Process Data for SmartPlant Instrumentation

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SmartPlant ©

Implementation Team

By John Dressel

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Process Department Issues

- **Identifying Process Customer**
  - The Process Data is not a project deliverable to the Client on most projects
  - The Primary Process Customer is Control Systems for the Sizing and Calibration of the Inline Instrument devices
  - Mechanical and Piping also use the Process Design Conditions for equipment and line sizing and material spec
- **Additional Process Hours for SPI loading**
  - Process develops initial Process Data on spreadsheets using the stream data and material balance
  - Additional time to enter this data into SPI is not normally estimated in the Process Home Office Man Hour Estimate
  - It is the responsibility of Control Systems to make the SPI data loading as efficient as possible for Process

Process Department Issues

- **Change Control in SmartPlant Instrumentation**
  - Because of the Critical and Dynamic nature of process data it is important that Change Management Procedures be in place on every project.
  - The Process Engineer is the Owner of the Process Data in SmartPlant Instrumentation
- **Process Training for SmartPlant Instrumentation**
  - It is the responsibility of the Control Systems SmartPlant Instrumentation administrator to Train the Process Engineers in the use of the Process Module
  - Use the SPI Process Module tutorial provided by Intergraph
  - Supplemental Training of Browser and Save As functions

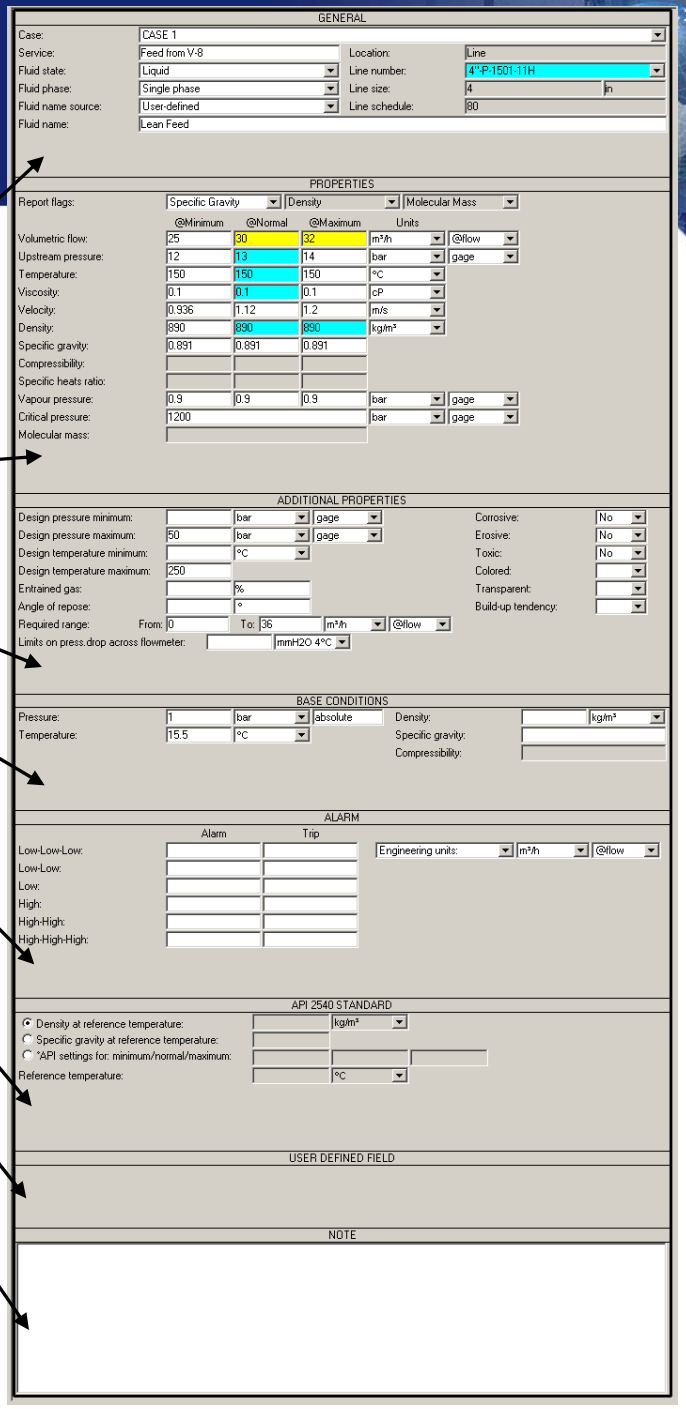
Current Process Data Work Practices

- **Hard copied process datasheets**
  - Process issues paper copies of Process Datasheets
  - Requires Control Systems to manually load Process data into SPI and requires some interpretation by SPI users.
