexial Carbon Star Regnold Number in Onfrice Red 11259322.394056 Onfrice Dimenter of In 1 2 Velocity in Thooat V (I FL/eec) 7.9817724 Onfrice Material 316 SS Pless Refine Monostrial Pressues Refine More Nather in Onfrice Red 11259322.394056 Onfrice Material 316 SS Pless Refine Vol (FL/eec) 7.9817724 Onfrice Material 316 SS Plessee Refine More Nather in Onsolt Startize Fluid Progenties Cliquid (* Gas Startize Manometer Temp. Cencecition Factor Fean 0.993731 <td></td> <td></td> <td>Results</td> <td>Illeite</td> <td></td>			Results	Illeite	
Pipe and Online Dimensions Pressue Loss PLess Pipes (Pais) 1,657/82 Pipe Diameter OD (in) Texperature	Avg Andent Tenperature Ta (F)	100			384,730000
Pipe Diameter OD (in) Image: Comparison Factor FV 0.00000 Pipe Schedule 40 v 0.998016 0.998016 Pipe Schedule 40 v 0.998016 0.998016 Pipe Notesid Carbon Starv V 0.001978 0.998016 Get ID [in] 7.981 Coefficient of Discharge CD 0.673913 Regendel Munifer in Pipe Red 11259322.394056 0.102067 Ontice Disneter d [in] 2 v Velocity in Throat Vol [FL/sec] 5.020466 Ontice Disneter d [in] 2 v Velocity in Throat Vol [FL/sec] 5.020466 Ontice Disneter d [in] 2 v Velocity in Throat Vol [FL/sec] 7.93947024 Difice Material 316 SS v Difice Plate Thickness in 0.2500593 Difice Material 316 SS v Difice Plate Thickness in 0.250009 Difice Material 316 SS v Difice Plate Thickness in 0.250009 Discal Gaw/Mainend			Pressure Loss PLoss		
Pipe Schedule Valuative Out (H) U Valuative Out (H) U Pipe Schedule 40 Valuative Out (H) Suger Compressibility Factor IPV 0.01978 Suger Compressibility Factor IPV 0.01978 Suger Compressibility Factor IPV 0.01978 Spe Material Carbon Ster v Regmodd Number in Pipe Red 2221658, 700543 Onloc Disneter d (n) 2 v Valuative in Pipe Red 11259932, 394056 Onloc Disneter d (n) 2 v Valuative in Onloce Red 11259932, 394056 Onloc Disneter d (n) 2 v Valuative in Pipe Npt Npt 0.250053 Onloc Material 316 SS v Beta Fabio 0.250053 0.250053 Onlice Plate Thickness in 0.250050 0.250053 0.950133 Onlice Plate Thickness in 0.250050 0.950133 0.950133 Diffice Plate Thickness in 0.250050 0.950133 Velocity in Pipe Caread Gavalatinon Conscion Factor Fast	Pipe and Onlice Dimensions -		Temperature	Tf[deg B]	524.670000
Velocity Approach Factor EV 1.001378 Pipe Schedule 40 Super Compressibility Factor FIV 0.001378 Pipe Notesid Carbon Star w Ecore Compressibility Factor FIV 0.001378 Get ID [in] 7.981 Reymold Number in Pipe Red 2821658, 780543 Onice Disneter d [in] 2 Velocity in Pipe Vpl F2/sec.] 2502465 Unice Material 316 55 Weiter Manosetie I Diffice in . 0.250533 Diffice Material 316 55 Beta Ratio b [1/0 0] 0.250533 Diffice Material 316 55 Weiter Manosetie I Densuee Ratio d/P ^P 0.00465 Diffice Material 516 57 Velocity in Throat b [1/0 0] 0.250533 Diffice Plate Thicknerz in . 0.250533 0.00465 Water Manosetier Leg Correction Factor Fed 0.959313 1.2ccal Gav/Rational Decad Weight Correction Factor Fed 0.959313 Local Gav/Rational Decad Weight Correction Factor Fed 0.959313 1.2ccal Gav/Rational Decad Weight Correction Factor Fed <td< td=""><td>Pice Diaveter OD (in)</td><td></td><td>Expansion Factor</td><td>Y</td><td>0.998516</td></td<>	Pice Diaveter OD (in)		Expansion Factor	Y	0.998516
Bigen Competition of Pice		· ·			
Page robot Carbon Stati • Regredd Number in Pfpe Red 2821658 700543 Get ID (in) 7.981 7.981 Regredd Number in Diffice Red 1125932.394056 Drifee Disneter d in) 2 • Velocity in Pipe Vp (Fr/sec.) 5.020466 Unice Disneter d in) 2 • Velocity in Pipe Vp (Fr/sec.) 7.9847024 Unice Massial 316 55 • Velocity in Throat Vo (Fr/sec.) 7.9347024 Unice Massial 316 55 • Better Bation 0.07 0.250593 Defice Plate Thickness in 0.250593 0.0463 Water Manometer Leg Correction Factor Fast 0.9953019 Vecouty @ Pl. TI 0.57 User Manometer Leg Correction Factor Fast Vecouty @ Pl. TI (Pl) 0.0162067 Hear Capacity Ration Dead Weight Correction Factor Fast Vecouty @ Pl. TI (Pl) 0.0162067 Hear Capacity Ration Dead Weight Correction Factor Figet 0.995733 Hear Capacity Ratio (Crows) 1.3 Mescury Manemeter Factor Leg Correction Factor Figet	Pige Schedule	40 -		11.1	
Feet ID [in] 7.981 Regnald Number in Online Red 11259932.394056 Onloc Disneter d [in] 2 × Velocity in Theost Velocity in Theost Velocity in Theost 50.024466 Onloc Material 316 55 × Beta Ratio b [J/D] 0.250593 Fluid Properties C Liquid (G Gar Beta Ratio b [J/D] 0.250090 Daface Plate Thickness in 0.250090 0.014459 Daface Plate Thickness in 0.250090 Daface Plate Thickness free 0.990113 Daface Plate Manometer Temp. Concection Factor Fean 0.999013 Lacel Gravitational Dead Weight Concection Factor Fean 0.999013 Lacel Gravitational Concection Factor Fean 0.999731 Hod Compace/bity @ Pb,	Pipe Material	Carbon Ster +			
Unice Disneter d [n] 2 Volacity in Pipe Vp[FL/sec] 5 020466 Unice Material 316 55 V Volacity in Pipe Vp [FL/sec] 5 020466 Unice Material 316 55 V Bit Control (IIII) Vp [FL/sec] 5 020466 Fluid Properties Liquid (F Gas IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	East ID (in 1)	7.001			
Velocity in Throat Vo (Fr/vec) 79,947824 Difice Material 316 55 • 0 0 0 0.250533 Fluid Properties Liquid © East Velocity in Throat b (LVD) 0.250533 Specific Gravity @ Pl, T1 0.57 Using Management Differential Pressue Ratio dp/P 0.00469 Vacority @ Pl, T1 0.57 Using Management East Management Temp. Correction Factor Fam 0.993019 Vacority @ Pl, T1 0.0102067 Heat Capabily Ratio (CP/CV) 1.3 Mercury Managemeter Temp. Correction Factor Fem 0.993039 Heat Capabily Ratio (CP/CV) 1.3 Mercury Managemeter Temp. Correction Factor Fed 0.993039 Fluid Comparatibility @ Pl, T1(2) 0.937371 Fluid Comparatibility @ Pl, T1(2) 0.937371 Fluid Comparatibility @ Pl, T1(2) 0.937371 Fluid Comparatibility @ S1F(2a) 0.937371 Fluid Comparatibility @ S1F(2a) 0.93739 Hait @ Comparatibility @ S1F(2a) 0.937300 Marcer Water Temp. Correction Factor Fluid 0.000000 Fluid Comparatibility @ S1F(2a) 0.937391 </td <td></td> <td></td> <td></td> <td></td> <td></td>					
Diffice Material 316 \$\$ Bets Failin b { b/D } 0.250050 Fluid Progenties Diffice Plate Thickness in 0.250000 0.250000 Specific Gravity @ Pl, TI 0.57 0.0002067 Fean 0.939309 Vacosity @ Pl, TI 0.57 0.0002067 Fean 0.939309 Heat Capssity Ratio (CP/CV) 1.3 Cacel Gravitational Connection Factor Fean 0.939309 Fluid Compactability @ Pl, TI (2) 0.9397371 Foor Flate @ Flowing Cond. Fey 0.939309 Fluid Compactability @ Pb, TI (2) 0.9397371 Flow Flate @ Flowing Cond. Qir (MMSCPD) 0.3154700 Flow Flate @ Flowing Cond. Qir (MMSCPD) 0.3155000 Mass Flow Rate Qir (Lbm/Hr) 3.946000 Flow Flate @ Standard Cond. Qir (Lbm/Hr) 3.946000 Plow Flate @ Standard Cond. Qir (Lbm/Hr) 3.946000	Drifice Diameter d [in]	2 *			110000
Diffice Plate Thickness in 0.25000 Diffice Plate Thickness in 0.25000 Differential Prossue Ratio dp/P 0.00463 Specific Gravity @ Pl. 11 0.57 0.57 Viscosity @ Pl. 11 0.57 0.0012067 Hext Capacity Ratio (CP/CV) 1.3 0.00000 PLid Comparison (CP/CV) 1.3 Mescury Manemeter Temp. Correction Factor Fiel Plate Capacity Ratio (CP/CV) 1.3 Mescury Manemeter Temp. Correction Factor Figst 0.939039 Plate Capacity Ratio (CP/CV) 1.3 Mescury Manemeter Temp. Correction Factor Figst 0.00000 Plate Capacity Ratio (CP/CV) 1.3 Mescury Manemeter Temp. Correction Factor Figst 0.00000 Plate Comparison Dead Weight Correction Factor Figst 1.000000 Mescury Manemeter Temp. Correction Factor Figst 1.000000 Plate Comparison Dead Weight Correction Factor Figst 1.000000 Mescury Manemeter Temp. Correction Factor Figst 1.000000 Plate Comparison Dead Weight Correction Factor Figst 1.000000 Mescury Manemeter Temp. Correction Factor	Drifice Material	316.55			
Fluid Properties Liquid Fluid End Differential Pressue Ratio dp/P 0.00453 Specific Gravity @ Pl, T1 0.57 Water Manometer Log Correction Factor Fam 0.993016 Vacority @ Pl, T1 0.57 Local Gravitational Correction Factor Fem 0.993068 Local Gravitational Correction Factor Fed 0.993068 0.993036 Local Gravitational Correction Factor Fed 0.993036 0.990036 Hoir Carponentibly @ Ph, Th (2r) 0.997371 Flow Rate @ Flowing Cond. Qr (MMCFD) 0.154700 Flow Rate @ Flowing Cond. Qr (MMCFD) 0.957300 3.945000 Rate @ Flowing Cond. Qi (LMNCFD) 3.945000 0.957047 Flad Compensibility @ SF1 (Zi 1) 0.951300 Wass Flow Rate <td></td> <td>10000</td> <td></td> <td></td> <td></td>		10000			
Useral Film 0.999309 Specific Gravity @ Pl, T1 0.57 Connection Factor Fwt 0.999309 Viscosity @ Pl, T1 0.57 Connection Factor Fwt 0.999309 Viscosity @ Pl, T1 0.0102067 Exact Connection Factor Fwt 0.999309 Hest Capacity Ratio (CP/CV) 1.3 Connection Factor Fwt 0.9997371 Had Compsensibility @ Pl, T1(27) 0.997971 0.997971 0.000000 Mencury Maneseter Factor Leg Connection Factor Flight 1.000000 Had Compsensibility @ Pl, T1(22) 0.997971 0.997971 0.997973 1.000000 Had Compsensibility @ Pl, T1(22) 0.9979739 Flow Rate @ Flowing Cond. Qv (MMCFD) 0.154700 Fluid Compsensibility @ Pl, T1(23) 0.997839 Flow Rate @ Flowing Cond. Qv (MMCFD) 3.015000 Fluid Compsensibility @ S17(23) 0.997839 Generation Rate @ Generation Rate Qin (Linu/HCFD) 3.946000 Fluid Compsensibility @ S17(23) 0.951300 Mass Flow Rate Qin (Linu/HCFD) 3.946000					
Local Gravitational Correction Factor Fwl 0.998668 Viscosity @ Pt. T1 (D*) 0.0102067 Local Gravitational Dead Weight Correction Factor Fyel 0.993739 Hext Capacity Ratio (CP/CV) 1.3 Hexcury Managenetic Factor Leg Correction Factor Fyel 0.997371 Fuid Comparability @ Pt. T1 (27) 0.997971 0.997971 Flow Rate @ Flowing Cond. Qr (MMSCPD) 0.154700 Flow Rate @ Flowing Cond. 0.9 (MMSCPD) 0.154700 1.000000 1.954700 Flow Rate @ Flowing Cond. 0.9 (MMSCPD) 0.154700 1.954700 1.000000 Flow Rate @ Flowing Cond. 0.9 (MMSCPD) 0.154700 1.05000 1.05000 Flow Rate @ Standard Cond. 0.9 (MMSCPD) 3.946000 1.05000 1.05000 Flow Rate @ Standard Cond. 0.9 (LMMSCPD) 3.946000 1.05000 1.05000 Flow Rate @ Standard Cond. 0.9 (LMMSCPD) 3.946000 1.05000 1.05000	C Li	quid 🖲 Gac		Fan	0.999309
Uscosity @ Pl, T(1 CP 1 0.0102067 Local Gravitational Connection Factor Fed 0.939058 Host Capacity Ratio (CP/CV) 1.3 Mercury Maneseter Factor Leg Connection Factor Figet 0.997339 Host Capacity Ratio (CP/CV) 1.3 Mercury Maneseter Factor Leg Connection Factor Figet 0.00000 Fluid Compressibility @ Pf, T(12) 0.97971 Rescury Maneseter Temp. Connection Factor Fluid 1.000000 Fluid Compressibility @ Pr, T(12) 0.957971 Fluid Engressibility @ STP(Zs1) 0.957309 Non Rate @ Fluid Cond. 0.x [MMCFD) 0.154700 Fluid Compressibility @ STP(Zs1) 0.951300 Mars Fluid Rate Qm [Linu/Hr] 7035.047900	Specific Gravity (9 Pl. T)	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013
Hest Capacity Ratio (CP/CV) 1.3 Mescury Maneseter Teston Leg Conection Factor Figs 0.000000 Fluid Congescribitity @ Pf, 11(2) 0.397371 Rescury Maneseter Teston Leg Conection Factor Fluid 0.000000 Fluid Congescribitity @ Pf, 11(2) 0.397371 Rescury Maneseter Teston Leg Conection Factor Fluid 0.000000 Fluid Congescribitity @ Pf, 11(2) 0.397371 Risk @ Flowing Cond. 0.v [MMCFD) 0.155700 Fluid Congescribitity @ STP [Zs1] 0.951300 Risk @ Flowing Cond. 0.s [MMCFD] 3.015000 Hass Flow Rate Qm (Lbm/Hr) 7035.047900 205.047900 205.047900					0.998668
Hesc Comparability @ Pr. Tr[22] 0.997971 T.3 Hesc cury Management Temp. Correction Factor Fligt 1.000000 Fluid Comparability @ Pr. Tr[22] 0.997971 0.977971 0.977971 0.977971 0.977971 0.977971 0.977971 0.977971 0.9154700 0.154700 0.154700 0.154700 0.154700 0.97839 0.97839 0.97839 0.97839 0.97839 0.97839 0.97839 0.978300 0.97839	Viscosity @ Pt, Tr [DP]	0.0102067			
Miscury Maneneter Tengo Physic 1.000000 Flad Compensibility @ Ph. Th [2h] 0.997971 Flow Rate @ Flowing Cond. 0x [MMCFD) 0.154700 Flad Compensibility @ Ph. Th [2h] 0.997839 Flow Rate @ Standard Cond. 0x [MMCFD] 3.015010 Flow Rate @ Standard Cond. 0b [MMCFD] 3.946000 Mass Flow Rate 0m [Lbm/Hr] 7035.047900	Heat Capacity Ratio (CP/CV)	1.3			
Fluid Compressibility @ Pb. (b 2b) 0.957839 Fluid Compressibility @ STP (Zs) 0.957839 Fluid Compressibility @ STP (Zs) 0.957300 Fluid Compressibility @ STP (Zs) 0.957300 Automatic State Qm (Lbm/Hr) 3.955000	Floid Commercibility (9) Pf. 7(1721)	0.007071			
Flow Rate Opt MICED [3.946000 Fluid Compressibility @ STP [Zs] 0.951300 Mass Flow Rate Qm [Lbm/Hr] 7035.047900		,			
Mass Flow Rate Om (Llow/Hr) 7035.047900	Fluid Compressibility @ Pb. Tb (2b)	0.997839			
	Fluid Compressibility @ STP (Zs)	0.951300			
Presered by	Calculate Reset	Exit			

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

18- RESTRICTION ORIFICE SIZING [ISO 5167-1]

A restriction orifice software is exclusively developed to determine the correct size the orifice required to restrict the high pressure flow downstream of a blow down valve on flare headers, pump's minimum circulations lines and downstream of a level control valve to mitigate the vapor breakthrough and many other similar operations requirements. Sizing method selected is based on ISO 5167-1 flow measurement standard for its wide applicability and accuracy.

Program is design such that it completes the calculation steps while highlighting the choked flow condition, correct range of pipe and orifice size and pressure drop limitations.

