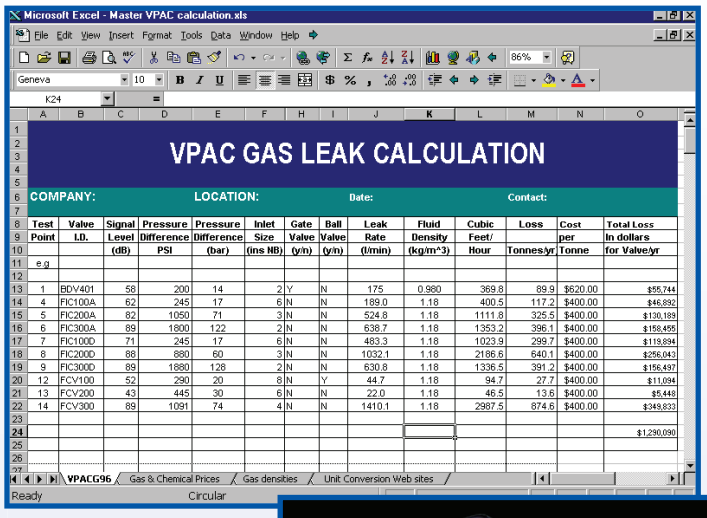
MISTRAS
A World of NDT Solutions
Products & Systems Division

LOSS CONTROL FOR REFINERIES

CHEMICAL PLANT AND OFFSHORE PLATFORMS

Measurement on a Relief Valve



Microsoft Excel - Master VPAC calculation.xls

VPAC GAS LEAK CALCULATION

COMPANY: LOCATION: Date: Contact:

Test Point	Valve I.D.	Signal Level (dB)	Pressure Difference PSI	Pressure Difference (bar)	Inlet Size (ins NB)	Gate Valve (y/n)	Ball Valve (y/n)	Leak Rate (l/min)	Fluid Density (kg/m^3)	Cubic Feet/ Hour	Loss Tonnes/yr	Cost per Tonne	Total Loss in dollars for Valve/yr
e.g													
1	BDV401	58	200	14	2	Y	N	175	0.980	369.8	89.9	$620.00	$55,744
4	FIC100A	62	245	17	6	N	N	189.0	1.18	400.5	117.2	$400.00	$46,892
5	FIC200A	82	1050	71	3	N	N	524.8	1.18	1111.8	325.5	$400.00	$130,189
6	FIC300A	89	1800	122	2	N	N	636.7	1.18	1353.2	396.1	$400.00	$158,455
7	FIC100D	71	245	17	6	N	N	483.3	1.18	1023.9	299.7	$400.00	$119,894
8	FIC200D	88	880	60	3	N	N	1032.1	1.18	2186.6	640.1	$400.00	$256,043
9	FIC300D	89	1880	128	2	N	N	630.8	1.18	1336.5	391.2	$400.00	$156,497
12	FCV100	52	290	20	8	N	Y	44.7	1.18	94.7	27.7	$400.00	$11,094
13	FCV200	43	445	30	6	N	N	22.0	1.18	46.5	13.6	$400.00	$5,448
14	FCV300	89	1091	74	4	N	N	1410.1	1.18	2987.5	874.6	$400.00	$349,833
													$1,290,090

Spreadsheet Calculation of Losses

VPAC™

- Identifies through-valve gas losses
- Estimates Leak Rate
- Totally Non-invasive
- Helps plants to comply to EPA Reg. 40 CFR Part 61
- Works on steam valves especially in power generating plants (heat loss)
- On-line Measurement
- Field-proven by British Petroleum™
- 10-year Database
- Portable Instrument
- Intrinsically Safe (Atex EEx ia IIC T3; Factory Mutual Class I, Div. 1, Groups A, B, C, D, T4)
- Simple Operation
- 300 Point Memory
- PC Loss Calculator

5131 Portable Intrinsically Safe Monitor

VPAC™/5131 - Loss Control for Valves in Process Plants

VPAC™ estimates through-valve leakage based on measurements made using a Physical Acoustics Model 5131 portable monitor together with data on valve size, type, and differential pressure. Developed for use in refineries, chemical plants and offshore platforms by British Petroleum™ (B.P.), VPAC is sold under licence exclusively by Physical Acoustics Limited. This technology package is primarily used for estimating gas losses, gas-to-gas or liquid-to-gas, but limited data on liquid leakage is also included. The system is immune to environmental noise by virtue of the advanced sensor technology. This ensures that measurements are easily made on-line and does not require extensive training of operators.

DATABASE

The basis of VPAC is a database built up by British Petroleum over the past decade that estimates leak rate from the acoustic signal level, taking into account valve type, size, and pressure. The database was built up by removing valves from service that had been identified as leaking by the use of the portable monitor, and testing them under controlled conditions in the laboratory. Several hundred measurements were made. This data is included in the package in both numeric and graphical form, together with procedures for making site measurements and calculating losses.

BENEFITS

B.P. uses this technology in its operations and loss-control, resulting in a very fast payback. Site experience has shown that 5-10% of valves leak, and 1-2% of valves cause 70% of total loss. Savings in excess of $100,000 per site are easily achieved. Where gas recovery systems are in use, monitoring product valve leakage helps to identify and estimate the extent of the downgrading of valuable products to fuel gas due to valve leakage. This is something previously identified by the flare, but goes unseen with gas recovery in use. Cost savings are achieved in maintenance planning, troubleshooting plant operations and monitoring of losses for environmental purposes.

PREDICTIVE EQUATION

Using their database, B.P. developed an calculation that estimates losses from the input data. This is provided as part of the package in a spreadsheet form, which makes use very easy on a PC. It is particularly useful on large sites that have many hundreds of valves. It is also provided in a graphical form for quick use out in the plant.

CUSTOMER COMMENTS

". . . by using this instrument we can identify with much more certainty (and much faster) the leaking valve, enabling a quick repair (without trial and error attempts in finding the faulty valve) and thus reducing the hydrogen leakage which translates into more hydrotreating capacity (= more money!). " Shell Oil

". . .our hydrotreater was losing $900,000 per year through one valve. The VPAC helped us justify $60,000 of bypass lines to eliminate future problems." Mobil

". . .our survey found 20% leaks of all sizes, and the estimated value was several hundred thousand $ worth in a one week. The survey didn't even cover the most valuable unit, which was shutdown at the time." UOP

". . .we can check a valve in under 20 seconds." Tosco

VPAC CONSISTS OF:

- License for its use on a single site, plus technology package containing:
- Product Manual/Information: Introduction, Background, Instrument Operation, Operating Procedure and Maintenance
- Database - Graphical and Numeric (MS EXCEL)
- Reference Materials and Papers

MEASUREMENT HARDWARE:

- To use VPAC you will need the Physical Acoustics Model 5131 Portable Monitor and D9203IS sensor to make the measurements.
- On-site training is optional.
- Ordering information and specifications as follows:
  Model 5131 monitor, Model D9203IS sensor and cable, charger (specify 110/220V), field carrying case, 300 point memory, fully autoranging measurement, 85dB dynamic range.
- Intrinsically Safe to : Atex EEx ia IIC T3; Factory Mutual Class I, Div. 1, Groups A, B, C, D, T4

VPAC Procedures and Database developed by British Petroleum, 5131 System by Physical Acoustics.

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