- **Excel Process datasheets**
  - Process can issue Excel Spreadsheet Datasheets
  - Requires Control Systems to manually load Process data into SPI but has some Cut and Paste capability
- **Process Loads Process data into another tool for import into SPI**
  - Complex method that brakes chain of data ownership
- **Process Loads Process data directly into SPI**
  - Preferred method but requires SPI trained Process users

SPI Process Data Module

- **Tag data is the primary process loading method.**
  - **General Instrument area**
  - **Process Properties area**
  - **Additional Properties**
  - **Base conditions area**
  - **Alarm conditions area**
  - **API 2540 Standards**
  - **User Defined Fields**
  - **Process Notes Area**

- **Different Process Functions Require Different Process Data**



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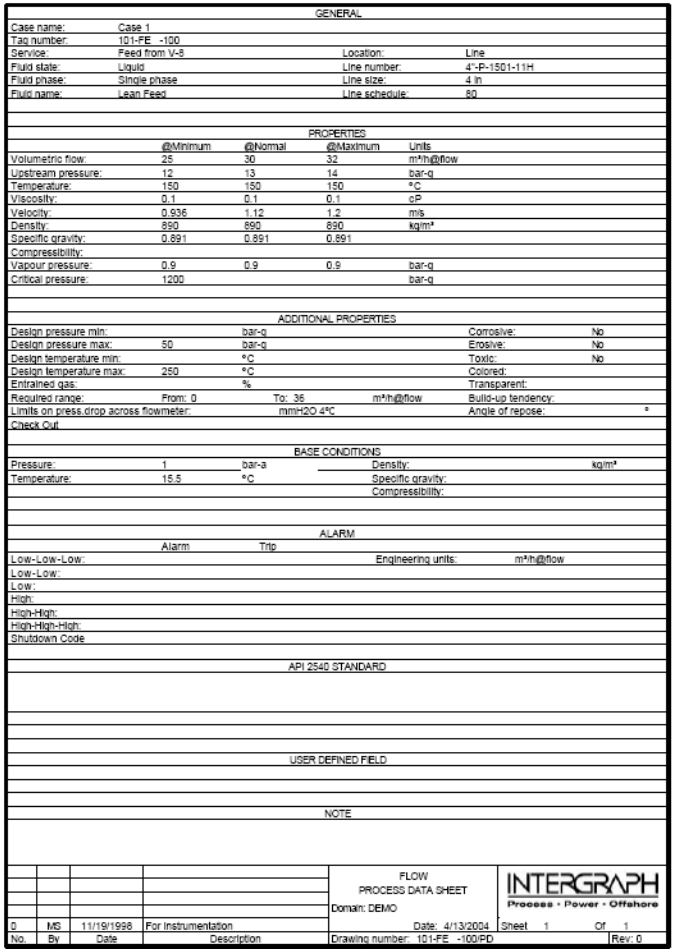
Instrument Process Data Module

- Handles multiple Cases
- Fluid properties lookups
- Data entered by Tag or Line
- Unit of Measure conversion
- Copy data from other Tags
- Additional Properties
- Base Conditions
- Alarm / Trip Settings
- User Defined Fields
- Workflow control
- Process datasheets with Revisions



GENERAL

Case name:	Case 1		
Tag number:	101-FE -100		
Service:	Feed from V-8	Location:	Line
Fluid state:	Liquid	Line number:	4"-P-15D1-11H
Fluid phase:	Single phase	Line size:	4 in
Fluid name:	Lean Feed	Line schedule:	80

PROPERTIES

	@Minimum	@Normal	@Maximum	Units
Volumetric flow:	25	30	32	m³/h@flow
Upstream pressure:	12	13	14	bar-g
Temperature:	150	150	150	°C
Viscosity:	0.1	0.1	0.1	cP
Velocity:	0.936	1.12	1.2	m/s
Density:	890	890	890	kg/m³
Specific gravity:	0.891	0.891	0.891	
Compressibility:				
Vapour pressure:	0.9	0.9	0.9	bar-g
Critical pressure:	1200			bar-g