Flow transmitters are not commonly installed on restriction orifices although, program have the flexibility to size the flow transmitter which is sometimes required in critical operation. Having this software on computer can really make the calculations just a click away.

estriction Orifice ISC	0 5167-1	Wednesday Feb-13-2013 12	22.25		
Tag #		Transmitter Data	Input Meter R	entino	
Site Conditions	1				
Bace Temperature TB (dep F)	50 -	Transmitter (* Water Manometer C Mercury Manometer	Pressure Tap	🕫 Up Stream 🔿 Down Str	ean
		Pressure Range Pt [Psig] 370			
Base Pressure Pb [Psia]	14.65 💌	310	Differential Press	ue(Sahw) 10	-
Latitude L (degrees)	3	Differential Pressure Range hw (in) 50			_
		Temperature Range Tri (F) 65	Temperature (S	aT) 10	
Elevation EL (FT)	76		Pressure (Sq P)	10	-
Avg Water Temperature Tw [F]	95	Evaluate Transmitter Calibration Constants 🛛 🖓			
AvgAnbient Temperature Ta (F)	100	Bezultz	Units		_
		Static Pressure	Pf (Psis)	384,730000	_
Pipe and Onlice Dimensions		Pressure Loss PLoss	Ploss [Psia]	1.678457	-
Pipe and Unifice Dimensions		Temperature	Tf (deg B)	524.670000	
Pipe Diameter 0.D (in)	2 -	Expansion Factor	Y	0.998516	
Pice Schedule		Velocity Approach Factor	EV	1.001716	
Pipe schedue	40 💌	Super Compressibility Factor	FPv	0.999934	
Pipe Material	Carbon Ster +	Coefficient of Discharge	CD	0.617875	
Get ID (in)	1.657	Reynold Number in Pipe	BeD	687916.341845	
	2.067	Reynold Number in Drifice	Red	2843872.179101	
Drilice Diameter d [in]	0.5 +	Velocity in Pipe	Vp[Ft/sec]	4.287866	
Drilice Material		Velocity in Throat	Vo [Ft/sec]	73.280778	
	304 SS 💽	Beta Ratio	b [b/D]	0.241894	
Fluid Properties		Onlice Plate Thickness	in	0.125000	
	Liquid 🕫 Gas	Differential Pressure Ratio	dp/P	0.00469	
		Water Manometer Log Correction Factor	Fam	0.999309	
Specific Gravity @ Pt. TF	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	
Viscosity @ Pt. Tf (CP)	0.0102067	Local Gravitational Correction Factor	Fed	0.998668	
		Local Gravitational Dead Weight Correction Factor	Epwl	0.997339	
Heat Capacity Ratio (DP/DV)	1.3	Mercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
Fluid Compressibility @ Pl. TH [2]	0.997971	Mercury Manometer Temp. Correction Factor	Fhgt	1.000000	
		Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.008900	
Fluid Compressibility @ Pb, Tb (Z	b] 0.997839	Flow Rate @ Standard Cond.	Qs (MMSCFD)	0.218600	
Fluid Compressibility @ STP (Zz)	0.951308	Flow Rate @ Base Cond.	Qb (MMCFD)	0.226100	
	10.001.000	Mass Flow Rate	Qm (Lbm/Hr)	403.023600	
Calculate Beset	Exit				
Propared by					_
	Aslan ss Engineer	•			+

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

19- ISA 1932 NOZZLE SIZING [ISO 5167-1]

ISA 1932 Nozzles is a differential pressure flow measuring devices. Nozzle sizing software is developed with great precision according to ISO standard recommended procedure. Program is very users friendly and main interface is kept same as of the orifice sizing software. Program calculates mass flow rate and volumetric flow at standard conditions, flowing conditions and local base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

lozzle - [ISA 1932 Nozzle] Nie About Help	@ Process Engineering	2011				. 0
A 1932 Nozzle ISO	5167-1				Nozzle Profile	
		Wednesday Feb-13-2013 01:			100100002200001000	R1 0.80 in
Tag #		Transmitter Data	Input Meter Re	rading		
Site Conditions		Transmitter @ Water Manometer C Mercury Manometer				R2 1.33 in
Base Temperature TB (deg F)	50 -		Differential Press	re(Sqhw) 10	211112	an 1.22 in
lace Precoure Pb (Poia)	14.65 •	Pressure Range PI [Psig] 370	Temperature (So	T) 10	97 M1	
		Differential Pressure Range frei (in) 50		10	A	bn 1.20 in
atitude L (degrees)	3		Pressure [Sq P]	10	- Allannon	L 2.42 in
levation EL (FT)	76	Temperature Range TF(F) 65			8	14.46.00
		Evaluate Transmitter Calibration Constants			C C F	
wgWaterTemperature Tw (F)	95					
vgAmbientTemperatureTa(F)	100	Results	Units		-	
	1.00	Static Pressure	Pf (Psia)	384,730000		
Pipe and Orifice Dimensions		Pressure Loss PLoss	Ploss [Psia]	1.074826	Note (1)	
ripe and Unlice Dimensions		Temperature	Tf (deg B)	524.670000	Direction of flow	
(pe Diameter OD (in)	8 •	Expansion Factor	Y	0.997049		
ipe Schedule		Velocity Approach Factor	EV	1.033125		
ipe schedule	40 -	Super Compressibility Factor	FPy	0.999934		
ipe Material	Carbon Ster +	Coefficient of Discharge	CD	0.976616		
Get ID (in)		Reynold Number in Pipe	BeD	3287462.957190	and a second sec	
decid (in)	7.981	Reynold Number in Orifice	Red	6559310.465334		
hiñce Diameterd (in)	4 -	Velocity in Pipe	Vp[Ft/sec]	29.963198		
Irifice Material	316 55 +	Velocity in Throat	Vo [Ft/sec]	119.284168		
nace marena	316 55 💌	Beta Ratio	b [b/D]	0.501190		
luid Properties		Differential Pressure Ratio	dp/P	0.99531		
	Liquid (* Gas	Water Manometer Leg Correction Factor	Fam	0.999309		
		Water Manometer Temp. Correction Factor	Fwt	0.995013		
pecific Gravity @ Pf, Tf	0.57	Local Gravitational Correction Factor	Fwl	0.998668		
iscosily @ Pf, Tf (CP)	0.0102067	Local Gravitational Dead Weight Correction Factor	Fpwl	0.997339		
		Mercury Manometer Factor Leg Correction Factor	Fhgm	1.00000		
ieat Capacity Ratio (CP/CV)	1.3	Mercury Manometer Temp. Correction Factor	Fhgt	1.000000		
luid Compressibility @ PI, TI (ZI)	0.997971	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.923300		
	,	Flow Rate @ Standard Cond.	Qs (MMSCFD)	22.769500		
luid Compressibility @ Pb, Tb (2b	0.997839	Flow Rate @ Base Cond.	Qb (MMCFD)	23.551500		
kuid Compreccibi¥y @ STP (Z≭)	0.951308	Mass Flow Rate	Qm (Lbm/Hr)	41988.205500		
	1		1			
alculate <u>B</u> eset	Exit					
Prepared by Iniran	Aslam			-		
Proces	is Engineer	4				
	slan@petrosof.com			_		
	etiosof.com	Ok				

20- LONG RADIUS HIGH BETA RATIO NOZZLE SIZING [ASME & ISO 5167-1]

Software is developed with great accuracy according to ASME & ISO 5167-1standard procedure for liquid and gas measurement. Program is very users friendly and main interface is kept same as of the other nozzle sizing software. Program calculates mass flow rate and volumetric flow at standard conditions, flowing conditions and local base conditions. Nozzle dimensions are also displayed on the screen for ready reference. Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

le Sizing Programs About Help)				-
ong Radius High Beta		ASME			Nozzle Profile
ing radius riigh boa	i nano nozzio	Wednesday Feb-13-2013 11:	41:02 pm		NOLLIO FTONIO
Tag #		Transmitter Data	Input Meter Re	ading	Date Real
Site Conditions		Transmitter @ Water Manometer C Mercury Manometer			2.01 in 1.80 in
Base Temperature TB (deg F)	50 👻		Differential Pressu	e(Sqhw) 10	
Base Pressure Pb (Psia)		Pressure Range PI (Psig) 370	Temperature (Sg	T) 10	
,		Differential Pressure Bange hw (in) 50			
Latitude L (degrees)	3		Pressure (Sq.P.)	10	0.51 in
Elevation EL (FT)	76	Temperature Range Tř (F) 65			
	1.0	Evaluate Transmitter Calibration Constants			A Summing
Avg Water Temperature Tw [F]	95				1 100000 1
Avg Ambient Temperature Ta (F)	100	Besults	Units		3.0mm
	1	Static Pressure	Pf [Psia]	384,730000	1.80 in = Lenght
Pipe and Online Dimensions		Pressure Loss PLoss	Ploss [Psia]	2.490067	
Pipe and Unitice Dimensions		Temperature	Tf (deg B)	524.670000	3.00 in Direction @
Pipe Diameter 0D [in]	4 -	Expansion Factor	Y	0.995693	A offlow
Pipe Schedule		Velocity Approach Factor	EV	1,202388	1
Pipe schedule	40 💌	Super Compressibility Factor	FPv	0.999934	1 1 mm
Pipe Material	316 55 🛛 🕶	Coefficient of Discharge	CD	0.994048	
Get ID (in)	4.026	Beynold Number in Pipe	ReD	4351394.523830	
		Reynold Number in Orifice	Red	5839571.450980	
Onifice Diameter d (in)	3 -	Velocity in Pipe	Vp(Ft/sec)	78.354176	
Onitice Material	316 55 🔹	Velocity in Throat	Vo (Ft/sec)	141.113050	060 m
	1910 33	Beta Ratio	b[b/D]	0.745156	
Fluid Properties		Nozzle Thickness	nn	3.000000	I
	iquid 🛞 Gas	Differential Pressure Ratio	dp/P	0.99531	P
		Water Manometer Leg Correction Factor	Fan	0.999309	
Specific Gravity @ Pt, Tr	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	
Viscosity (0 Pf, Tf (CP)	0.0102067	Local Gravitational Correction Factor	Feel	0.998668	
Heat Capacity Ratio (CP/CV)		Local Gravitational Dead Weight Correction Factor	Fpwl	0.997339	
	1.3	Nercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
Fluid Compressibility @ PI, TI (21)	0.997971	Nercury Manometer Temp. Correction Factor	Fhgt	1.000000	
Fluid Compressibility @ Pb, Tb (2b	0.007030	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.614400	
		Flow Rate @ Standard Cond.	Q = (MMSCFD)	15.151700	
Fluid Compressibility @ STP (Zs)	0.951308	Flow Rate @ Base Cond.	Qb (MMCFD)	15.672100 27940.502600	
		Mass Flow Rate	Qm (Lbm/Hr)	27940.902600	
Calculate Reset	Exit				
	Ent				
Prepared by Incan /	Aslam			•	
	s Engineer	•		•	
	slam@petrosof.com				
	etrosol.com	01	k l		

21- LONG RADIUS LOW BETA RATIO NOZZLE SIZING [ISO 5167-1]

Software is developed with great accuracy according to ISO standard recommended procedure. Program is very users friendly and main interface is kept same as of the other nozzle sizing software. Program calculates mass flow rate and volumetric flow at standard conditions, flowing conditions and local base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Sizing Programs About Help		scess Engineering 2011			-
ng Radius Low Beta	Ratio Nozzle	ISO 5167-1 Wednesday Feb-13-2013 11	45:35 on		Nozzle Profile
Tag #		Transmitter Data	Input Meter Re	ation	
ite Conditions			ingen recent in		1.00 in 0.60 in
ate Temperature TB (deg F)	50 -	Transmitter @ Water Manometer @ Manometer	Differential Pressu	re(Sqhw) 10	
		Pressure Range PI (Psig.) 370		10	
ate Pressure Pb (Psia)	14.5 💌	010	Temperature Sq	T) 10	
aitude L (degrees)	3	Differential Pressure Range hw (in) 50	Pressure (Sq.P.)	10	
6 - P. (PT.)	1-	Temperature Range Tř (F) 65			
evation EL (FT)	76				1.33 in
vg Water Temperature Tim (F)	95	Evaluate Transmitter Calibration Constants			. i / i*†
g Ambient Temperature Ta (F)		1	1		
granuerix remperature TallF1	100	Besults	Units	-	3.0 mm , 1.17 m
		Static Pressure	Pf [Psia]	384.730000	4
ipe and Orifice Dimensions		Pressure Loss PLoss	Ploss (Psia)	1.458913	1.001
pe Dianeter 0D (in)		Temperature	Tf (deg R)	524.670000	1.00 in Direction B
	3 🔹	Expansion Factor	Y	0.997250	of flow
ipe Schedule	40 -	Velocity Approach Factor	EV	1.005692	1 innin
pe Material	316 55 -	Super Compressibility Factor	FPv	0.999934	C
	316 SS 🔹	Coefficient of Discharge	CD	0.991384	Oliver
Get ID (in)	3.068	Reynold Number in Pipe	ReD	530940.359941	6
niice Diameter d (in)	1 -	Reynold Number in Orifice	Red	1628925.024299	
		Velocity in Pipe	Vp(Ft/sec)	12.525971	
ifice Material	316 55 🔹	Velocity in Throat Beta Ratio	Vo (Ft/zec)	117.902253	
		Nozzle Thickness	b [b/D]	0.325945	
luid Properties		Differential Pressure Ratio	nn	3.000000	
	iquid 🛈 Gas	Water Manometer Leg Correction Factor	dp/P Fan	0.999309	
peolific Gravity @ Pf, Tr	0.57	Water Manometer Leg Correction Factor Water Manometer Temp. Correction Factor	Fan	0.995013	
		Local Gravitational Correction Factor	Fut	0.399668	
scosiły @ Pf, Tř (CP)	0.0102067	Local Gravitational Dead Weight Correction Factor	Ford	0.997339	
eal Capacity Ratio (CP/CV)	1.3	Nercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
	1	Hercury Hanometer Factor Leg Correction Factor Hercury Manometer Temp. Correction Factor	Fhgt	1.000000	
uid Compressibility @ Pf, Tf (Zf)	,	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.057600	
uid Compressibility @ Pb, Tb (Zb	0.997839	Flow Rate @ Standard Cond.	Q= (MMSCFD)	1.421200	
		Flow Rate @ Base Cond.	Qb (MMCFD)	1.485200	
uid Compressibility @ STP (Zs)	0.951308	Mass Flow Rate	Qn (Lbn/Hr)	2593.601000	
alculate <u>R</u> eset	Exit				
repared by					
A linean /		at 1			
	s Engineer			•	
4 🔛 🦭 🕨 🛛 inirana	clam@petrozof.com	0	-		

22- LONG RADIUS LOW BETA RATIO NOZZLE SIZING [ASME]

Software is developed with great accuracy according to ASME standard recommended procedure. Program is very users friendly and main interface is kept same as of the other nozzle sizing software. Program calculates mass flow rate and volumetric flow at standard conditions, flowing conditions and local base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

i Formi - Long Redius Lov s Sking Programs About Help		al poess Engineering 2001			-
ng Radius Low Beta					Nozzle Profile
ing maands con bona	THEIR HOLLIG	Wednesday Feb-13-2013 11	:47:47 pm		
Tag #		Transmitter Data	Input Meter Re	ading	and a second second
Site Conditions		Transmitter @ Water Manometer @ Marcusy Manometer			2.01 in 0.60 in
Base Temperature TB (deg F)	50 •	Hansmittel (* Water Manometer (* Mercuty Manometer	Differential Pressu	e(Sqhw) 10	- 1- 1
Bate Pressure Pb (Psia)	14 000	Pressure Range PI (Psig) 370	Temperature Sq.	T) 10	
,	14.696 💌	Differential Pressure Bange hw (in) 50			
atitude L (degrees)	3	100	Pressure (Sq.P.)	10	
Elevation EL (FT)	76	Temperature Range Tf (F) 65			1.51 m
	1.0	Evaluate Transmitter Calibration Constants			
wg Water Temperature Tim [F]	95				
Avg Ambient Temperature Ta (F)	100	Besults	Units		30m
	1100	Static Pressure	Pf (Psia)	384.730000	
		Pressure Loss PLoss	Ploss (Psia)	1.820570	
Pipe and Orifice Dimensions		Temperature	Tf (deg B)	524.670000	1.00 in
Pipe Diameter BD (in)	4 -	Expansion Factor	Y V	0.997277	A Direction B
		Velocity Approach Factor	EV	1.001909	offlow (
Pipe Schedule	40 👻	Super Compressibility Factor	FPv	0.999934	
Pipe Material	316 55 +	Coefficient of Discharge	00	0.991374	XUIIIII-C
		Beynold Number in Pipe	BeD	403110.558425	
Get ID (in)	4.026	Reynold Number in Orifice	Red	1622923.108217	
Drifice Diameterd (in)	1 -	Velocity in Pipe	Vp[Ft/sec]	7.246425	
Drifice Material		Velocity in Throat	Vo (Ft/zec)	117.454956	
Annoe Macenia	316 55 💌	Beta Ratio	b [b/D]	0.248385	
Fluid Properties		Nozzle Thickness	00	3.000000	
	iquid 🕫 Gas	Differential Pressure Batio	dp/P	0.99531	0.60 in
		Water Manometer Leg Correction Factor	Fan	0.999309	-> H +
specific Gravity @ Pt, Tr	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	
/iscosity @ Pf. Tr (CP)	0.0102067	Local Gravitational Correction Factor	Feel	0.998668	
		Local Gravitational Dead Weight Correction Factor	Epwl	0.997339	
leat Capacity Ratio [CP/CV]	1.3	Mercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
Ruid Compressibility @ PI, TI (ZF)	0.997971	Mercury Manometer Temp. Correction Factor	Fhgt	1.000000	
	,	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.056600	
Fluid Compressibility @ Pb, Tb (Zb	0.997839	Flow Rate @ Standard Cond.	Q = (MMSCFD)	1.396900	
Fuid Compressibility @ STP (Zs)	0.951308	Flow Rate @ Base Cond.	Qb (MMCFD)	1.440300	
	0.301300	Mass Flow Rate	Qm (Lbm/Hr)	2584.020000	
Calculate Beset	Evit				
	Exit]			
Prepared by Imran	Aslam			-	
	s Engineer	•		•	
	ilan@petrozof.com				
	etrosof.com	0	4		

23- VENTURI NOZZLE SIZING [ISO 5167-1]

Software is developed with great accuracy according to ISO standard procedure for liquid and gas measurement. Program is very users friendly and main interface is kept same as of the other nozzle sizing software. Program calculates mass flow rate and volumetric flow at standard conditions, flowing conditions and local base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

le About Help (D Process Engineering 2	013			-
enturi Nozzle ISO 51	67-1				Nozzle Profile
onidii norrio 100 on		Wednesday Feb-13-2013 11	:53:52 pm		NOZZIE FIOINE
Tag #		Transmitter Data	Input Meter Rea	đing	40
Site Conditions		Transmitter @ Water Manometer C Mercury Manometer			P2 1 1 1 2
Bace Temperature TB (deg F)	50 -		Differential Pressure	(Sqhw) 10	1 A A A A A A A A A A A A A A A A A A A
Bate Pressure Pb (Psia)	14.65 •	Pressure Range PI (Psig) 370	Temperature Sg T) 10	Direction
	14.65 💌	Differential Pressure Bange hw (in) 25			offow
Latitude L (degrees)	3		Pressure (Sq P)	10	
Elevation EL (FT)	76	Temperature Range Tf (F) 65			¥ 2///////
	1.0	Evaluate Transmitter Calibration Constants			VIIIIII), VIIIIII
Avg Water Temperature Tim [F]	95				N 10
Avg Ambient Temperature Ta [F]	100	Besults	Units		N N
	1.00	Static Pressure	Pf [Psia]	384.730000	1 12 12
Disc and Differe Discoution		Pressure Loss PLoss	Ploss (Psia)	52 to 202	, 8 8
Pipe and Orifice Dimensions		Temperature	Tf (deg B)	524.670000	A 1000
Pipe Diameter DD (in)	3 -	Expansion Factor	Y	0.998250	0.80 in 0.40 in
Pipe Schedule		Velocity Approach Factor	EV	1.104714	1,3 2
Pipe 5 cheque	40 -	Super Compressibility Factor	FPv	0.999934	060 n 3 7 5 7
Pipe Material	316 55 -	Coefficient of Discharge	CD	0.957221	Dep n E-+0
Get ID (in)	3.068	Reynold Number in Pipe	BeD	1586235.860922	
		Reynold Number in Orifice	Red	2433285.810655	0.51 m , //////////////////////////////////
Onlice Diameterd (in)	2 🔹	Velocity in Pipe	Vp(Ft/sec)	37.611921	North Annual Contraction
Drifice Material	316 55 🔹	Velocity in Throat	Vo (Ft/zec)	88.506718	x // #
	310.33	Beta Ratio	b [b/D]	0.651890	Cg
Fluid Properties		Throat	in	0.900000	
CI.	.iquid 🛞 Gas	Differential Pressure Ratio	dp/P	0.99765	154
		Water Manometer Leg Correction Factor	Fan	0.999347	
Specific Gravity @ Pf, Tr	0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	
Viscosity @ Pf, Tf (CP)	0.0102067	Local Gravitational Correction Factor	Feel	0.998668	
Heal Capacity Ratio (CP/CV)		Local Gravitational Dead Weight Correction Factor	Fpel	0.997339	
	1.3	Mercury Manometer Factor Leg Correction Factor	Fhgm	1.000000	
Fluid Compressibility @ PI, TI (21)	0.997971	Mercury Manometer Temp. Correction Factor	Fhgt	1.000000	
Fluid Compressibility @ Pb. Tb (2b	1 0.002030	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.171300	
		Flow Rate @ Standard Cond. Flow Rate @ Base Cond.	Q= (MMSCFD)	4.223800 4.368900	
Fluid Compressibility @ STP (Zs)	0.951308		Qb (MMCFD)		
		Mass Flow Rate	Qm (Lbm/Hr)	7788.919000	
Calculate Reset	Exit				
	Even				
Prepared by Innan /	Aslam			-	
Process Engineer		4			
	slam@petrosof.com				
	etrosof.com	0	k internet		

24- ROUGH CAST CONVERGENT VENTURI SIZING [ASME & ISO 51671-1]

Software is developed with great accuracy according to ISO 5167-1 and ASME standard procedure. Application contains two sub-applications for ISO-5167-1 and ASME. Program is very user's friendly containing two main section a) The input section to provide site conditions and b) result section where a detailed calculation of flow measuring device displayed. Program calculates mass flow rate and volumetric flow at standard conditions, flowing/site conditions and local site base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

XSC Venturi - [RSC Venturi A				_ 6
Ple Sizing Programs About Help	Proce	as Engineering 2011		- 1
Rouch Cast Covergent	Venturi ASME			Venturi Profile
		Thursday Feb-14-2013 12:03		
Tag #		Transmitter Data	Input Meter Reading	8
Site Conditions		Transmitter @ Water Manometer @ Mercury Manometer	IS degree divergent C 7 degree divergent	
Bace Temperature TB (deg F)	50 💌			8 8
Bate Pressure Pb (Psia)	14.65 •	Phessure Range PI (Psig.) 370	Differential Pressure (Sq hw) 10	8 8
Latitude L (degrees)	3	Differential Prezzure Bange hw (in) 50		
	-	Temperature Bange Tr(F) 65	Temperature (Sq T) 10	g Note (11)
Elevation EL (FT)	76		Pressure (Sq.P.)	
Avg Water Temperature Tw [F]	95	Evaluate Transmitter Calibration Constants		2 1 2
	100			Coninal divergent, E
Avg Ambient Temperature Ta (F)	100	Results	Units A	E Protection of now
		Static Pressure	Pf [Psia] 384.730000	
Pipe and Orifice Dimensions		Pressure Loss PLoss	Ploss (Psia) 0.125443	99
Disc Discolar DD (in)		Temperature	Tf (deg R) 524.670000	
Pipe Diameter 0D (in)	6 🔹	Expansion Factor	Y 0.996453	
Pipe Schedule	40 -	Velocity Approach Factor	EV 1.110562	
Pipe Material	316 55 -	Super Compressibility Factor	FPv 0.999934	Plane of interved int
	316.55 -	Coefficient of Discharge	CD 0.984000	400 m
Get ID (in)	6.065	Reynold Number in Pipe Reynold Number in Orifice	ReD 4682313.883496 Red 7099558.425851	40.00 in = R3
Onlice Diameter d (in)	4 -	Velocity in Pipe	Vp(Ft/sec) 56.162034	Collection House, C
		Velocity in Fige	Vo (Ft/zec) 129.117305	
Onifice Material	316 SS 🔹	Beta Ratio	b (b/D) 0.659522	21.99 in = R2
Phyld Properties		Conical Convergent B	in 5,575500	
Fluid Properties	iquid (* Gas	Differential Pressure Ratio	dp/P 0.99531	Plans of interaction
	indana ita mara	Water Manometer Leg Correction Factor	Fan 1.000000	Cunical convergent, 8 21 deg
Specific Gravity @ Pf, Tr	0.57	Water Manometer Temp. Correction Factor	Fwt 1.000000	Paras el intersection +1 deg 558 in = 8
Viscosity @ Pf. Tr (CP)	0.0102067	Local Gravitational Correction Factor	Fel 1.000000	
		Local Gravitational Dead Weight Correction Factor	Fpml 1.000000	834in=R1
Heat Capacity Ratio (CP/CV)	1.3	Nercury Manometer Factor Leg Correction Factor	Fhgn 1.000000	Cellindrical estimator, A
Fluid Compressibility @ PI, TI (21)	0.997971	Nercury Manometer Temp. Correction Factor	Fhgt 1.000000	607 n=A 30 38
		Flow Rate @ Flowing Cond.	Qv (MMCFD) 1.009200	1 m 1
Fluid Compressibility @ Pb, Tb (2b		Flow Rate @ Standard Cond.	Qx (MMSCFD) 24.886400	3
Fluid Compressibility ⊕ STP (Zs)	0.951308	Flow Rate @ Baze Cond.	Qb (MMCFD) 25.741200	8
		Mass Flow Rate	Qm [Lbm/Hr] 45891.943400	2
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	Exit			
Prepared by Incan /	Aslam		*	
	s Engineer	•	•	
	no.locotaq@main			
	etrosol.com	0	k in the second s	

25- MECHANICAL CONVERGENT VENTURI SIZING [ASME & ISO 5167-1]

Software is developed with great accuracy according to ISO 5167-1 and ASME standard procedure. Application contains two sub-applications for ISO-5167-1 and ASME. Program is very user's friendly containing two main section a) The input section to provide site conditions and b) result section where a detailed calculation of flow measuring device displayed. Program calculates mass flow rate and volumetric flow at standard conditions, flowing/site conditions and local site base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

INC Venturi - [MC Venturi ISO	5167-1]			
Pile Sizing Programs About Help	O Proce	es Engineering 2011		- 0
Mechanical Covergent	Venturi ASME			Venturi Profile
2		Thursday Feb-14-2013 12:09:		Vendir Frome
Tag #		Transmitter Data	Input Neter Reading	8-+-8
Site Conditions		Transmitter @ Water Manometer C Mercusy Manometer	@ 15 degree divergent C 7 degree divergent	2 3
Base Temperature TB (deg F)	60 🔹			6 E
Bate Pressure Pb (Psia)	14.65 •	Pressure Range PI (Psig) 370	Differential Pressure (Sq.hw) 10	
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		Temperature Bange Tr (F) 65	Temperature [Sq T] 10	o Note (11)
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Avg Anders renpeature rai F j	100	Results	Units A	
		Static Pressure Pressure Loss	Pf [Psia] 384.730000 Ploss [Psia] 0.201631	6
Pipe and Orifice Dimensions		Temperature	Tf (deg R) 524.670000	8
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Pipe Schedule		Velocity Approach Factor	EV 1.008781	6 0
	40 -	Super Compressibility Factor	FPy 0.999934	Page of intersection .
Pipe Material	316 SS 🛛 🕶	Coefficient of Discharge	CD 0.995000	
Get ID (in)	2.067	Reynold Number in Pipe	ReD 443967.524803	0.38in=R3
		Reynold Number in Orifice	Red 1223574.498357	
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Onifice Material	316 55 🔹	Velocity in Throat	Vo (Ft/zec) 118.693169	0.52 h - B2
		Beta Ratio Conical Convergent B	b [b/D] 0.362845	USE N=R2
Fluid Properties		Differential Pressure Ratio	in 3.555900 dp/P 0.99531	Plane of interesting
	iquid (* 6as	Water Manometer Leg Correction Factor	Ean 0.999309	§ 3.56 in = B
Specific Gravity @ Pf. Tr	0.57	Water Manometer Temp. Correction Factor	Fwt 0.995013	Contrail convergent, B 7 21 deg 8 Planes of information
Viscosity @ Pt. Tr (CP)		Local Gravitational Correction Factor	Fwl 0.998668	(the + 1)
	0.0102067	Local Gravitational Dead Weight Correction Factor	Fpwl 0.997339	0.52 h - R1
Heat Capacity Ratio [CP/CV]	1.3	Mercury Manometer Factor Leg Correction Factor	Fhgn 1.000000	Cylinchical entrance, A
Fluid Compressibility @ PI, TI (2)	0.997971	Mercury Manometer Temp. Correction Factor	Fhgt 1.000000	80 08
		Flow Rate @ Flowing Cond.	Qv (MMCFD) 0.032900	2.07 in = A
Fluid Compressibility @ Pb, Tb (2b)		Flow Rate @ Standard Cond.	Q= (MNSCFD) 0.812200	§+ T+
Fluid Compressibility @ STP (Z₂)	0.951308	Flow Rate @ Base Cond.	Qb (MMCFD) 0.856500	2
		Mass Flow Rate	Qm [Lbm/Hr] 1468.687200	
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A linean A				
	s Engineer	•	•	
	clan@petrozof.com	Ok		
www.p	etrosof.com			

26- FABRICATED CONVERGENT VENTURI SIZING [ASME & ISO 51671-1]

Software is developed with great accuracy according to ISO 5167-1 and ASME standard procedure. Application contains two sub-applications for ISO-5167-1 and ASME. Program is very user's friendly containing two main section a) The input section to provide site conditions and b) result section where a detailed calculation of flow measuring device displayed. Program calculates mass flow rate and volumetric flow at standard conditions, flowing/site conditions and local site base conditions. Nozzle dimensions are also displayed on the screen for ready reference.

Users are prompted about the limitations of the programs in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

FC Venturi - [RCC	Venturi ASI	AE]				. 6
Pile Sizing Programs	About Help					- 1
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	-		Thursday Feb-14-2013 12:2			
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Drifice Diameter d (in	n j	1.5 •	Velocity in Pipe	Vp(Ft/sec)	11.548519	Cylindrical throat, C-
Onifice Material		316 55 🔹	Velocity in Throat	Vo (Ft/sec)	83.193870	1.01 in = R2 a 87 08
			Beta Ratio	6[6/D]	0.372578	
Fluid Properties			Conical Convergent B	in	6.820200	Page of internation
	C L	iquid 👎 Gas	Differential Pressure Ratio	dp/P	0.99765	§ 6 0.75 m
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		0.57	Water Manometer Temp. Correction Factor	Fwt	0.995013	Planes of intersection
Viscosity @ Pf, Tr (D	CP)	0.0102067	Local Gravitational Correction Factor	Ful	0.998668	1.01 in - B1
Heat Capacity Ratio	(CP/CV)	1.3	Local Gravitational Dead Weight Correction Factor Nercury Manometer Factor Leg Correction Factor	Epel Fhan	0.997339	
		1	Nercury Manometer Factor Leg Correction Factor Nercury Manometer Temp. Correction Factor	Fhgin	1.00000	Cylindrical ontranos, A Media (21
Fluid Compressibility (@PI,TI(Z)	0.997971	Flow Rate @ Flowing Cond.	Qv (MMCFD)	0.090600	400 m=A
Fluid Compressibility (@Pb, Tb (Zb)	0.997839	Flow Rate @ Standard Cond.	Q = (MMSCFD)	2.233300	40
			Flow Rate @ Base Cond.	Qb (MMCFD)	2.310000	
Fluid Compressibility (@51P(23)	0.951308	Mass Flow Rate	Qm (Lbm/Hr)	4118.269900	2B
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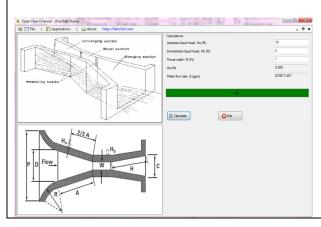
27- OPEN CHANNEL FLOW MEASUREMENT

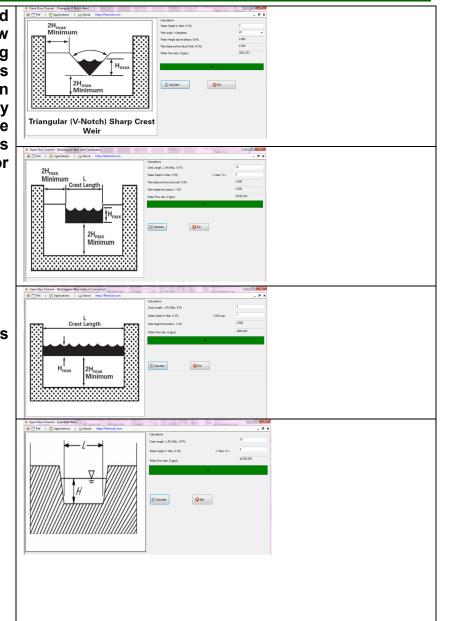
Open channel flow measurement software is developed with great accuracy to calculate open channel water flow through various types of measurement devices. Following five types of devices are normally used in open channels to calculate the flow of water/drains or water channels in rivers canals and gutters. Software is very user's friendly allowing users to provide simple inputs and determine the flow. Software covers all possible errors and define limits on the screen for user's to provide accurate details for calculation.

- Triangular V-Notch Sharp Crest weir type device
- Rectangular weir with contraction
- Rectangular weir without contraction
- Cipolletti weir
- Parshall flume

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.





28- UNIVERSAL GAS CONSTANT

Universal gas constant is used in a variety of calculations with different set of units. A simple program is developed to calculate the R values with most commonly set of units. A simple tool to be used on desk calculations.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

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http://www.petrosof.com/

29- GAS TO LIQUID CONVERSION

A most common practice is the gas plant purging with an inert gas before and after the plant shutdown. Nitrogen is an inert gas and mostly used for this specific purpose. Engineers are required to determine the volume of liquid nitrogen used during the purging process based on the volume of piping and vessels at various pressures. A simple and robust software is developed to calculate the exact volume of liquid nitrogen at different pressures based on the piping and vessel volumes.

Also a list of selective components are incorporated in the software for which the equivalent liquid volume can be calculated. All is required to select the component from the list of components and equivalent liquid volume will be calculated automatically as the gaseous volume is typed.

An introductory demonstration of this software is available online at www.petrosof.com

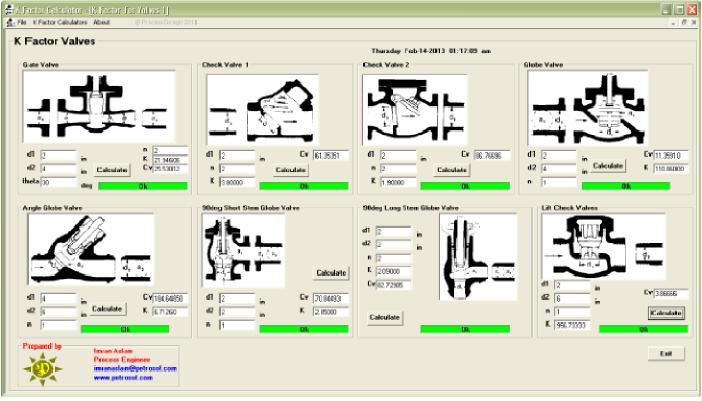
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- 🐠 🛏 imranas	zlam Engineer Jam@petrosol.com Exit	Ok	Calculate

30- K FACTOR CALCULATIONS

In fluid hydraulic calculations, flow resistance coefficient is the key variable to be calculated to determine the pressure drop. There are various types of fittings and valves normally used in the piping system and each type has different value of K depending on the size and internal body casting. This software is developed with great precision to calculate the K factor for all types of known fittings in the piping system. This is a complete package consisting of four sets of screens each can be pulled up from the drop down menu on the title bar of the program. This program is very simple to use and Engineers can obtain the results with little inputs without manual calculations of lengthy equations.

An introductory demonstration of this software is available online at www.petrosof.com





31- INCOMPRESSIBLE FLUID HYDRAULICS

Hydraulic calculation is the basic requirement of Process Design. This software is developed with great commitment to accurately calculate the pipeline hydraulics carrying incompressible fluid. Engineers can define a complete isometric layout of the pipes installed at different elevations including various types of fittings and valves. Program can determine the hydraulic calculations of each pipe segment and displays the summary results in tabulated form on the screen while a detailed calculations analysis of each individual item is provided on hydraulics section of the program.

All possible errors and warning are captured and display in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

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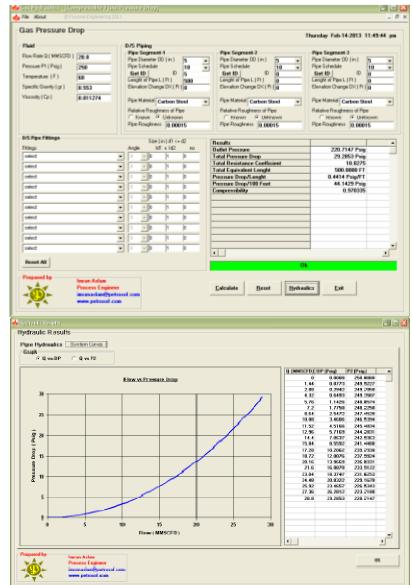
32- GAS HYDRAULICS

Flow of gas in the pipeline is very different than the liquid flow due to the nature of fluid. Properties of the compressible fluid changes with the temperature and pressure drop in the pipe and hydraulic calculations requires more attentions and care in order to predict the accurate results. The Gas Hydraulic software is developed with great effort and time to precisely calculate pressure drop, velocity, compressibility and other important hydraulic parameters.

A complete piping system can be defined along with fittings and valves with elevation details. A separate section of tabulated and graphical results are compiled within the software. An important feature of the program is; it generates the pressure drop and system resistance curves and presents a breakdown of pressure drop over the entire range of flow and pipe length.

All possible errors and warning are captured and display in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



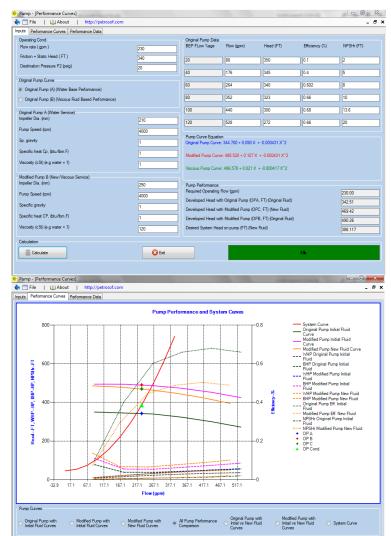
33- PUMP HYDRAULICS

Pump sizing and system hydraulic calculation is the most important and challenging task in Process Design. Engineers often face the situation where they design a new system or have to determine the performance of existing pump system and its hydraulics calculations.

This application is designed with high accuracy to model the performance curves of centrifugal pump provided vendors original performance curves. Then engineers can specify the new field conditions to determine performance of the pump. A system resistance curves is also developed in the application. An exquisite application specially designed for process engineering calculation.