ADDITIONAL PROPERTIES

Design pressure min:		bar-g		Corrosive:	No
Design pressure max:	50	bar-g		Erosive:	No
Design temperature min:		°C		Toxic:	No
Design temperature max:	250	°C		Colored:	
Entrained gas:		%		Transparent:	
Required range:	From: 0	To: 36	m³/h@flow	Build-up tendency:	
Limits on press.drop across flowmeter:		mmH2O 4°C		Angle of repose:	°
Check Out					

BASE CONDITIONS

Pressure:	1	bar-a	Density:	kg/m³
Temperature:	15.5	°C	Specific gravity:	
			Compressibility:	

ALARM

	Alarm	Trip		
Low-Low-Low:			Engineering units:	m³/h@flow
Low-Low:				
Low:				
High:				
High-High:				
High-High-High:				
Shutdown Code				

API 2540 STANDARD

USER DEFINED FIELD

NOTE

No.	By	Date	Description
0	MS	11/19/1998	For Instrumentation

FLOW
PROCESS DATA SHEET
Domain: DEMO

INTERGRAPH
Process · Power · Offshore

Date: 4/13/2004 Sheet 1 Of 1

Drawing number: 101-FE -100/PD Rev: 0

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SmartPlant® Instrumentation

Process Data Module

PROCESS WORK FLOW

Status	Description	Set / Changed by
Process Data not Required	Tags that do not require process data and therefore are not available to the process engineering group	Set by Instrument Engineers Changed by Instrument Engineers
Process Data Required	Tags available for process data entry by the process engineering group (in the Process Data module or Browser).	Set by Instrument Engineers Changed by Process Engineers
Lock out from Instrument	Tags marked for editing by the process engineering group and not available to the instrument group.	Set by Process Engineers Changed by Process Engineers
Release to Instrument	Tags available to the instrument engineering group following release from the process group.	Set by Process Engineers Changed by Instrument Engineers
Lock out from Process	Tags not available to the process engineering group.	Set by Instrument Engineers Changed by Instrument Engineers

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Process Data Module

- **Data Required from Process Department**
  - **Inlines**; Process Data for inline devices (control valves and flow elements) and analyzers are furnished by Process. Depending on the project scope, Relief Valve Process Data may be required to be furnished to Control Systems by Process Engineering.
- **Data NOT Required from Process Department**
  - **Offlines**; Data for off-line instruments (transmitters, temperature elements, pressure elements, etc.) is collected by Control Systems from the inline device data, line list, mechanical equipment data sheets and other sources. On a work share project, it may be possible to have personnel in another office, such as a GEC, enter some or all of this data. The work process for doing so will be the responsibility of Control Systems.
  - **Piping Inlines;** For Thermowell velocity calculations, Control Systems will utilize the inline device data, line list and other sources for applicable installations. For those Thermowells where flow information is not available from other sources, Process will be consulted.

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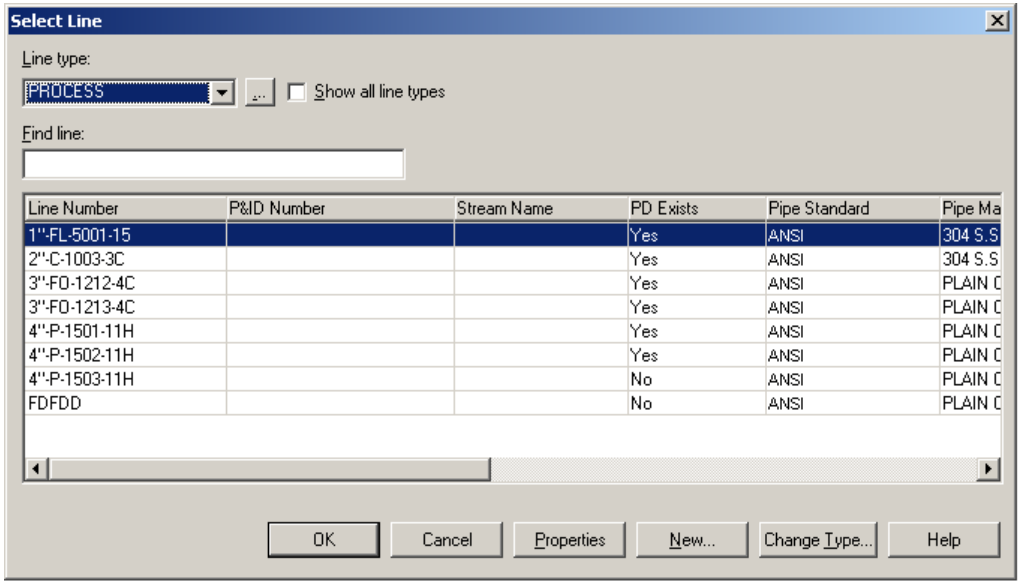
SPI Line Data Table