All possible errors and warning are captured and display in the message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



34- PETROLEUM FRACTION PHYSICAL PROPERTIES

This software is developed to calculate the physical properties of hypothetical petroleum fractions. This program contains a set of seven complex empirical equations to which the manual interpolation is laborious and tedious. A very handy and useful tool for quick calculation without using graphs or tables.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Petroleum Fractions Physical Properties Calculator Riazi-Daubert Correlation Input Normal Boiling Point (Deg F) Specific Gravity 67 Calculate Properties Molecular Weight 93 020771 Critical Pressure (Psia) Gritical Pressure (Peg F) 64651206 Critical Volume (ft3/Lbm) Accentric Factor 0255738 Accentric Factor 0255739 Sherwood 0256773 Salemo 067493 0260016	Physical Properties			
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Haugen Math Sherwood 0.266773 Salemo 0.067493 0.266016 0k Biazi-1 Biazi-2 Cawet Lee Winn Owens Magoulas Exit Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com				
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Sciemo Nath 0.266016 Ok Ok Riazi-1 Riazi-2 Cavett Lee Winn Owens Magoulas Exit Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com				
Ok Riazi-1 Riazi-2 Cavett Lee Winn Owens Magoulas Exit Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com				
Riazi-1 Riazi-2 Cavett Lee Winn Owens Magoulas Exit Prepared by Process Engineer imranaslam@petrosof.com		nan	1	
Winn Owens Magoulas Exit Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com			Ok	
Exit Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com				Lee
Process Engineer imranaslam@petrosof.com	Winn	Owens		
The second secon	<u>E</u> xit		Prepared by	

35- PRESSURE RELIEF VALVE SIZING [GAS SERVICE]

The most important part of Process Engineering is Pressure Relief Valve Designing. Accurate sizing of PSV is highly important for the life and safety of equipment.

This software is developed with great precision and care to accurately determine the required orifice size of PSV in gas service.

A complete list of most common gases is given in the program to help defining the physical properties which users can alter as per requirements. Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants and mass flow rate and volumetric flow rates at standard and actual conditions. Also calculate the rated flow of selected orifice size.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at www.petrosof.com

			Friday Feb-15-2013 01:11:	_ ć
PS				:58 am
PS			Deputto	
				Sub-Critical
	V Tag#	_		58850.0000
Type of Relief Valve PS	v	-	nequired riow hate w (ibrivitr)	5725.049
	ser Defined		Standald Vapors Flow [SUFM]	1043.985
	ventional Type		Actual Vapors Flow (ACFM)	8577.023
0	perimposed Constant		EQ. AITHOW (2 STP (SCHM)	7.5
	50500	_	Allowable over Prestore (plug)	326.0000
Flow Rate W [Ib			Sizing Coemcient (C)	0.9750
Salety Factor (%	age] 10 💌		Discharge Coelicient (Kd)	1.0000
Set Pressure P (Psig] 75		Combination Correction Factor (Kc)	0.9300
Over Pressure (3	Kapel 10 -		Black Pressule Correction Pactor (Kb)	55.0000
Superimposed Pressure	rr.	_	Total back Pressure (psig)	69.7
Built-up Back Pressure		_	Fotal back Pressure [psia]	72.0000
Inlet Relieving Temperature T (107		Dack Pressure 4 age	97.2000
Compressibility Facto	1	_	Heleving Pressure (Psia)	6.3610
Molecular Weight M [bm/]	C.F.	_	Unlice Alea (in 2)	1.5000
Heat Capacity R	1.00	_	riessale naio (rn)	29.0000
Gas Specific Gravit		_	Sound Pressure @ 100 Pr [Decible]	82.0000
Noise Calculation in P	- 1.8.7	_	Noise Intensity (2º 100 Pt [Decible]	82.0000
	***(**)]		Noise Intensity 🗠 100 Pt	20.0000
Calculate Reset	Exit		CDTP SP for Conventional PSV s (pag)	6.3800
	<u>-</u>		APTPSY Office size selected (in 2.)	
	Aslam		WEI FOY SQUE Selected	P
	aslam@petrosof.com		Rated Flow (Ibm/hr)	59022.1487
	petrosof.com		Ok	

36- PRESSURE RELIEF VALVE SIZING [LIQUID SERVICE]

The most important part of Process Engineering is Pressure Relief Valve Designing. Accurate sizing of PSV is highly important for the life and safety of equipment.

This software is developed with great precision and care to accurately determine the required orifice size of PSV in liquid service. Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

File About Help	@ Process Engineering 201 1		- ć
iquid Relief V.	alve Sizing	Friday Feb-15-2013 10:22:53 p	M
Inputs		Results	
	PSV Tag#	Required Flow Rate W (gpm) 1980	
Type of Relief Valve	PSV	Equivalent Water Flow (gpm.) 1878.3	93
PSV Stule		Allowable Over Pressure (psig) 25	
-	Conventional Type	 Viscosity Correction Factor (Kv.) 0.969 	
Superimposed Pressure	Superimposed Constant	 Discharge Coeficient (Kd.) 0.65 	
Flow Bate)	((app) 1800	Combination Correction Factor (Ko)	
Safety Fact		Back Pressure Correction Factor (Kb)	
		Reynold Number (Re.) 5711	
Set Pressu	er(rag)	Total Back Pressure (psig) 50	
Over Press	ue (% age) 10 🔫	Total Back Pressure (psia) 64.7	
Superimposed Pre	ssure (psig) 50	Back Pressure % age 20	
Buit-up Back Pres	sure (nsin)	Relieving Pressure [Psia] 289.7	
	222	Onlice Area (in *2) 5.234	
Vis	0049/0F)	CD TP SP for Conventional PSV's (psig) 200	
Gias Specific	Gravity (gr.)	API PSV Onlice Size Selected [in^2] 6.38	
		API PSV Style Selected	
<u>C</u> alculate	eset <u>E</u> xit	Ok	
		Prepared by Imran Act Process I imranatia	

37- PRESSURE RELIEF VALVE SIZING [STEAM SERVICE]

The most important part of Process Engineering is Pressure Relief Valve Designing. Accurate sizing of PSV is highly important for the life and safety of equipment.

This software is developed with great precision and care to accurately determine the required orifice size of PSV. Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

PSV Steing - [PSV Steam Service]	
File About Help @ Process Engl	- 🗗 🕨
Steam Relief Valve Sizing	Friday Feb-15-2013 10:39:13 pm
Inputs	Results
PSV Tag#	Flow Regime Critical
Type of Relief Valve PSV	Required Flow Rate W (Ibm/hr)
PSV Style Conventional Type	Allowable Over Pressure (psig) 175
	Discharge Coeficient (Kd)
Superimposed Pressure Superimposed Con	Containation Collection Pation (KC)
Steam Characteristic Saturated Steam	Back Pressure Correction Factor (Kb.)
Flow Rate W [gpm] 153500	Superheat Steam Connection Factor (Ksh.) 1 Nucleic Connection Easter (Kh.) 1.021
	Inspire Collection Factor (KM)
Safety Factor (% age) 10	I Dial Dack Pressure (prig)
Set Pressure P [Psig] 1750	Total Back Pressure (psia) Back Pressure % age 1
Over Pressure (% age) 10	Believing Pressure (Psia)
	Drite Area (in'2) 2565
Temperature (F) 400	CDTP SP for Conventional PSV's (psig) 1750
Superimposed Pressure (pain)	API PSV Online Size Selected (in'2) 2853
	API PSV Style Selected
Built-up Back Pressure (psig)	Pressure Ratio (PR) 132
Noise Calculation in Pipe (Ft) 100	Sound Pressure @ 100 R (Decible) 58
	Noise Intensity @ 10D Ft (Decible) 120
Calculate Reset Exit	Noise Intensity @ 100 Ft 120
	Ok
	Prepared by Imran Aslam Process Engineer imranaslam@petrosof.com ymm.petrosof.com

38- PRESSURE RELIEF VALVE SIZING [THERMAL RELIEF]

Thermal relief valve is somewhat different than the regular relief valves as it is not meant to full relief instead, it fulfills the purpose of relieving a small volume through the valve enough to bring the pressure down that was increase due to the trapped liquid inside the pipe due to expansion caused by the ambient temperature.

This software is developed with great precision and care to accurately determine the required orifice size of PSV. Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

File About Help @ Process Engineering 2011	- 8
Thermal Relief Valve Sizing	
- Inputs	Results
PSV Data	Linear Expansion (alpha) 0.0000067
PSV Tag#	Modulas of Elasticity [E] 3000000
Type of Relief Valve PSV -	Isothermal Compressibility (Z) 0.0000189
PSV Style Conventional Type -	API Gravity (API) 25.7
Superimposed Pressure Superimposed Constant	Liquid Cubic Expansion (Beta) 0.0004
Safety Factor (% age) 10	Valve Leakge Rate (in^3/sec) 0.000762211
Set Pressure P (Psig) 250	Wall Thickness of Pipe [in] 0.2370
Dur Dur (Kurs)	Releving Temperature T2 (F) 97.690
	Heat Transfer Rate Q (MMBtu/hr) 0.2727
Schembosen Liessne (bail)	Specific Heat @ T2 (Btu/hr.F) 22
Built-up Back Pressure (psig)	Required Flow Rate W (gpm) 0.0121
Process Data	Equivalent Water Flow EQW [gpm] 0.011
Fluid Propane	Allowable Over Pressure (psig) 25
Pipe Material Carbon Steel	Viscosity Correction Factor (Kv) 0.122
Pipe Size D (in) 4 Pipe Schedule 40	Discharge Coeficient (Kd) 0.65
Lenght of Pipe Exposed L (FT) 10	Combination Correction Factor (Kc)
Isolation Valve Size (in) 4	Back Pressure Correction Factor (Kb)
Elapsed Time of Valve (sec.) 10	Reynold Number (Re)
	Total Back Pressure (psig) 50
	Total Back Pressure (psia) 64.7
numariessae in peri (rag)	Back Pressure % age 20
Gas Specific Gravity (gr.) 0.9	Releving Pressure (Psia) 289.7
Maximum Ambient Temperature (F) 100	Oritice Area (in ^2)
Provincial Serveral religerature (P.)	CDTP SP for Conventional PSV's (psig) 200.0000
Calculate Prepared by Imran Aslam	API PSV Onlice Size Selected [in 2]
Process Engineer	API PSV Style Selected
Reset imanaslam@petrosof.com	Ok
www.pedosor.com	
<u>E</u> nit	

39- PRESSURE RELIEF VALVE SIZING FIRE CASE [GAS SERVICE]

This software is developed with great commitment to precisely determine the required orifice size of PSV and relieving rate through the vessel in case of fire.

Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

PSV Sizing - [PSV Fire	e Case Gas Service]		
File About Help	@ Process Engineering 2011		- = >
Fire Relief Val	ve Sizing for Vapors –	Saturday Feb-16-2013	3 12:32:34 am
_ Inputs		Results	
	PSV Tag#	Required Flow Rate W (Ibm/hr)	0.7189
Type of Relief Valve	PSV v	Vapor Flow @ STP (SICFM)	0.070
Fluid	User Defined 🗾	Actual Flow (ACFM)	0.012
PSV Style	Conventional Type	Equivalent Air Flow @ STP (SCFM)	0.105
Superimposed Pressure	Superimposed Constant	Allowable Over Pressure (psig)	21
Salety Factor (% age)	10 -	Sizing Coefficient (C)	326.0000
Set Pressure P (Psig.)	100	Discharge Coefficient (Kd)	0.9750
	21 -	Vessel Wall Temperature (deg R)	1560.0000
Over Pressure [% age)		Fire Relief Factor	0.0207
Superimposed Pressure (pr	sig j	Total Back Pressure (psig)	0.0000
Buit-up Back Pressure (ps	(g)	Total Back Pressure (psia)	14.7
Normal Operating Temperal		Black Pressure % age	11.0000
Normal Operating Pressure	(peig)	Relieving Pressure (Psia)	135.7000
Vessel Wall Temperature [09g F)	Onlice Area (in "2)	0.3917
Exposed Area of Vessel [It		Pressure Ratio (PR)	9.2000
Molecular Weight M (Ibm/b	2mol) 0.0	Sound Pressure @ 100 Ft (Decible)	57.6000
Heat Capacity Ratio K	1	Noise Intensity @100 Ft (Decible)	62.0000
Gas Specific Gravity (gr)	1	Noise Intensity @ 100 Ft	62.0000
Compressibility ([Z])	100	CDTP SIP for Conventional PSV's (psig)	100.0000
Noise Calculation in Pipe (F	R) I'w	API PSV Onlice Size Selected (in 2)	0.5030
1		API PSV Style Selected	6
Calculate B	eset Exit	Ok	
			ran Aslam ocess Engineer ranaslam@petrosof.com ww.petrosof.com

40- PRESSURE RELIEF VALVE SIZING FIRE CASE [LIQUID SERVICE]

This software is developed with great commitment to precisely determine the required orifice size of PSV and relieving rate through the vessel filled with liquid in case of fire.

Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

aputs	ve Sizing for Vaporiz	sacuracy res-re-zots t2:4421 am	Sitical
pe of Relief Walve		Venel Type Horizontal Venuel with Spherical Lock + Required Flow Bate W (beyfyr)	122.9225
pe orneller viewe		- Equivalent Vessel - Equivalent Water Play EQV (ben/hr)	122.923
	Uper Defined	Insulation Tables Statute trace to Alexande Dye Pressure print	42
owindoad Pressue	Conventional Type	The second	3526.0000
hele Factor (10 age)	Superimposed Constant	Discharge Coefficient (Kd)	0.9750
	10 -	File Fighting and Lipski Drainage Faculty (Fighting and Lipski Drainage Faculty)	1.0000
t Precoue P (Poig)	200	C Not Available Back Pressure Correction Factor (Kb)	1.0000
er Prozen (Xiege)	21 .	Total Back, Prenzue prig	0.0000
presimposed Pressure (pr	eal d	Insulation Thickness (in) 15 Total Back Pressure (poin)	14.7
ittupBackPressue (po	al a	Dia of Vessel (//) 15 Back Plessure % age	6.0000
al Releving Temperature	eT(deg F) 100	Lenght of vessel (N.) 20 Referring Pressure (Paia)	256.7000
repressibility Factor (Z)		Liquid Level in Vessel (R) 12.25 Insulation K (Bu, in Part 2 deg F)	0.7100
kecular Weight N (bm/b	and 65	Later/Heat of Vapositation (8 to/bm) 172 Environmental Factor F	0.0035
est Capacity Ratio K	1.09	Vessel Hight Above Broard (II) 15 Weted Area (112)	991.2445
a Specific Granty (g) :	1	Heat Absorption (Bharte)	21143
ine Calculation in Pipe (Fi 100	Orifoe Area (in'2)	0.0040
		Pressure Rhatio(PRI)	10.000
		Sound Perceare (#100 Pr Decible	58.000
		Calculate Benet Exit Noise Intensity @ 100 Pt (Decible)	83.0000
		Noire Intensity (B 100 Ft	831.0080
		CDTP SP the Conventional PSV/b (psig)	200.0000
apared by	Insan Aolan	API PSV 0 alice Size Selected (iv/2)	0.1100
1	Process Engineer	API PSV Style Selected	D

41- PRESSURE RELIEF VALVE SIZING TWO PHASE [SUB-COOLED LIQUIDS]

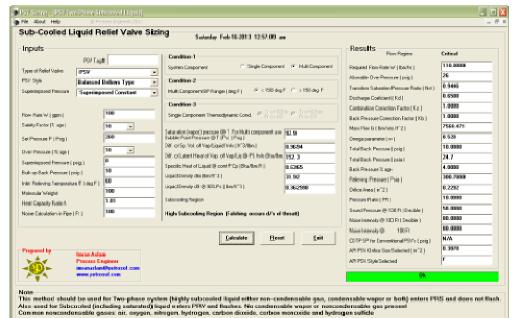
PSV sizing for two phase flow is entirely different than other types of sizing methods which involves iterative solutions to complex equations to correctly size the orifice. This software is developed with great accuracy to solve the equations to calculate the factors and achieve the required orifice size.

Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section. Also users can select the possible scenarios and conditions of the two phase fluid involved in the sizing.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



42- PRESSURE RELIEF VALVE SIZING TWO PHASE METHOD 1 [FLASHING LIQUIDS]

PSV sizing for two phase flow is entirely different than other types of sizing methods which involves iterative solutions to complex equations to correctly size the orifice.

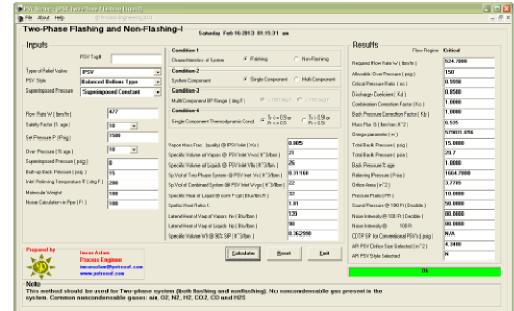
This software deals with different type of two phase fluid and it is developed with great accuracy to solve the equations to calculate the factors and achieve the required orifice size.

Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section. Also users can select the possible scenarios and conditions of the two phase fluid involved in the sizing.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



43- PRESSURE RELIEF VALVE SIZING TWO PHASE METHOD 2 [FLASHING LIQUIDS]

PSV sizing for two phase flow is entirely different than other types of sizing methods which involves iterative solutions to complex equations to correctly size the orifice.

This software based on a method 2 for different type of two phase fluid. It is developed with great accuracy to solve the equations to calculate the factors and achieve the required orifice size.

Selection of different types of PSV, back pressure, set pressure and over pressure range can be defined in the input section. Also users can select the possible scenarios and conditions of the two phase fluid involved in the sizing.

The result section gives complete information on all the sizing constants, mass flow rate and size of orifice.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Inputs			1			Results	
PSV Tagli Type of Rolet Valve PSV Style Superingeoved Pressure		Ballows Type	- Condition A) • D)	Contains <= 0.1 wfl of H2 Nimmed By Range <= 150 deg F Nikol Staustin on Dhabit Priate present to P3V Ser Pressure to <= 0.9 4 Troc43 or Proc43 Contains > 0.1 wfl of H2 Nimmed By Range > 150 deg F S Refor of Schedeling > 0.8	if The	Flow Regine Required How Rate W (Brufts) Allowable Deer Prezzer (prig.) Intel East Hol Frace in Vigor Phase Discharge Caeficient (Kd.) Combinitien Correction Facture (Kn.)	Callical 169213.0000 60 0.0225 0.9500 1.0000
Flow Flate W (Ibm/hr) Salely Factor (X age)		153830	C)	4 Tri05 er Po15 >>> If both of above mentioxed canditione are False or not known	C Twe	Back Pressure Connection Factor (Kb.) Mass Flue G (Ber/sec.R*2)	1.0000 2782.340 0.531
Set Pressure P (Prig)		600	Saturation/Ba	bble Prezzue (8 To Pro Psig.)	0.025	Graega pasameter (w) Total Back Pressure (psig)	55.0000
Dver Pressure % age		10 •	Vapor Mass P	tas. @ PSV Inlet (Xo)	0.5596	TotalBack Pressure (pog)	69.7
Superimposed Pressure ((prig.)	0	Noncondess	able Gas Vapor Partial Press Pgo (Psig.)	0.4595	Back Premure % age	9.0000
Built up Back Pressure (pnig	50	Diff. Sp. Vol. (of Vap/Liquid Vvio (It* 3/bm)	26	Releving Pressure (Psia)	\$74,7000
Inlet Releving Temperat	(Red Tenu	450	Sp.Vd of Two	Phase System (8-PSV Inst Vo (R*3/Ibm)	0.1549	Diffice deea (in "2)	2.0520
Molecular's/eight		100	Sp.Vol of Car	bined System (# PSV Inlet Vigo (R*3/bm)	0.2452	Pressure Ratio (PR)	3.7000
Noixe Calculation in Pipe	[R]	100	Specific Heat	of Liquid Component op! (Btu/Ibm.R	32	Sound Pressure @ 100 Fi (Deoble)	57.8500
			Spelici Heat F		1.01	Noise Intensity (P 100 Pt 10 ecible)	114.0000
Flow Charachimistic			Diff. Latent H	eat of Visp. of Visp/Liq B/PS hwls (BiturBen, R)		Noise Intensity IP 100 Pc	114.0000
			Liquid Density	at PRV Inlet do (bm/8"3)	0.362990	CDTP SP to Conventional PSV's (psig.)	N/A
Non-Flashing Flow			Sp. Volume V	9 @ 90% of PSV Set Pressure [#13/bes]	0.1737	API PSV Dation Size Selected (in (2)	3.6000
Propaged by	Incon Asla Process Ex			Coloulate	et Eei	API PSV Style Selected	M

44- RUPTURE DISC SIZING [ATMOSPHERIC RELEASE]

Rupture discs are another means to relieve pressure from equipment. Mostly they are installed on the shell side of heat exchangers to protect over pressurizing the shell from a leak of high pressure fluid from inside tubes.