- **Line Data Table maintains the piping line data as required for material and sizing**



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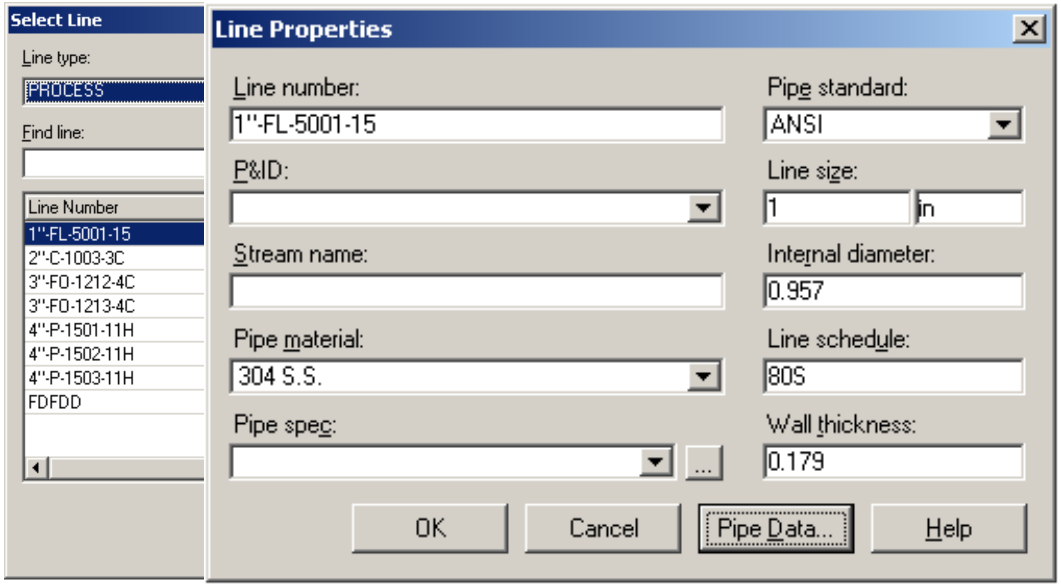
SPI Line Properties

- **Line Properties dialog box allows the editing of line materials, Size, Schedule and dimensions**



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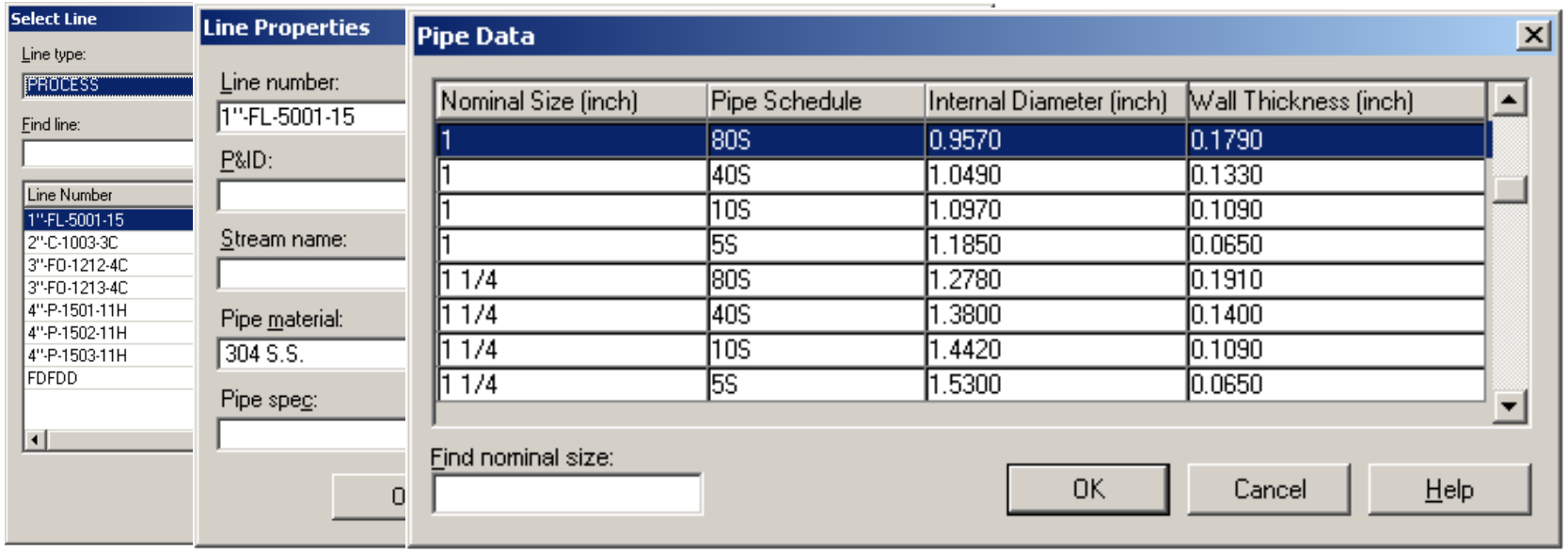
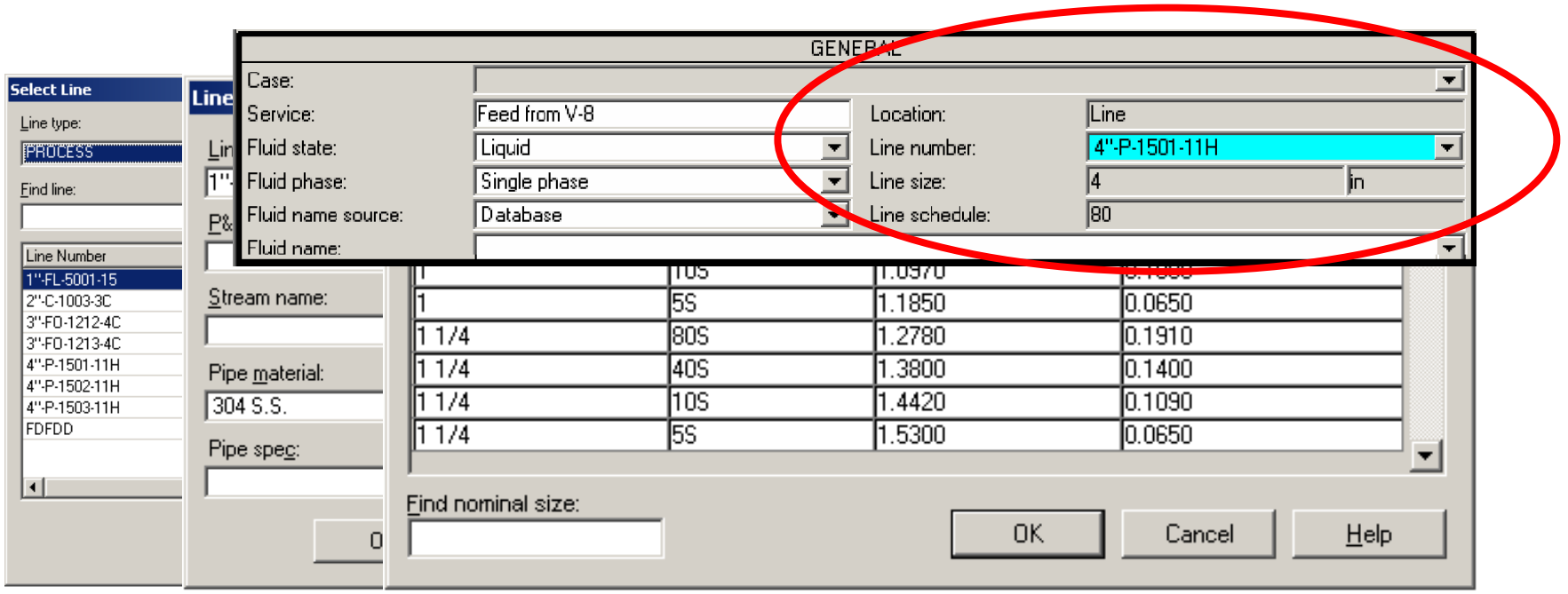
SPI Pipe Data lookup Table