Mostly flow through rupture discs are not required to be calculated however, in some special cases where it is required to estimate the flow through rupture disc relieved to atmosphere this software can be a handy tool to quickly calculate the flow.

This software is developed with great care for precise calculations.

The result section gives complete information on all the sizing constants, mass flow rate and choked flow conditions.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Rupture Disc - [Rupture Disc Sizing]	
File About Help @Process Engineering 2011 Vapors Through Rupture Disk To A	
	Saturday Feb-16-2013 10:46:22 pm Result
PSV Tag#	Actual Pressure Drop (Act DP Psia) 110.000 Limiting Pressure Drop (Lim DP Psia) 81.788 Referring Pressure (Psia) 124.700 Actual Pressure Drop Retic (DP Plat) 0.882
Over Pressure (% age) 10 Inlet Relieving Temperature T (deg F) 200 Compressibility Factor (Z) 1	Actual Pressure Drop Ratio (DP/P1) 0.882 Actual Expansion Factor (ActY) 0.542 Limiting Pressure Drop Ratio (Lim DP/P1) 0.656 Limiting Expansion Factor (Lim Y) 0.659
Molecular Weight M (lbm/lbmol) 20 Pipe Dimensions	Assumed K (Cp/Cv) 1.3 Specific Volume V (It^3/Ibm.) 2.840 K Pipe 0.316
Pipe: Diameter 0D (in) 8 Pipe: Schedule STD Get 1D (in) 7.381 Lenght of Pipe L (Pt) 115	K Pipe Entrance 0.500 K Pipe Exit 1.000 K Rupter Disk 1.500
Lenght of Fipe L (Ft) 15	Total K 3.316 Moody Friction Factor [1] 0.014 Flow Rate W (Ibm/hr) 210697.108
Prepared by Process Engineer imranaslam@petrosof.com www.petrosof.com	Flow is Choked

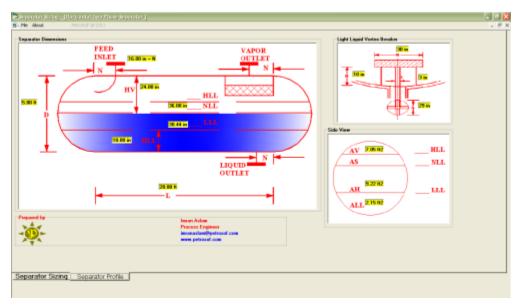
45- HORIZONTAL TWO PHASE SEPARATOR SIZING

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation.

This software is developed with great precision to determine the sizing parameters of separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, residence time, slug lengths, hold up time and separator weight and ratings pressure are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points are calculated. All calculated results including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



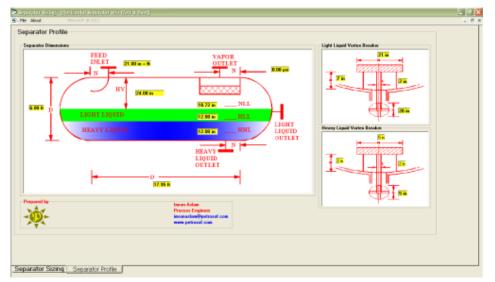
46- HORIZONTAL THREE PHASE SEPARATOR SIZING WITHOUT WEIR AND BOOT

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation. To separate the three components in the associated gas, three phase separators are mostly the first equipment in the battery limit of any gas plant where separation takes place also, separator acts as slug catchers as well.

This software is developed with great precision to determine the sizing parameters of three phase separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, residence time, slug lengths, hold up time and separator weight and pressure ratings are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points are calculated. All calculated results including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



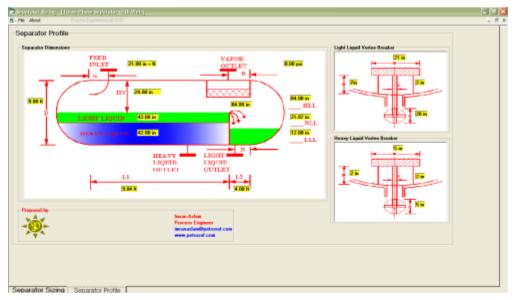
47- HORIZONTAL THREE PHASE SEPARATOR SIZING WITH WEIR

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation. To separate the three components in the associated gas, three phase separators are mostly the first equipment in the battery limit of any gas plant where separation takes place also, separator acts as slug catchers as well.

This software is developed with great precision to determine the sizing parameters of three phase separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, residence time, slug lengths, hold up time and separator weight and pressure ratings are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points are calculated. All calculated results including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



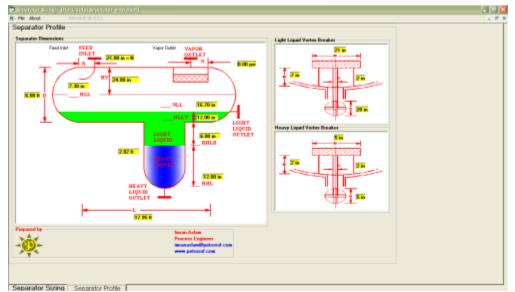
48- HORIZONTAL THREE PHASE SEPARATOR SIZING WITH BOOT

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation. To separate the three components in the associated gas, three phase separators are mostly the first equipment in the battery limit of any gas plant where separation takes place also, separator acts as slug catchers as well.

This software is developed with great precision to determine the sizing parameters of three phase separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, residence time, slug lengths, hold up time and separator weight and pressure ratings are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points are calculated. All calculated results including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



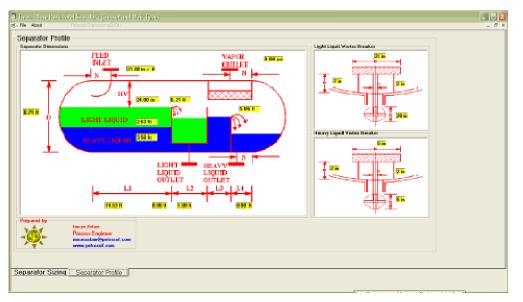
49- HORIZONTAL THREE PHASE SEPARATOR SIZING WITH BUCKET AND WEIR

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation. To separate the three components in the associated gas, three phase separators are mostly the first equipment in the battery limit of any gas plant where separation takes place also, separator acts as slug catchers as well.

This software is developed with great precision to determine the sizing parameters of three phase separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, residence time, slug lengths, hold up time and separator weight and pressure ratings are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points are calculated. All calculated results including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



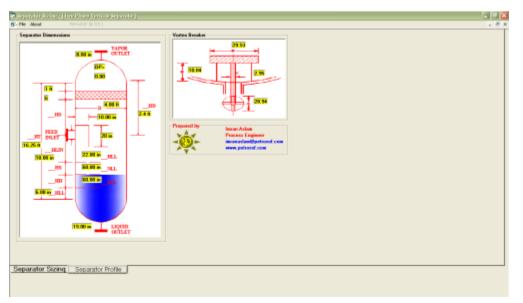
50- VERTICAL TWO PHASE SEPARATOR SIZING

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation.

This software is developed with great precision to determine the sizing parameters of three phase separators by solving complex iterative equations. Demister pad, inlet and outlet nozzle sizing, separator capacity, residence time, slug lengths, hold up time and separator weight and pressure ratings are calculated simultaneously. Besides, liquid levels at normal, low and high points are determined and respective alarm set points calculated. All calculated results are including complete level and alarm information are also displayed on the separator picture on the screen.

Errors and program limitations are cautioned through message bar on the screen.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



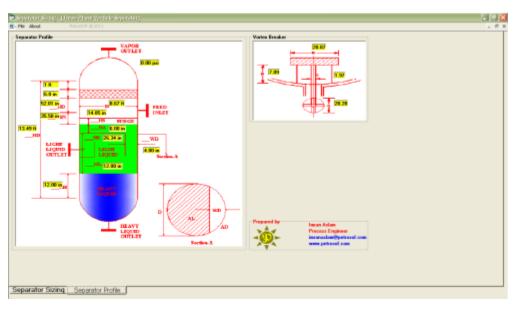
51- VERTICAL THREE PHASE SEPARATOR SIZING

In oil and gas facilities separators are the key equipment used both offshore and onshore plants for oil, water and gas separation. To separate the three components in the associated gas, three phase separators are mostly the first equipment in the battery limit of any gas plant where separation takes place also, separator acts as slug catchers as well.

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Errors and program limitations are cautioned through message bar on the screen.

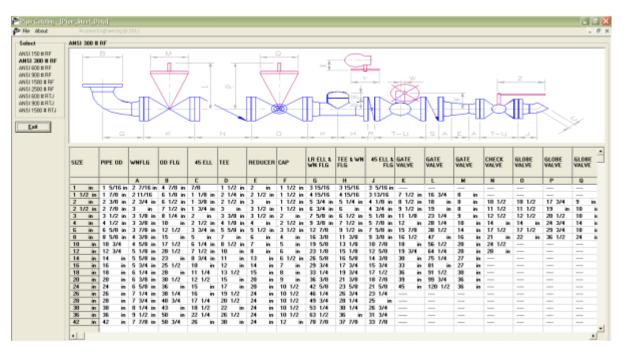
An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



52- STEEL PIPE CATALOG

Pipe and fittings dimensions are often required to prepare accurate isometric drawings for new projects and existing plant piping modifications. This quick piping catalog is prepared to provide complete dimensions details of any ANSI piping class.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

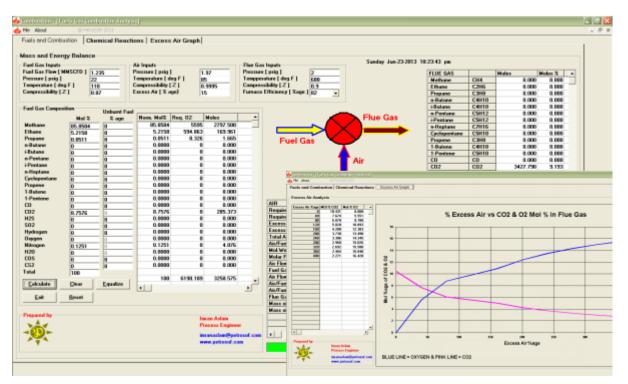


53- FUELS AND COMBUSTION

In oil and gas facilities heating system is the main utility to provide heat to exchangers and re-boilers. Often engineers are required to optimize the furnace performance by analyzing the combustion process of the fuel gas. This program is developed in order to carry out complete fuels and combustion analysis by mass and energy balance. components Most common found in fuel gas are provided in the program. Α rigorous calculations method is used specifically to determine the optimum excess air in order to control the carbon dioxide and oxygen emission in the flue gas.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible with Windows 95-2000/XP/7/8.



54- CONTROL VALVE SIZING [TWO PHASE SERVICE]

A comprehensive and detailed valve sizing software has been developed with great care and efforts to help out Design Engineers to appropriately size the valve for two phase service.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

	ase Service								
	ase Service								
Inputs	Mahan Tao B			Valve Selection Service					
	Valve Tag #			367400					
	Ninimum 🖓	Normal 🖓	Hasiman 😿	G Flow C Pressure C	Level C Temperature				
Two Phase Flow Rate Q SCFH)	2e6	4e6	6e6	Load Varies					
Vapor Fraction (Evap)	0.9	0.9	0.9		icentage Valve				
Valve Inlet Pressure P1 (Poig) 200		200	200	Contoller Action Reverse					
Valve Outlet Pressure P2 Poig)	100	150	180						
Inlet Temperature T1 [deg F]	60	60	60	Valve Type	PV Sensing				
Specific Gravity Sp G]	0.67	0.67	0.67	G AFC C AFD					
Vapor Pressure PV @ T1 [Psia]	0.37	0.37	0.37						
Citical Pressure Po (Psia)	670	670	670	Valve Selection Criteria	r				
Heat Capacity Ratio (K.)	1.27	1.27	1.27	1- Select Valve with:	Equal-Percentage Valve				
Compressibility [Z]	0.96	0.96	0.96	2-Valve has Cirreq at 80-85% opening =	1215.598 531.275				
NolecularWeight (N) Two Phase Fluid Viscosity (CP)	19.41	19.41	19.41	3-Valve has Cirreg at 60-70% opening = 4-Valve has Cirreg at 20-40% opening =	201.275				
Liquid Density (3 T1, P1 (1bm/ft2)	0.012	0.012	0.012	e- Valve has Uneq at 20-404 opening = 5-Valve has XT Value >	0.103				
oper vehicle (in Pri (in Vis))	5	5	5	Valve Conditions	0.190				
	Cone Ma	x Cond to Min a	rd Norm	Yarve Conditions					
Selected Valve	Lopy m			Tented Table Scille, They Reed Table Theoretical Real					
	- Assume Va	-		The full-beaptragene shad a provide provide the					
Size (= 1/2 Pize Valve)(1 0.94			Valve Churacteristics Notes Tagli						
Valve Cv @ 100% Open 1300		Valve FL							
Valve CV @ 100; Open 35		Valve Fd	0.94	Take Travely Miles					
Valve Characteristics (* Equa	Sage C Line	~							
U/S Pipe Dimensions		pe Dimensions							
Pipe Size 0D (in) select		e OD [in]	select ·	1 2 m					
Pipe Schedule SDH select		hedule SCH	select ·	1					
Get ID (in) 8	Get II)(in)	8						
Results	Minimum . N	ionnal . M	azimum						
nesure									
					10 10 10 1 to 00				
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Phelininary Dv Piping Geometric Factor FP	201.236	531.275	215.598	Natura Agenting Lage					
Phelininary Cv Piping Geometric Factor FP Required Cv	201.236	531.275 1 531.275	215.598	10.0 m (10.0 m	Berline Dervery 1. Just har rite. Just rite im.				
Prelininary Cv Piping Georeettic Factor FP Required Cv Actual DP	201.236 1 201.236 100	531.275 1 531.275 1 50 2	215.598 215.598 0	10.0 m (10.0 m	ter in a second				
Prelininary Cv Piping Geometric Factor FP Pipagiared Cv Actual DP Mac Number in Valve	201.236 1 201.236 100 0.008	531.275 1 531.275 1 50 2 0.011 0	215.598 215.598 10 1.014	10.0 m (10.0 m	Ballion Speeces, L. Xoat Say 1000 - Xoat Say 1				
Pelininary DV Piping Geometric Factor FP Required CV Actual DP Nac Nanber in Valve Nac Nanber in Pipe	201.235 1 201.235 100 0.008 0.008	531.275 1 531.275 1 531.275 1 50 2 1.011 0 1.011 0	215.598 215.598 10 1014 1014	10.0 m (10.0 m	Berline Jamma 1, Jan tar rise Jamma 2, Jan tar rise Jamma 1, Jan tar rise Jamma 1, Jan tar rise Jamma 1, Jamma				
Pelininary DV Piping Geometric Factor FP Pequired CV Actual DP Nac Number in Valve Nac Number in Pipe Expansion Factor (11)	201.235 1 201.235 100 0.008 0.008 0.818	331.275 1 1 1 331.275 1 331.275 1 30 2 1.011 0 0.011 0 0.909 0	215.598 215.598 0 1.014 1.014 1.964	Print (First) (MP) (Print) (MP)	Berlie Speen, 1 Jaarlag des Jahrde Jaer				
Polininary Cv Piping Geometric Factor FP Required Cv Actual DP Nac Number in Valve Nac Number in Valve Expansion Factor (V1) Persone Rotio (X1)	201.236 1 201.236 100 0.008 0.008 0.818 0.466	331.275 1 1 1 331.275 1 30 2 1.011 0 1.011 0 1.909 0 1.233 0	215.598 215.598 0 1014 1014 1964 1093	Control (1994) Control	Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Polinicary Dv Piping Geometric Factor IPP Required Cv Actual DP Nac Nauber in Valve Nac Nauber in Pipe Expansion Factor (V1 Phenane Ratio (X1 Neiman Phenane Drop Platio (C1)	201.236 1 201.236 100 0.008 0.008 0.818 0.466 0.514	331.275 1 531.275 1 531.275 1 50 2 1.011 0 1.011 0 1.303 0 1.233 0 1.257 0	215.598 215.598 0 0.014 0.014 1.964 0.093 0.103	Print (First) (MP) (Print) (MP)	Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Pelininary Ev Piping Geonetric Factor FP Required Cv Actual DP Nac Number in Valve Nac Number in Valve Expansion Factor (V) Persone Retric (X) Ninimum Pressure Drop Ratio (X1) Visicoly in Plan Vi (Fichae (201.235 1 201.235 100 0.008 0.008 0.818 0.465 0.514 10.046	331.275 1 531.275 1 50 2 1.011 0 1.011 0 1.013 0 1.233 0 1.257 0 1.3993 1	215.598 215.598 30 0.014 1.014 1.964 1.093 1.103 7.756	Control (1997) Control	Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Polininary Dv Piping Georetric Factor IPP Pipagiand Cv Actual DP Mac Nauber in Valve Mac Nauber in Pipe Expansion Factor [V1] Personer Ratio [X1] Writing Pipe Vig (Flore, [V Velocity in Pipe Vig (Flore, [V Velocity in Pipe Vig (Flore, [V Velocity in Valve VV; [Flore, [V]	201.236 1 201.236 100 0.008 0.008 0.008 0.465 0.514 10.045 10.045	331.275 1 331.275 1 331.275 1 331.275 1 300 2 1.011 0 1.039 0 1.233 0 1.257 1 13.993 1 13.993 1	215.598 215.598 0 1.014 1.964 1.093 1.103 7.756 7.756		Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Palminage Ev Piping Geometric Factor IPP Piping Conductor Actual DP Nac Nauber in Valve Nac Nauber in Pipin Expansion Factor (Y) Persona Ratio (X) Velocity in Viping (V) (Piping) Velocity in Viping V) (Piping)	201.236 1 201.236 100 0.008 0.008 0.818 0.465 0.514 10.046 10.046 189.397	331.275 1 331.275 1 331.275 1 331.275 1 300 2 1.011 0 1.039 0 1.233 0 1.257 1 13.993 1 13.993 1	215.538 215.538 0 1.014 1.964 1.093 1.103 7.756 89.397		Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Polininary Dv Piping Georetric Factor IPP Pingaired Cv Actual DP Mac Nauber in Valve Mac Nauber in Pipe Expansion Factor (Y1 Persoare Riski (X1 Miniman Persoare Drop Patio (X1) Velocity in Pipe V1 (Filsec 1 Velocity in Valve V1 (Filsec 1 Cholaed DP Reynold Nauber Factor (FR.)	201.235 1 201.235 100 0.008 0.008 0.008 0.008 0.465 0.465 0.514 10.046 10.046 189.397 1	331.275 1 1 1 331.275 1 300 2 1.011 0 1.011 0 1.233 0 1.257 0 1.3.993 1 1.3.993 1 1.99.397 1	215.598 215.598 30 0014 1014 1014 1093 1103 7.756 89.397		Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Polininary Dv Piping Georetric Factor IPP Pingaired Cv Actual DP Mac Nauber in Valve Mac Nauber in Pipe Expansion Factor (Y1 Persoare Riski (X1 Miniman Persoare Drop Patio (X1) Velocity in Pipe V1 (Filsec 1 Velocity in Valve V1 (Filsec 1 Cholaed DP Reynold Nauber Factor (FR.)	201.235 1 201.235 100 0.008 0.008 0.008 0.008 0.465 0.465 0.514 10.046 10.046 189.397 1	331.275 1 1 1 331.275 1 300 2 1.011 0 1.011 0 1.233 0 1.257 0 1.3.993 1 1.3.993 1 1.99.397 1	215.538 215.538 0 1.014 1.964 1.093 1.103 7.756 89.397		Baltins Sprong L. Just Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam) Sam (Sam)				
Polininary Dv Piping Georetric Factor IPP Pingaired Cv Actual DP Mac Nauber in Valve Mac Nauber in Pipe Expansion Factor (Y1 Persoare Riski (X1 Miniman Persoare Drop Patio (X1) Velocity in Pipe V1 (Filsec 1 Velocity in Valve V1 (Filsec 1 Cholaed DP Reynold Nauber Factor (FR.)	201.236 1 201.236 1 0 0.008 0.008 0.008 0.0818 0.514 1 0.465 10.046 10.046 10.046 11 1 Tubulent 1	331.275 1 1 1 331.275 1 300 2 1.011 0 1.011 0 1.233 0 1.257 0 1.3.993 1 1.3.993 1 1.99.397 1	215.598 215.598 30 0014 1014 1014 1093 1103 7.756 89.397						