- **The Pipe Data Lookup Table will allow selection of the proper Pipe Schedule for a given size from the line class specification report.**



SPI Process Data Module

- **Line data automatically placed in Process Data Module**



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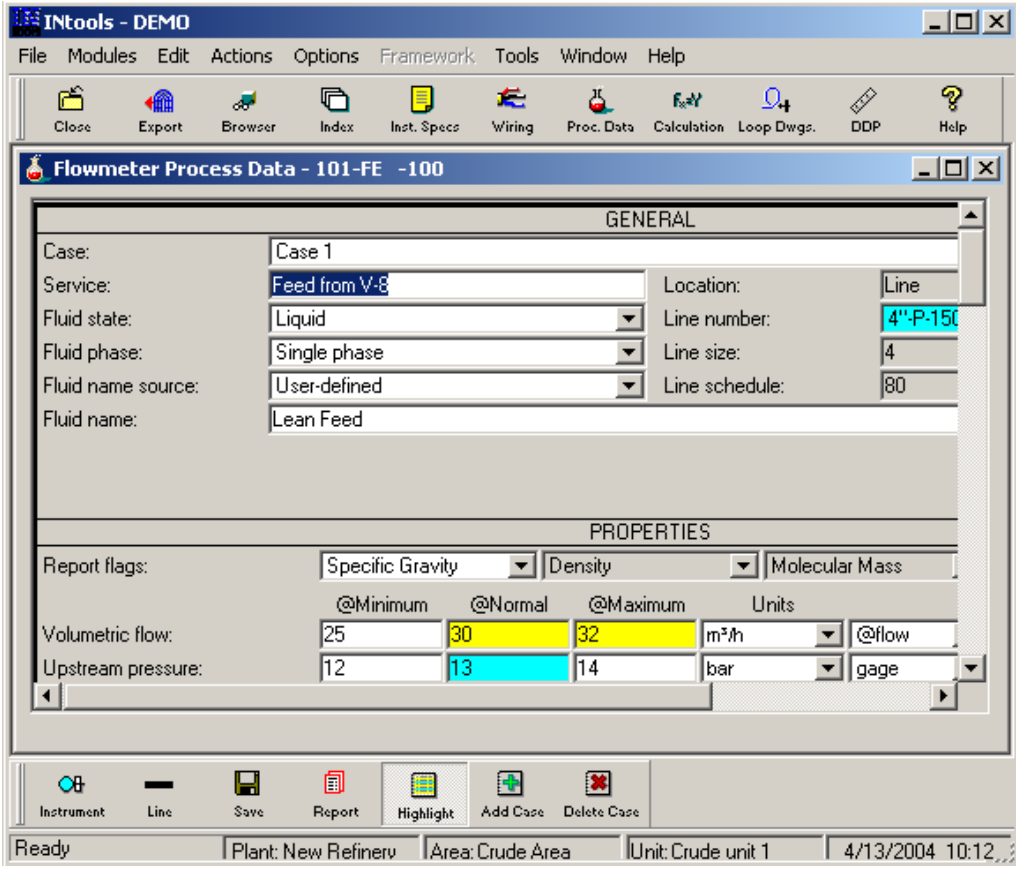
Instrument Process Data Module

- Process Engineers enter data directly into SPI for Calculations and Instrument Spec Sheets.



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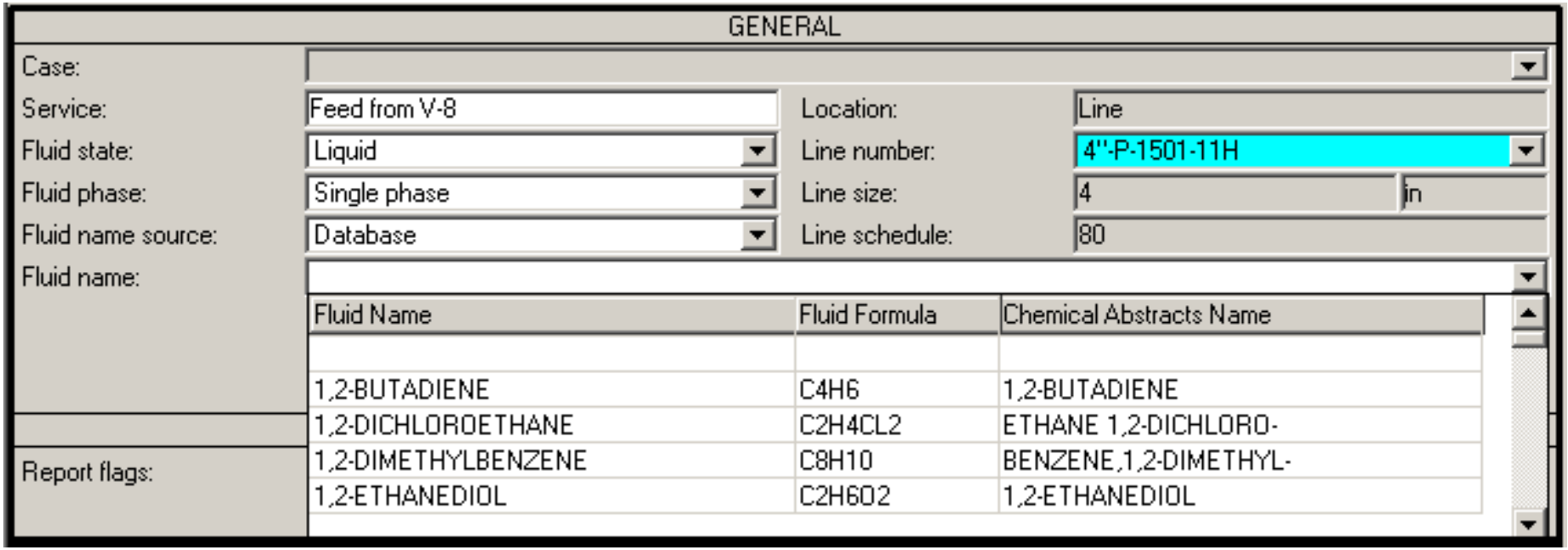
Instrument Process Data Module

- Process Engineers may enter fluid properties manually or select from internal database.



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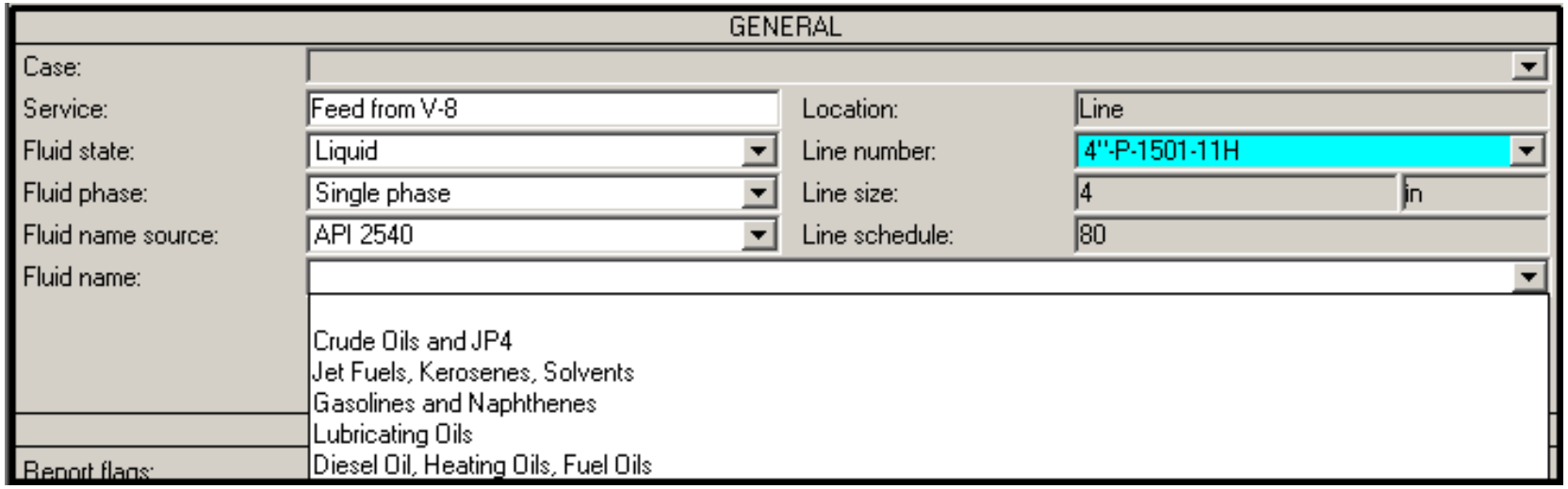
Instrument Process Data Module