55- CONTROL VALVE SIZING [STEAM SERVICE]

A comprehensive and detailed valve sizing software has been developed with great care and efforts to help out Design Engineers to appropriately size the valve for steam service.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

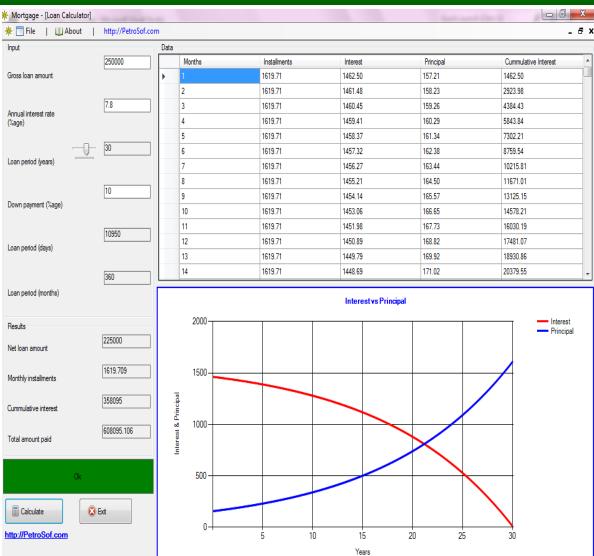
Valve U/S P1 (Psig) 200 Valve U/S P2 (Psig) 150 Inlet Temperature T1 (deg F) 250 Specific Gravity (Sp 6) 1 Vapor Pressure @ T1 Pv1 (Psia) 0.37 Critical Pressure Pc (Psia) 3208 Viscosity V (CP) 0.1 Con Steam Quality C Salurated Valve Size	1700 200 170 250 1 0.37 3208 0.1 py Max Cond to Min 4 (* Superhea me Valve Size <= 1/2 Pig Valve KV Valve KV Valve KV Valve KT	pe size / 0.94 0.94 0.94	Controller Av	In the second se	Equal-Perc Reverse A	entage Valve	D/S of Valve
Flow Rate W (Ibm/hr) 1500 Valve U/S P1 (Prig) 200 Valve U/S P1 (Prig) 150 Intel Temperature T1 (deg F) 250 Specific Gravity (Sp G) 1 Vapor Phessure P1 (deg F) 250 Specific Gravity (Sp G) 1 Vapor Phessure P0 (Pris) 3208 Viscosity V (CP) 0.1 Construction Construction Steam Quality C Saturated Valve Size 15 Valve CV @ 1010 Open 15 Valve DV @ 102 Open 15 Valve Characteristics © Equal %age Pipe Size U/S Pipe Dimensions Pipe Size DD (in) Select v Bacultz B	Normal Normal Normal 1700 1700 200 170 170 1250 1 0.37 3208 0.1 0.37 3208 0.1 py Max Cond to Min a (* Superhear me Valve Size <= 1/2 Fig Valve KV Valve KV Valve KV Valve KV Valve KI Valve Fid Linear D/S Pige Dimension Pipe Size OD (in)	2000 200 200 180 250 1 0.37 3208 0.1 and Norm ated pe size 0.54 0.54 0.54 0.54 0.54	Service C Flow Load Varie Installed Val Controller Au Valve Type C A Valve Sel Valve Castantee Valve	C Pressure ies ieve Characteristics ction pe AFC AFO Incention Criterion wave traff Votes O	Equal Perc Reverse Ar PV S (~ U/	centage Valve cting ensing	D/S of Valve
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Valve DV @ 10% Open Valve FL Valve FL Valve Characteristics	Valve XT Valve Fd Linear D/S Pipe Dimension Pipe Size OD (in)	0.34			S S S		
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Valve FL 0.94 Valve Characteristics © Equal %age © Pipe Size U/S Pipe Dimensions Pipe Size DD (in) select ¥ Pipe Size DD (in) select ¥ Beet ID (in) 8 Beaultr	Linear D/S Pipe Dimension Pipe Size OD (in)	0.94	v ·		to the second rate		
Valve Characteristics Pipe Size U/S Pipe Dimensions Pipe Size DD (in) Setect	- D/S Pipe Dimensio Pipe Size OD (in)	2015	V ·	· · · ·	to the figure state		
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Pipe Size OD (in) Pipe Schedule SCH Get ID (in) Basedite	Pipe Size 0D (in)			al POP at 10 Pag Par Books C	White Witness	Included Value Sage Equal Tax	on Theorem Income
Pipe Schedule SCH Get ID (in) 8		select v		01 10.00 20.00 0.00 01 100.00 20.00 20.00	0.000 0.000	0.000	6.000 0.000 6100 90.000
Get ID (in) 8	Dina Cabadala 2014			40 14.00 20.00 400.00	1.74 1.74 342 242 397 397	21.975 2	8.727 20.000
Get ID (in) 8	Hipe schedule SCH	select -		HEI 196.00 20.00 006.00	1.34 1.34	21550 0	8.702 X.680 1.325 40.680 8.575 50.680 8.370 60.680
Results Minimum	Get ID (in)	8	2004	100 100 00 20 00 100 00	1007 1007	11/02 1	1.310 60.000
Results Minimum		1.	20	481 146.08 20.00 1406.00	8,278 8,278 10.028 10.028	75.964 0	1.809 70.880 8.367 80.880
Mininum	Marriel	Mandana		60 196.00 20.00 1966.00 60 196.00 20.00 2006.00	11.852 11.852 11.975 11.975	10.000 7	1.394 30.000 1.294 1.00.000
	Normal	Maximum					
Preliminary Dv 6.485	9.25	13.173					
Required Recovery Factor FL 0.483	0.374	0.305	04	Value			
Critical Pressure Ratio Factor FF 0.957	0.957	0.957					
Reynold Number 10192111		95392499					
Piping Geometric Factor FLP 0.94	0.939	0.939			Ok		
Required Cv 6.485					OK		
0.405	9.25	13.173					-
	30	20	Character	listics		Reset	<u>E</u> xit
1.149	1.303	1.532					
0.000	9.263	10.897	Caluadau Day	-07-2013 02:49:0	05		
Choked DP (Psia) 94.85	94.846	94.837	Saturday Dec	2013 02:49:0	os pm		
			Prepared by				
Warnings: < <note-1>></note-1>						Imran Asla	
< <note-2>> <<note-3>></note-3></note-2>						Process Er	ngineer n@petrosof.

56- LOAN CALCULATOR

Loan calculator is a simple yet complete application to determine the mortgage. This is a simple application where user's define the basic information of amount of loan, installment period and down payment then by simply pressing calculate button a complete tabulated details of installment, principal and cumulative interest amount is calculated for the entire period of loan. Also, a graph between principal amount and interest amount is drawn.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



57- NATURAL GAS PHYSICAL PROPERTIES

This application is developed to calculate the natural gas properties such as compressibility, molecular weight, viscosity, critical pressure and temperature. Also, this application is combined with another utility to calculate the physical properties of hypothetical hydrocarbon components. The application used highly accurate empirical equation to model all the physical properties of natural gas and hypothetical hydrocarbons.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

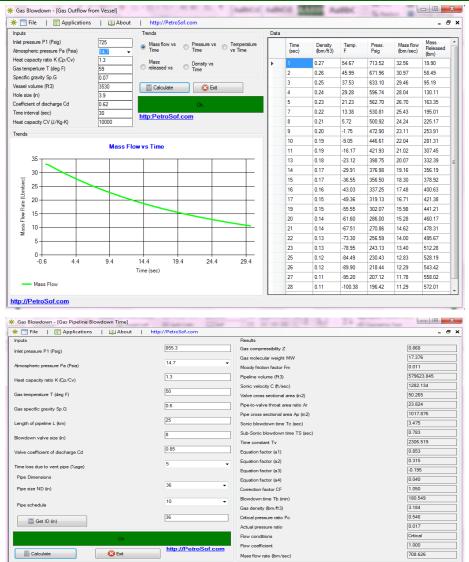
🧄 Natural Gas - [Compressib	pility]	And	4	
🔆 🛅 File \mid 📰 Applica	ations 🕕 Abou	t http://PetroSof.com		_ 8 ×
Natural Gas Compressibility		Critical Properties Model	Results	
Pressure, P (Psig)	650	Brown et el (1948) and Standing (1977) Natural Gas System	Compressibilit, Z	0.8952
Temperature, T (deg F)	70		Viscosity, Mue (CP)	0.0199
Specfic gravity, Sp.G	0.65	Brown et el (1948) and Standing (1977) Gas Condensate System	Molecular Weight Mw	18.850
H2S Mol% CO2 Mol%	2	Boyun Guo and Ali Ghalambor Simple Equation	Critical Pressure Pc (Psia)	670.906
N2 Mol%	6	Ahmed (1989) Natural Gas System	Critical Temperature Tc (Deg F)	373.969
Compressibility Model		Critical Properties Correction Methods		
Beggs and Brill		Wichart-Aziz Correction Method	Ok	
 Papay Hall-Yarborough 		Carr-Koyashi-Burrows Correction Method	Calculate	🔀 Exit
Oranchuk-Abu-Kassem		Viscosity Model © Car-Kobayashi-Burrows-Method	http://PetroSof.com	
Dranchuk-Purvis-Robinson		O Lee-Gonzalez-Eakin Method	<u></u>	
		Dean and Stiel Method		

58- PIPELINE GAS BLOWDOWN

application is Gas blow down developed with high accuracy. This application comprised of two individual applications to calculate the gas blow down time from a pipeline and other application is developed to time calculate the rated aas depressurization rate through hole in the pipeline. Calculation details are enlisted in the tabulated form and graph for rated flow and temperature versus time is plotted.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



59- RESERVOIR ENGINEERING

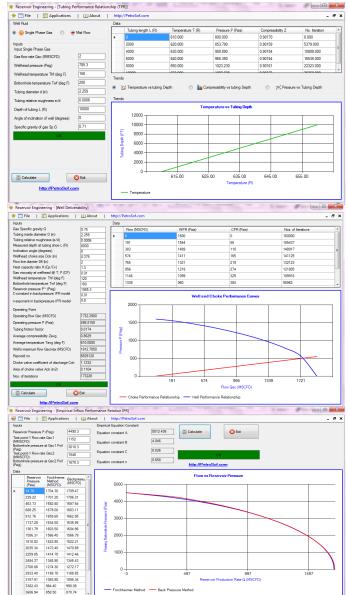
This application is developed with high accuracy to determine the important parameters required in reservoir engineering applications. The program contains three sub applications within a main software as follows.

- Well tubing performance relationship
- Well deliverability (choke and tubing)
- Empirical well inflow performance relationship

Application is simple to user where users provide input in the input fields and remaining calculations are done by pressing the calculate button and results are displayed in graphical and tabulated form in the application.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



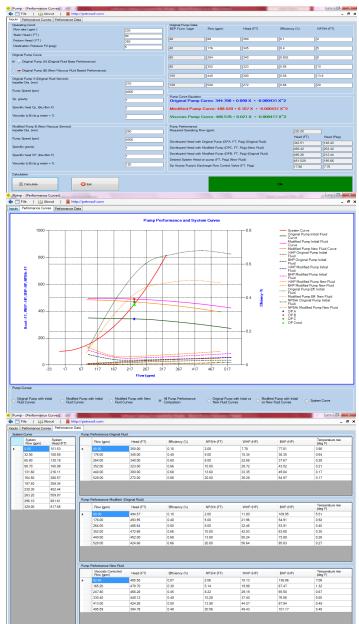
60- CENTRIFUGAL PUMP PERFORMANCE CURVES

Centrifugal pump performance curve application is a highly accurate and a specialized application to model the pump curve. Application is designed to developed performance curves of centrifugal pump, modifying the performance curves of exiting pump. Also, to modify and calculate the performance of exiting pump in a new fluid service conditions.

Application is highly accurate the ANSI and API governing empirical relations are used as per governing standards to model the pump curves.

Application comes with variety of results where users will provide simple inputs of fluid in input fields and application will calculate entire range of performance curves and display tabulated results. Application warns the users for possible errors and display error messages to accurately use the application to obtain the desired results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

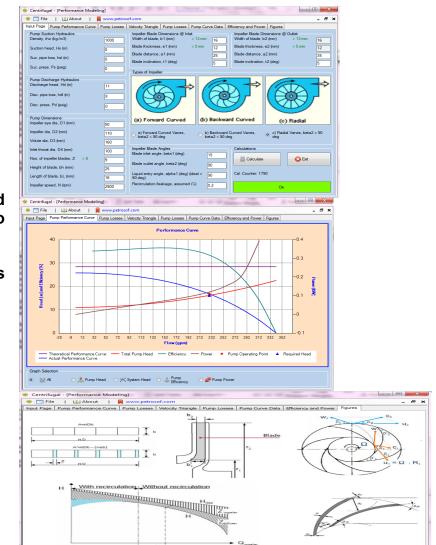


61- CENTRIFUGAL PUMP DESIGN

Centrifugal pump design application is a specialized software to design a centrifugal pump mechanical details to achieve the desired performance in the field. Application uses API and ANSI standard guidelines to model the pump. User can simply provide the information in the input fields and entire range of performance curves and mechanical details are calculated and shown in graphical form within the application.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



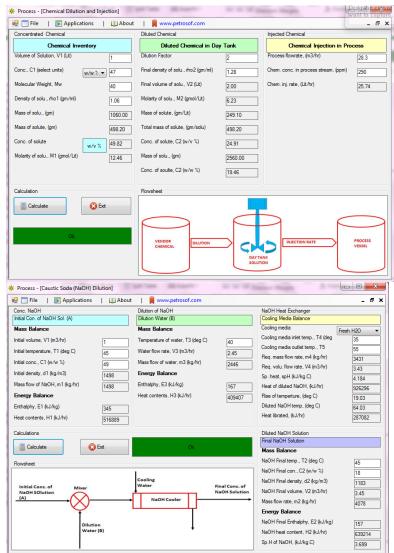
62- CHEMICAL INJECTION

Chemical injection application is developed as a specialized tool to calculate the accurate injection rate of chemical in process fluid stream especially in steam system and boiler water treatment. The application comprised off two sub applications. One application is for chemical injection in process fluid and second application is developed to model the dilution schematic of caustic soda which is also an important chemical used in water treatment in oil and gas industry.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



63- CENTRIFUGAL COMPRESSOR PERFORMANCE CURVES

Centrifugal compressor curve application is a specialized application developed with high accuracy to evaluate, analyze and calculate performance curves of a centrifugal compressor based on all the speed variations and power requirement.

Application can develop entire envelop of performance curve for entire range of compressor for flow, temperature, head, power and pressure. Also, a detailed tabulated results of performance curves are displayed in the tables for evaluation. Further a unique feature of application is to develop stone-wall and surge curves of compressor for entire speed variations.

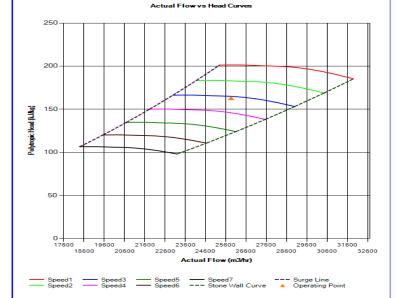
The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.

File H About	http://petroso	f.com								- 6 - 5
puts Data OEM Performance Data			an Pressure Pour	Cupie Temperatu	m					
Inputs	a juice renormance i	Data Thead Corve		nce @ 100 % Speed						
Physical Properties			Thated Tellolina			Speed 3 (% rpm)	Speed 4 (% rpm)	Speed 5 (% rpm)	Speed 6 (% rpm)	Speed 7 (% rpm
rnysical riopenies	Rated	Site Conditions								
	Conditions	Site Conditions		110	105	100	95	90	85	80
Molecular weight	50.33	13.60		10450	9975	9500	9025	8550	8075	7600
Suction Pressure, bara	1	3		Volumetric flow	Ploytropic head	Pressure ratio	Power (kW)	Discharge temp.	Discharge	Mass flow rate
Suction Temperature, deg K	303	288		rate (m3/hr)	(kJ/kg)	(Pd/Ps)		(deg C)	pressure (bara)	(kg/hr)
			Select All			Calculated	Calculated	Calculated		
Suction gas compressibility, Z	0.961	1	🗸 Data # 1	23000	166	18	2960	160	18.00	47817
Heat capacity ratio, K (Cp/Cv)	1.114	1.3	✓ Data # 2	24000	166	18	3060	158	18.00	49896
Compression Process	Madabatic	IC Polytropic								
Bficiency		 Se royaupic 	🔽 Data # 3	25000	165	17.8	3120	157	17.80	51975
	0.85		🔽 Data #4	26000	164	17.6	3180	155	17.60	54054
Rated speed @ 100% load, rpm	9500		Data # 5	27000	160	17	3240	153	17.00	56133
Operating Conditions		🗸 Data # 6	28000	157	16	3260	148	16.00	58212	
Required Row	MMSCFD -	65	V Data # 7	29000	151	14.8	3240	145	14.80	60291
Compressor Operating Speed, rpm	essor Operating Speed. rpm 9500		Uata # 7	20000	101	14.0	0240	140	14.00	00201
Surge Row Safety Margin (%)		-Operating Cond	ndition Results Operating Point Operating Point		Warnings << Warning !!! >>					
			ating Row, Am3/hr 25866				faming !!! >>			
		149.10	Polytropic Head		25866	25866		ning !!! >>		
Discharge side equipment volume,	m3	2	Pressure Ratio	, har hy	2.271	17.351		ning III >>		
Suction side low pressure alarm (PA	AL), bara)	0.95	Discharge Press	ure, bara	6.812	17.351	<< War	ning !!! >>		
Discharge side high pressure alarm	(PAH), bara)	10	Polytropic Efficie	ancy	0.803	0.850	<< War	- ning !!! >>		
Discharge side high temperature al			Discharge Temp		91.392	154.068	Calculati			
uischarge side nigh temperature al	sm (TAN), deg C	180	Mass Row, kg/l Power, kW	Y	44075 2482	53775	Calculate	one		_
🥪 is gas saturated with	water vapors ?		Power, KW Surge Point, Am	3.hr	2482	28/8	(i	alculate	6	a
Mol fraction of water, % mol		0.000	Stone Wall Point		29000	29000				
Water Vapor Pressure, bara		0.000	Compressor con	dition	Normal	Normal				
Moture molecular weight		0.000	Surge Valve sta	te	Close	Close				



http://www.petrosof.com/

64- GAS TURBINE CENTRIFUGAL COMPRESSOR

Gas turbine centrifugal compressor is highly specialized application to model the performance curve of centrifugal compressor driven by gas turbine. The application can be used to model the gas turbine performance along with centrifugal compressor. Also, a unique feature of application is to cover the performance of heat recovery steam generator (HRSG) which is a final element of gas turbine compressor unit.

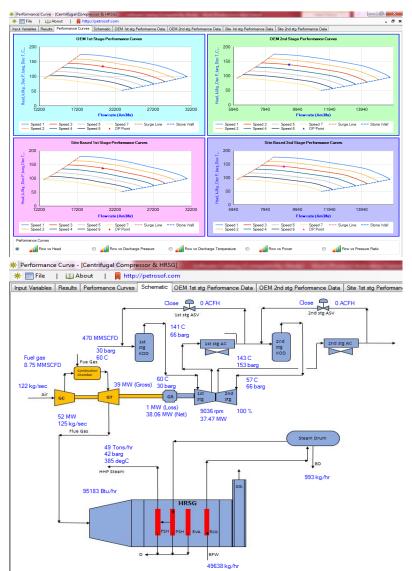
This application is develop with high accuracy to model correctly the complete unit including gas turbine, HRSG and centrifugal compressor. Application offers a complete details of tabulated results along with graphical presentation.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.



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65- COMPRESSOR SETTLEOUT PRESSURE

Compressor settle out pressure application is a unique and specialized application that can calculate the residual settle out pressure in a compressor loop after quick ort sudden shutdown scenario.

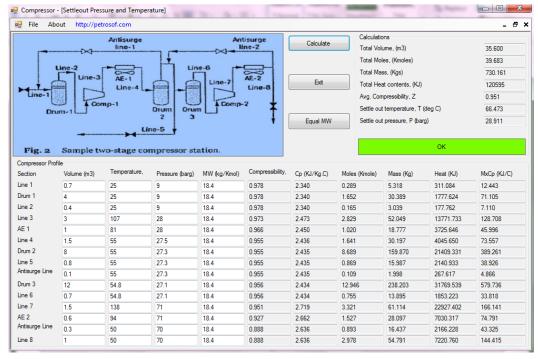
This application is developed with high accuracy to evaluate and calculate the emergency situation of compressor shutdown and pressure packing in the loop.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

Software is compatible to install and run on Windows 95-2000, Windows XP, Windows 7 and Windows 8.



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66- DYNAMIC PRESSURE

Dynamic pressure tool is developed with high accuracy based on the TOTAL's design standards to evaluate the piping dynamic pressure considering the flow of process fluid.

Dynamic pressure evaluation is an important phenomenon during the sizing of the process piping new or any modifications required in the existing piping system. This tool is highly recommended for the process engineering applications.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

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Pipe Dimensions		Allowable Maximum Limit		Warnings!
^P ipe OD (in)	26	Alpha Factor	288389.372	Actual Flow (ft3/day) > Max. Allowable Actual Flow (ft3/day)
Pipe Thickness, e (mm)	45	Beta Factor	-0.798	Standard Flow Actual (MMSCFD) > Max. Allowable Standard Flow (MMSCFD)
Fluid Molecular Weight, MW	22.45	Dynamic Pressure (Max. allowable), Pa	16917	Mass Flow Actual (kg/hr) > Max. Allowable
Mass Flow, Kg/hr	1685805.9	Pipe Area, m2	0.256	Mass Flow (kg/hr)
Pressure, P (Psig)	1827	Density @ P, T, Kg/m3	127.023	Actual Velocity > Max. Allowable Velocity
emperatrue, T (deg F)	158	Actual Flow (Max. allowable), ft3/day	8995500	Actual Velocity > Erosional Velocity
luid Phase Two Ph	ase 👻	Standard Flow (Max. allowable), MMSCFD	1204	
Piping Support Medium	-	Mass Flow (Max. allowable), Kg/hr	1349191	
Design Case king; Lig	uid & Multiphase Lines 🔻	Velocity (Max. allowable), m/sec	11.540	
Pipe Service tinuous	w/o Corrosion Inhibitor 🔻	Actual Conditions		
luid Properties		Standard Flow (Actual), MMSCFD	1503	📄 Calculate 🛛 🛞 Exit
	41	Viscosity, CP	0.027	
.iquid Density, dL (lbm/ft3)	41	Compressibility, Z	0.814	
/apor Fraction, Vf	0.96	Actual Flow, ft3/day	11239826	
125 Mol%	2	Actual Velocity, m/sec	14.420	Ok
		Dynamic Pressure (Actual), Pa	26411	
CO2 Mol%	4	Erosional Constant, C	100	
V2 Mol%	6	Erosional Velocity (API 14E), m/sec	10.838	
		Reynold No.	460716513	

67- GAS FLOW EQUATIONS

Gas flow equation is a tool developed to calculate the natural gas flow and associated process parameters in long pipelines. This tool is highly reliable and used in oil and gas industry for the evaluation of the gas flow through piping.

This application allow user to model flow through pipeline for eight (08) highly accurate flow equations available in the industry. User can model the flow through all the equations simultaneously for quick comparison and analysis.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

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Requirement		Pipe D	imensions for Equ	ivalent Diamter	(Series of Pipes)					-	Snipping	1001	(Lange and a		
Calculate Flow, Q (MMSCFD)		Pipe n	aterial	Carbo	n Steel 💦 👻	🔄 Pipe segme	🗌 Pip								
Calculate d/s Pressure, P2 (Ps	ig)	Absolu	te pipe roughness	.e(ft) 0.000	15	Poe IC		Pipe ID 3		Drag the cursor around the are: want to capture.					
Calculate friction factor by emp	sideal equation	Pipe fr	iction factor, f	0.017	4		٤	Pipe ID 5			want to ca	sture.			
		Pipe k	Pipe length, L (miles)			50		50	50		_	50			
Calculate gas viscosity by emp	ical equation	Pipe s	ze, D (in)	10		16	-	16	-	10		- 10			
Calculate gas Z by empirical e	quation		Pipe schedule			10	÷	10		T		- 10			
Inputs			Pipe ID (in)	15.5		15.5		15.5		15.5		15.5			
Gas flow, Q (MMSCFD)	n/a		ripe iD (in)			10.0		10.0		10.0					
our non, a (minour o)		Result	8			Malandari				C					
U/S pressure, P1 (Psig)	985	Moody	Friction Factor		1.74E-2	Molecular		17.38		Gas de	nsity @ STP		0.05		
D/S pressure, P2 (Psig)	844	Pipe n	lative roughness.	e/d	1.161E-04	Gas densit	(@T,P	3.05		Avg pip	eline press, Psia		930.98		
	60	Gas o	mpressibility, Z		0.864	Average o	mpressibility	0.87		API 14	E 'C' factor		100		
Gas Temperature, T (deg F)	60	Ganavi	scosity, mue (Cp)		0.021		volume, SCF	25.24		Erosion	al Velocity (ft/se	c)	57.27		
Gas specific gravity	0.6				530.866		rolane, sor			Ea, Ler	ath. Le (mile)		50		
	n/a	Critica	P2, (Psig)		330.000					<u> </u>			50		
Gas compressibility, Z			Flow	Row	Row max.	Mass Row	Pipe Inlet Velocity	Pipe Outlet	Pipe		Reynold	Conditio	n Profile		
Gas viscosity, mue (Cp)	n/a		Equations	(MMSCFD)	(MMSCFD)	(bm/day)	(ft/sec)	Velocity (ft/sec)	Erosio	n	No.	Conduc	ri Piole		
Heat capacity ratio, K (Cp/Cv)	1.3	E.	General	86.74	141.95	3973370	9.68	9.88	9.88 N/A		N/A		3139925		t Sub-Critical
	Continuous w/o Cl 💌		Weymouth	100.09	163.80	4584770	11.17	11.40	N/A		3623078	Turbuler			
Row and CI Injection			IGT	111.72	193.00	5117416	12.47	12.73	N/A		4043998	Turbuler			
Pipeline efficiency factor, E	99		Panhandle A	125.89	214.18	5766794	14.05	14.34	N/A		4557164	Turbuler			
	0		Panhandle B	128.01	211.56	5863689	14.29	14.58	N/A		4633734	Turbuler			
Bevation diff. dx (+/- mile)	-		Mueller	131.41	231.55	6019546 4598664	14.67	14.97	N/A N/A		4756899 3634058	Turbuler			
Ruid Properties			Spitzglass LP	9.99	17.92	4538664	1.11	1.14	N/A		3634058	Turbuler			
	0.001		Spitzglass LP	81.81	133.89	3747651	9.13	9.32	N/A		2961552	Turbuler			
Mol frac. H2S			opergrade				0.10	0.04			Loo rock				
Mol frac. CO2	0.02														
Molfrac. N2	0.04		Calculate		🔀 Ext				-	-	ок	_			

68- LIQUID PRESSURE DROP

Liquid pressure drop application is developed with high accuracy to model the pressure drop through series of pipes with varying size and lengths. Also, piping hydraulic details are calculated and shown in tabulated format for each section of the pipe and graphical presentation of the pipe hydraulic is developed and shown in the application for analysis.

Application uses eight types of friction factor calculation options and three types of K-factor calculation models in the application.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

ompressible	Fluid Inputs	Hydraulics															
Inputs Inputs Inputs Intel Pressure P1, barg Elowate Q, m3/hr Density, Kg/m3 Uscottly, cp 15 Vapor Pressure, bara 5 Cricial Pressure, bara 100			Ve Fit Bi	ead Loss Res Nocity Head I ting Head Lo evation Head essure Hed L	Loss, m ss. m I Loss, m Loss, m	0.028 0.012 0.000 0.000	Press. Total Outlet DP / I	Pressure Drop, Ber Total Eq. Length L.m. Ouldet Pressure P2, beng DP / Eq. Length, beng/m. Calculate									
Destination F Pipe Friction Fittings K Fra	Fractor	Churchil and Crane	0		н	ad Loss by I		0.0406		Calculate	,	Ox	😮 Exit				
Pipe Profile -	Comp	Material	Pipe NP	S Pipe	SCH	L(m)	EL(+/-)	OD(n)	Rel Rof (in)	Fitting	Pipe ID2	Angle	Qty	к			
🗸 tem 1	Pipe Se 💌	Carbon 💌	4	• 40	-	2	0	4.5	0.0018	4.026	4.026	0	1	0.4380			
🗂 Item 2	Pipe Se 👻	Carbon 👻	4	~ 40	÷	2	0	4.5	0.0018	4.026	4.026	0					
Item 3	Pipe Se 👻	Carbon 👻	4	~ 40	÷	2	0	4.5	0.0018	4.026	4.026	0					
Item 4	Pipe Se 👻	Carbon 👻	4	÷ 40	÷	2	0	4.5	0.0018	4.026	4.026	0					
tem 5	Pipe Se 👻	Carbon 👻	4	~ 40	Ŧ	2	0	4.5	0.0018	4.026	4.026	0					
tem 6	Pipe Se 👻	Carbon 👻	4	~ 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
tem 7	Pipe Se 👻	Carbon 👻	4	~ 40	-	0	0	4.5	0.0018	4.026	4.026	0					
Item 8	Pipe Se 👻	Carbon 👻	4	~ 40	-	0	0	4.5	0.0018	4.026	4.026	0					
Item 9	Pipe Se 👻	Carbon 👻	4	~ 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
ltem .	Pipe Se 👻	Carbon 👻	4	- 40	Ŧ	0	0		0.0018	4.026	4.026						
tem Item	Pipe Se 👻	Carbon 👻	4	- 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
tem 🗌	Pipe Se 👻	Carbon 👻	4	- 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
tem 🗌	Pipe Se 👻	Carbon 👻	4	- 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
tem Item	Pipe Se 👻	Carbon 👻	4	- 40	Ŧ	0	0	4.5	0.0018	4.026	4.026	0					
tem	Pipe Se 👻	Carbon 👻	4	- 40	-	0	0	4.5	0.0018	4.026	4.026	0					



69- LOOPED PIPING

Looped piping application is a specialized software to model the flow of gas through a looped piping network. Looped flow piping scenario often exist in the oil and gas industry where process engineer require to determine the accurate flow through the system based on the natural resistance of the looped piping network.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

🔆 Looped Pipes - (Pipe F	low]	Pipe Material Record (Material) 12 Pipe OD (in) 26 33 Wall thickness (mm) 39 34 Pipe Length (ft) 7 CI Inhibitor Continuous w/o C Actual Velocity < Erosion Velocity Mail thickness (mm) 39 39 Pipe Length (ft) 7 Continuous w/o C Actual Velocity < Erosion Velocity Actual Flow (ft 3/sec) 127.773 44 Pope Conflictent, K 0.0000777 Area of Pipe ft 2) 2.867 CC Factor (@ API 14E 100 144 Velocity (ft /sec) 35.217 Vapor Fraction 0.950 0.950 0.950 0.950 Vapor Dentaty (@ STP 0.059 Vapor Dentaty (@ STP 0.059 Vapor Dentaty (@ STP 0.059 Vapor Dentaty (@ STP 0.059 Vapor Dentaty (@ TP 0.059 Vapor Dentaty (@ TP 0.059									
🔆 🔚 File \mid 📖 Ab	out 💼 Lo	op Image www.pet	rosof.com								_ 8 ×
Inputs		Loop-1 ABE			Loop-2 A	CE		Loop-	3 ADE		
Gas Flow (MMSCFD)	1500	Pipe Material	Steel, welded an	id seamless 💌	Loop2	Required		V Lo	op3 Required		
Pressure (Psig)	1812	Pipe OD (in)	26		Pipe Mate	erial	Steel, welded and seamless	Pipe I	Material		and seamles 💌
	158	Wall thickness (mm)	39		Pipe OD		24		DD (in)	26	
Temperature (deg F)	26	Pipe Length (ft)	7		Wall thick Pipe Leni	ness (mm) nth.ftt)	20		hickness (mm) .ength (ft)	20	
Inlet Pipe OD (in)		CI Inhibitor	Continuous w/o	CI 👻	CI Inhibito		Continuous w/o Cl	Cl Inh		Continuous w/	⁄₀ CI 👻
Pipe Wall Thickness (mm)	39	Actual Veloci	ty < Erosion Veloci	ty		Actual Veloc	ty < Erosion Velocity		Actual Velocity	< Erosion Velo	icity
Pipe Steel, welded	and seamle 🔻	Inlet Pipe		Loop-1 ABE			Loop-2 ACE		Loop-3 ADE		
Continuous w	(- Cl	Gas Mass Flow (bm/hr)	3708773	Gas Mass Flow (bm/hr)	1842567	Gas Mass Flow (bm/hr)	821549	Gas Mass Flow (bm/hr)	1044657
Cl Inhib.	/o Cl 👻	Actual Flow (ft3/sec)	127.773	Actual Flow (ft3/s	ec)	63.479	Actual Flow (ft3/sec)	28.304	Actual Flow (ft3/s	sec)	35.990
Molecular Weight, MW	22.49	Static Head, HA (ft)	0.610	Static Head, HA	ft)	82.920	Static Head, HA (ft)	36.972	Static Head, HA	(ft)	47.012
	0.04	Pipe Coefficient, K	0.000077	Pipe Coefficient,	к	0.000282	Pipe Coefficient, K	0.001257	Pipe Coefficient,	к	0.000806
Liquid Fraction (wL)		Area of Pipe (ft2)	2.867	Area of Pipe (ft2)		2.867	Area of Pipe (ft2)	2.389	Area of Pipe (ft2)		2.867
Liquid Density (lbm/ft3)	41	'C' Factor @ API 14E		'C' Factor @ API	14E	100	'C' Factor @ API 14E	100	'C' Factor @ API	14E	100
	0.04	Hazen Williams C Factor	100.0	Hazen Williams C	Factor	100.0	Hazen Williams C Factor	100.0	Hazen Williams C	Factor	100.0
Mol Fraction of N2		Velocity in Pipe (ft/sec)	44.559	Velocity in Pipe (f	t/sec)	22.137	Velocity in Pipe (ft/sec)	11.847	Velocity in Pipe (f	t/sec)	12.551
Mol Fraction of CO2	0.025	Erosional Velocity (ft/sec)	35.217	Erosional Velocity	(ft/sec)	35.217	Erosional Velocity (ft/sec)	35.217	Erosional Velocity	(ft/sec)	35.217
	0.008	Vapor Fraction	0.960	Vapor Fraction		0.960	Vapor Fraction	0.960	Vapor Fraction		0.960
Mol Fraction of H2S			0.059	Vapor Density @ (bm/ft3)	STP	0.059	Vapor Density @ STP (bm/ft3)	0.059	Vapor Density @	STP (bm/ft3)	0.059
Calculations			7.802	Vapor Density @ (bm/ft3)	ТР	7.780	Vapor Density @ TP (bm/ft3)	7.792	Vapor Density @	TP (bm/ft3)	7.789
Calculate	🔀 Exit	Specific Gravity of Gas	0.776	Specific Gravity of	f Gas	0.776	Specific Gravity of Gas	0.776	Specific Gravity of	of Gas	0.776
Calculate	U Cu	Mixture Density (bm/ft3)	8.063	Mixture Density (I	bm/ft3)	8.063	Mixture Density (bm/ft3)	8.063	Mixture Density (I	bm/ft3)	8.063
		Gas Viscosity (CP)	0.028	Gas Viscosity (CF	9	0.028	Gas Viscosity (CP)	0.028	Gas Viscosity (CF	?)	0.028
Ok		Compressibility, Z	0.794	Compressibility, Z		0.794	Compressibility, Z	0.794	Compressibility, Z		0.794

70- NATURAL GAS HYDRATE

Natural gas hydrate application is a specialized application to model a very important phenomenon of hydrate formation in gas pipelines in oil and gas industry. Hydrate formation is critical phenomenon that must be prevented by managing the flow, temperature, pressure and injecting chemicals. This application allow users to accurately determine the scenario and further taken measures to prevent.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

🔆 Natural Gas Hydrate Temperature and Wa	ter Contents - [Calculations]			
🔆 🛅 File 🛄 About http:pet	rosof.com			_ 8 :
- Natural Gas Water Content Models	Natural Gas Hydrate Formation Models	Inputs		
Sloan's Method	Berge's Correlation	System Characteristics	Gas-Liquid Equilibrium	ium
Khaled's Method	Berge's Correlation		🔘 Gas-Solids Equilibr	ium
 Aireza Bahadori's Method 	Motiee's Correlation	Pressure, P (Psig)	436.60	185 Psig < P < 1987 Psig
○ Zhu Lin's Method		Temperature, T (deg F)	119.84 .	40 F < T < 120 F
○ Behr's Method	O Hammerschmidt's Correlation	Gas specific gravity, SpG	0.69	
⊘ Kazim's Method		Salt contents of gas, S	0	
Saturated Vapor Pressure (SVP) Model	O Towler and Mokhatab's Correlation	CO2 Mol%	2	
Modified Ideal Model (MDIM)		H2S Mol%	4	
 Simplified Thermodynamic Model (STM) 	Kidnay and Parish's Correlation	Results		
Bukacek's Method		H2S equivalent conc., HEC	(mol%)	5.400
	Alireza Bahadori's Correlation	Sour gas correction factor, F		1.021
Modified Bukacek's Method		Natural gas (Sweet) water co		3072.789
		Natural gas (Sweet) water co		
Calculate 😧 Exit	Ok	Natural gas (Sour) water con	· · · · ·	3135.835
		Natural gas (Sour) water con		195.738
		Hydrate Formation Temperat		-17.587
		Hydrate Formation Temperat	ure, T (deg C)	-17.987

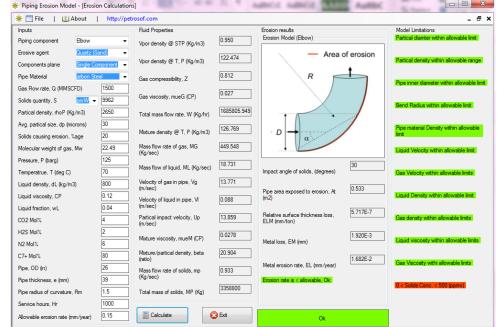
71- PIPE EROSION MODEL

Pipe erosion model is a specialized application developed to model the erosion rate and assessment of the health of the piping components. The application is developed based on Norvegian piping erosion standard and determine highly accurate results of erosion rate calculation based on the process fluid.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



72- STEAM SYSTEM MODEL

Steam system model is a specialized and highly accurate application developed based on the water and steam standards IFPS 97 guidelines. The application covers entire range of steam and boiler system components including steam turbines and boiler house. The application is a suite of entire steam and boiler system design calculations.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

			Boile	r Calcula	ations			
nputs			Boiler Feed Water Bal			Steam Produced		
Deaerator Inputs			Pressure, bara		3.200	Pressure, bara	37.000	Calcula
Deaerator pressure	3.2							
Select Boiler Fuel		bara 🔻	Temperature, deg C		135.758	Temperature, deg C	287.780	7
	Natural G	is 🔻				1		-
uel GCV, kJ/kg	52200		Mass Flow, kg/hr		20147.027	Mass Flow, kg/hr	18636.000	1
Combustion efficiency (%age)	68.5				-			_
Blowdown rate (%age)	7.5	=	Sp. Enthalpy, kJ/kg		570.935	Sp. Enthalpy, kJ/kg	2937.712]
	1.5							🙁 Exit
Steam Produced			Sp. Entropy, KJ/kg.K	c	1.695	Sp. Entropy, kJ/kg.K	6.354	
Steam mass flow	18636	kg/hr 🔻						
Pressure	37	bara 🔻	Energy Flow, kJ/hr		11502634.548	Energy Flow, kJ/hr	54747206.418	
Temperature	• 287.78	deg C 🔻	Quality		Liquid	Quality	Steam	7
Resulting units	Imperia	I @ SI			Light	1	licent	_
Boiler Blowdown		Boiler Para	neter					
Pressure, bara	37.000	Boiler Duty	, kJ/hr	44854168.027		Ok		
Temperature, deg C	245.754	Fuel Energ						
		Fuel Energ	y, ku/nr	65480537.266			∧ Steam	
Mass Flow, kg/hr	1511.027						1 Steam	
		Fuel Consu	mption, kg/hr	1254 416)	
Sp. Enthalpy, kJ/kg	1065.233			1204.410				
Co. Entropy In Mars M		_				Boiler		
Sp. Entropy, kJ/kg.K	2.755	Fuel Flow (@STP,m3/hr	1614.436				
nergy Flow, kJ/hr		_				CHINA CHINA		
anargy now, w/hr	1609596.157				Feed	Water	Blow	vdown
Quality	line of	_					5104	
	Liquid							

73- TANK VOLUME

Application of tank volume is developed to calculate the volume of all (12) design types of tanks used in oil and gas industry. The application is design with high accuracy to determine the total tank volume also, partial filled tank volume at various levels.

Highly accurate mathematical and differential equations are used within the application.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

C	3	🔆 Tank Volume - [Elliptical Tank					
f		💀 📄 File 🛛 👖 Types of T	anks 🛄	About www.petrosof.com			_ & ×
n		Inputs Tank Tag#		Tank Volume @ Operating Level Actual Liquid Level, L (m)	5.00	Tank Picture	
nt It		Tank Width W (m)	5	Actual Liquid Volume, VL (m3)	196		>
		Tank Length, L (m)	10			hept	///
		Tank Height, H (m)	10	Tank Volume @ HLL High Liquid Level, HLL (m)	9.50		length
		level Instrument Range, R (m)	10	High Liquid Volume, VHLL (m3)	385	width	
		Operating Level in Tank, L (%)	50				
s		High Liquid Level, HLL (%)	95	Tank Volume @ LLL Low Liquid Level, LLL (m)	1.00		
d		Low Liquid Level, LLL (%) Density of Liquid, rho (Kg/m3)	10	Low Liquid Volume, VLLL (m3)	20		
e	1	Density of Eliquid, mo (Kg/m3)	1042		20		
		Calculation		Working Capacity of Tank Working Capacity, WC (m3)	365		
d		Calculate	Exit	Websels to Table			
С		Ok		Weight of Liquid in Tank, W (Kg)	204596		
	l				ļ		
S							

74- TOTAL DYNAMIC HEAD OF PUMP

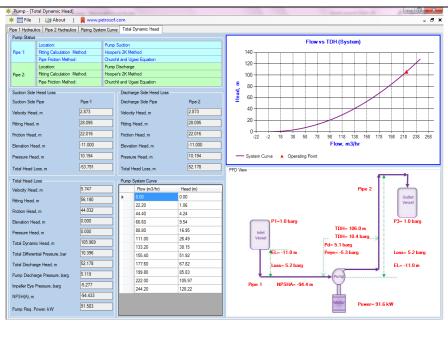
Total dynamic head of pump TDH is highly accurate and important application used by process engineers to model the dynamic head of the pump in service or design a new pump application in field.

The application used highly accurate and most commonly used methods of friction factor calculations, resistance coefficients of the piping components. Application offers a complete analysis and provide detailed results of the entire pump system from suction side to discharge side. Also, a graphical presentation of the system resistance curve is plotted within the application.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



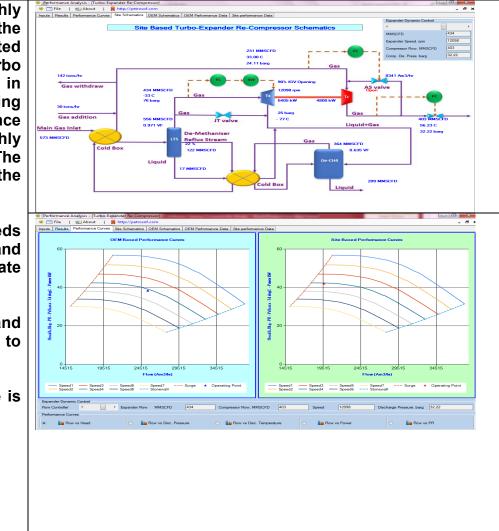
75- TURBO EXPANDER RE-COMPRESSOR

Turbo expander re-compressor is a highly specialized application developed to model the actual operation of turbo expander and associated re-compressor for natural gas system. Turbo expander is highly specialized equipment used in oil and gas industry in cryogenic system. Modeling of natural gas system, recovery and performance curve evaluation of compressor is highly demanding and a tedious manual calculation. The application uses accurate algorithm to model the machine and performance curves dynamically.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



76- PSYCROMETER

Psychrometer application is developed to determine the psychrometric calculations of water and air. By this application user can calculate water vapor saturation pressure, dew point, relative humidity and complete psychrometer evaluation. User need to select the options as desired from the calculation section and by providing basic information of temperature and pressure complete psychrometeric properties can be determined. A simple yet comprehensive application for engineers to perform desk calculation.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

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© Water Vapor Saturation Pressure © Dew Point from Relative Humidity	Results Water Vapor Saturation Pressure Ambient Temperature Over Ice	
Relative Humidity from Dew Point and Amb. Temperature	Ambient Temperature Tamb (deg C) Results	40
Use Psychrometers	Water Vapor Saturation Pressure Pws (hPa) Critical Temperature Tc (K)	73.890 647.096
0k	Critical Pressure Pc (hPa) Temperature Ratio Factor V	220640.000 0.516
Calculate	Equation constant C1 Equation constant C2 Equation constant C3	-7.860 1.844 -11.787
htp://PetroSof.com	Equation constant C4 Equation constant C5	22.681 -15.962
	Equation constant C6 Equation constant a0	-13.928
	Equation constant a 1 Temperature ratio factor Theta	0.000
	Tripple Point Temperature Tn (K) Vapor Pressure @ Tn Pn (hPa)	6.117

77- OIL SKIMMER DESIGN

In oil and gas plants produced water is often stored in large tanks after treatment however, still a significant quantity of oil is separated in the tanks due to large residence time. So, large tanks in oil and gas plant often comes with oil skimmers to collect the oil from the tanks. Therefore, this application is developed to size and design the appropriate skimmer. User can also evaluate the existing skimmer design to be adequate for the need. The application allows to perform both task of sizing and evaluation of existing design.

The application consist of three most common types of skimmer designs user can select and perform calculations with;

- Horizontal cylindrical skimmer
- Horizontal rectangular API skimmers
- Vertical skimmer

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

🗄 🥅 File 📔 🛄 About 📔 http	p://petrosof.com													- 8 ×				a (API) Skim	mer Verlies C	edical Chie						-
orizontal Cylindrical Skimmer Horizontal F	Rectangular Cross Section	(API) Sk	immer	Vertical Cylin	drical Skimn	ner										Inputs	Socialization Cross 36030	Skimmer		nuncai skimmi			Coalescer Design	,	_	
Inputs		Skimn	ner Ratin	ng					Coalescer D	esian					1	Coalescer Design			time, To (min)		0.431		Dil conc. in Inflov	v, Ci (ppm)		2000.000
Coalescer Design				To (min)		0.432			Oil conc. in I		ypm)		2000.000			Coalescer size d/s skimmer required										
													_			Oil conc. in outflow, Co (ppm)	80	Water re	etention time, Tw	cal. (min)	8.138	'	nflow oil droplet i	size, dmi (mM))	200.000
Coalescer size d/s skimmer required		Water	r retentio	in time, Tw ca	al. (min)	13.305		_	Inflow oil dro	plet size, di	mi(mM)		200.000					Chimmen	r capacity, Qpw (100)			Dutflow oil drople	tsize.dm.(m)li	/ 0	20.000
Oil conc. in outflow, Co (ppm)	80					13.305						1	200.000			Actual Skimmer Rating		Skimmer	r сараслу, црw (SPD)	8279.202			a oreo, on priv		20.000
									Outflow oil d	molet eize	dm (mM)					Skimmer Rating		Skimmer	r volume, Vpw (ft	a	262.500	(Overall efficiency	r. E (%)		96.000
Actual Skimmer Rating		Skimn	ner capa	icity, Qpw (BF	-0)	13091.2	291						20.000			Width, W (ft)	5				202.000					
									Overall effici	angu E (%)	, ,					Height, H (ft)	2.5	Water re	etention time req.	Twr (min)	7.926	E	Efficiency of Sp p	backs, Esp (%)	80.000
Skimmer Rating		Skimn	ner volun	me, Vpw (ft3)		414.887	7		Overall effici	ency, E (4))		96.000			Length, L (ft)	21					,	Nos. of SP Packs	s required N		2
Diamter, D (in)	60															Produced water flow, Qw (BPD)	8000	Avg. wat	ter velocity, Uw (t/sec)	0.043		103.01.01.01.1.0040	a required, re		2
		Water	retentio	in time req. T	wr (min)	8,135			Efficiency of	Sp packs,	Esp (%)		80.000					0			Ok					
Length, L (ft)	42.26															Oil contents of water.Qo (mg/L, PPM)	2000	Check			UK.				Ok	
		Avg. y	water vel	locity, Uw (ft/	(sec)	8.345		_	Nos. of SP F	Packs requi	ried, N		2			Oil droplet size, dm (mM)	500						Calculate			🔀 Exit
Produced water flow, Qw (BPD)	8000					8.345										Water sp. gravity	1.07									
		Check				Ok													Width Height	Length L		Dil C droplet ri	Avg.wa	Water	Skimmer Ski	mmer retention D) req.
Oil contents of water,Qo (mg/L, PPM)	2000	Check	¢			UK					Ok					Water viscosity. (cP)	1.1		(ft) (ft)	(ft) n	stio Control s	size ti	me velocity min) (ft/sec)	time	volume cap (#3) (BF	D) reg
Oil droplet size, dm (mM)	500										ן		_			Oil specfic gravity	0.87	<u>۲</u>	4.40 2.20	43.99 10	0.00 Reten 2		38 0.05	13.66 4	25.60 152	57 6.97 Ok
	500								Calcula	ste			🙆 Exit			Oil content reduction, Qo(red) (mg/L,	800		4.74 2.37			00.00 0.			25.60 141	
Water sp. gravity	1.07							L								PPM) Desired rentention time, Tw (min)			5.22 2.61 5.97 2.99	31.29 6. 23.87 4		00.00 0.			25.60 128 25.60 112	
							Oil	Oil risin	Ava wa	te Water retentio	Skimme	r Skimme	Water				10		7.52 3.76	15.04 2.						1.54 11.93 Ok
Water viscosity, (cP)	1.1		Diamt	ter Length	L/D ratio	Control	droplet size	time				capacit	f retention	n Check		Turbulence factor, (%age)	90	1	14.24 7.12	7.12 0.	50 Settlin 2	00.00 1.	23 0.01	23.19 7	22.64 800	0.00 22.58 Ok
Oil specfic gravity	0.07		_				(mM)	(min)	(ft/sec)	(imily	' (ft3)	(01.0)	req.					*								
on openio granty	0.87	•	56.73		10.00	Retenti		0.41	4.56	13.31	414.93	13847	_	Ok												
Oil content reduction, Qo(red) (mg/L,	800		61.11		8.00	Retenti	200.00	0.44	5.29	13.31	414.93	12854		Ok												
PPM)			67.26		6.00	Retenti	200.00	0.48	6.41	13.31	414.93	11679	_	Ok												
Desired rentention time, Tw (min)	10		77.00		4.00	Retenti	200.00	0.55	8.40	13.31	414.93	10202	_	Ok												
Turbulence factor, (%age)			97.01		2.00	Retenti	200.00	0.70	13.33	13.31	414.93		13.15	Ok												
rubulence ractor, (wage)	90		192.84	4 8.04	0.50	Settling	200.00	1.39	52.68	26.13	814.87	8000.00	26.15	Ok												
		*																								
															-											

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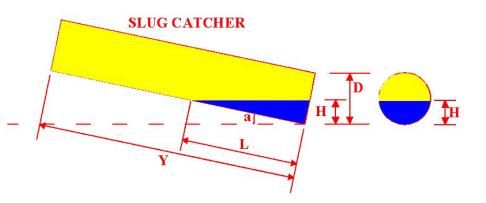
78- SLUG CATCHER SIZING

In oil and gas plants slug catcher is an important and often the very first three phase separator to receive the associated gas from offshore or onshore reservoir. The orientation of slug catcher is often makes a challenge for the engineers to determine the volume of liquid inventory inside. This application is specifically developed to determine the correct volume of slug catcher by simple field inputs given by user.

The application is simple to use where user needs to provide required information in input fields and results are obtained with simple pressing calculate button.

Users are cautioned about incorrect inputs and limitations during valve sizing and guide them to achieve the correct results.

An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



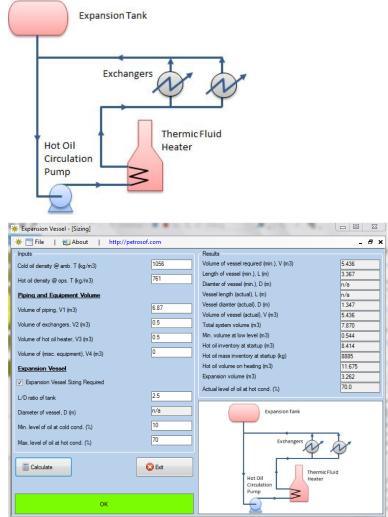
79- HOT OIL SYSTEM

Hot oil is a vital element in oil and gas plants as heating media in process heat exchangers. Sizing of hot oil vessel for inventory management during start up and commissioning phases is an important task.

Process engineers often need to determine the fluid hydraulics of hot oil system and associated piping and vessel which can be a tedious task. this application offers an accurate and quick estimation of hot oil hydraulics to save time and effort.

In this application user's are required to provide basic process information in the input section and results are calculated and displayed in the result section by simply pressing "calculate" button.

Users are prompted about the limitations of the programs in the message bar on the screen. An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

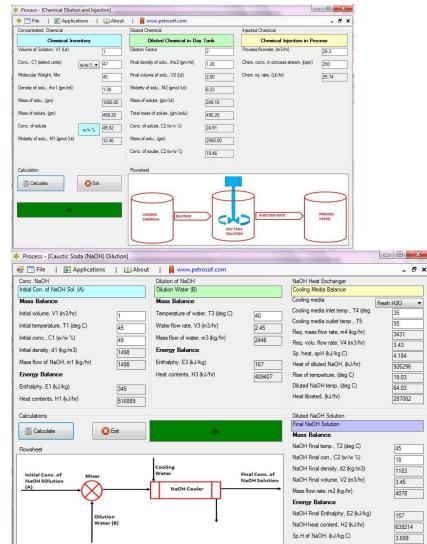


80- CHEMICAL INJECTION

Chemical injection in process stream is essential part of the operation to control the quality and maintain the product specifications. Estimations of chemical injection in process stream, dilution and concentration and accurate injection rate management can be critical task.

This application is developed specifically to estimate the accurate injection rate, dilution and concentration of chemical and other critical parameter. This application is simple to use where user's need to provide basic information then application will calculate the required results quickly.

Users are prompted about the limitations of the programs in the message bar on the screen. An introductory demonstration of this software is available online at <u>www.petrosof.com</u>



81- CENTRIFUGAL PUMP MODELING

Centrifugal pump modeling is a specialized application developed with great care and accuracy for designing a new pump and its performance curves.

This applications is a unique type especially for pump manufacturers and designers. In this application engineer can define the boundaries and dimension of the pump for a system and determine the performance curves of the pump.

In this application users can select the basic design of the pump by selecting the given options in the application and at the end by pressing the calculate button a complete design configuration and performance curves of the pump will be determined. Users can simply alter the inputs to vary the results as wish to achieve the desire performance and then order the pump to vendors to supply the pump with matching characteristics.

Users are prompted about the limitations of the programs in the message bar on the screen. An introductory demonstration of this software is available online at <u>www.petrosof.com</u>