- Process Engineers may select hydrocarbon properties from the internal API 2540 table.



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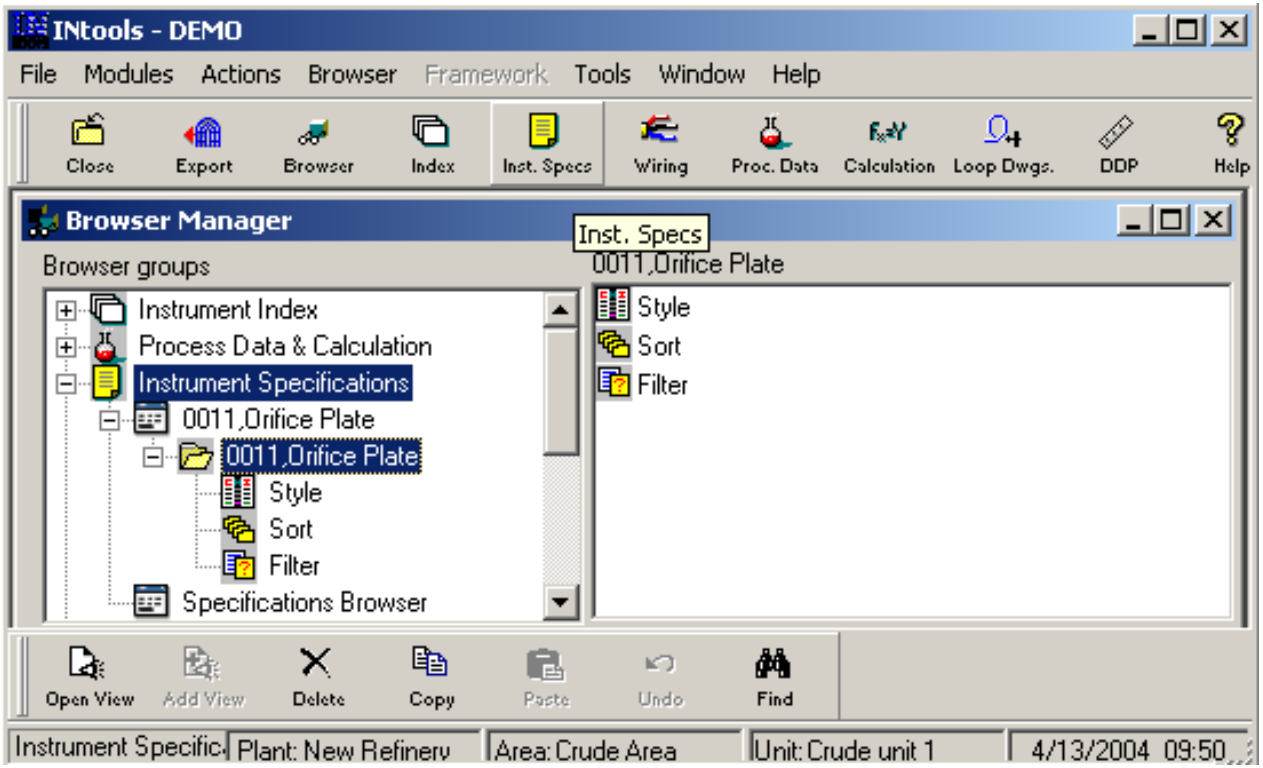
SmartPlant Browser Module

- All primary SmartPlant data tables are exposed for Browsing
- Allows users to create queries on Spec Sheets and Process Data
- Automatic Report and Export of query data from Browser



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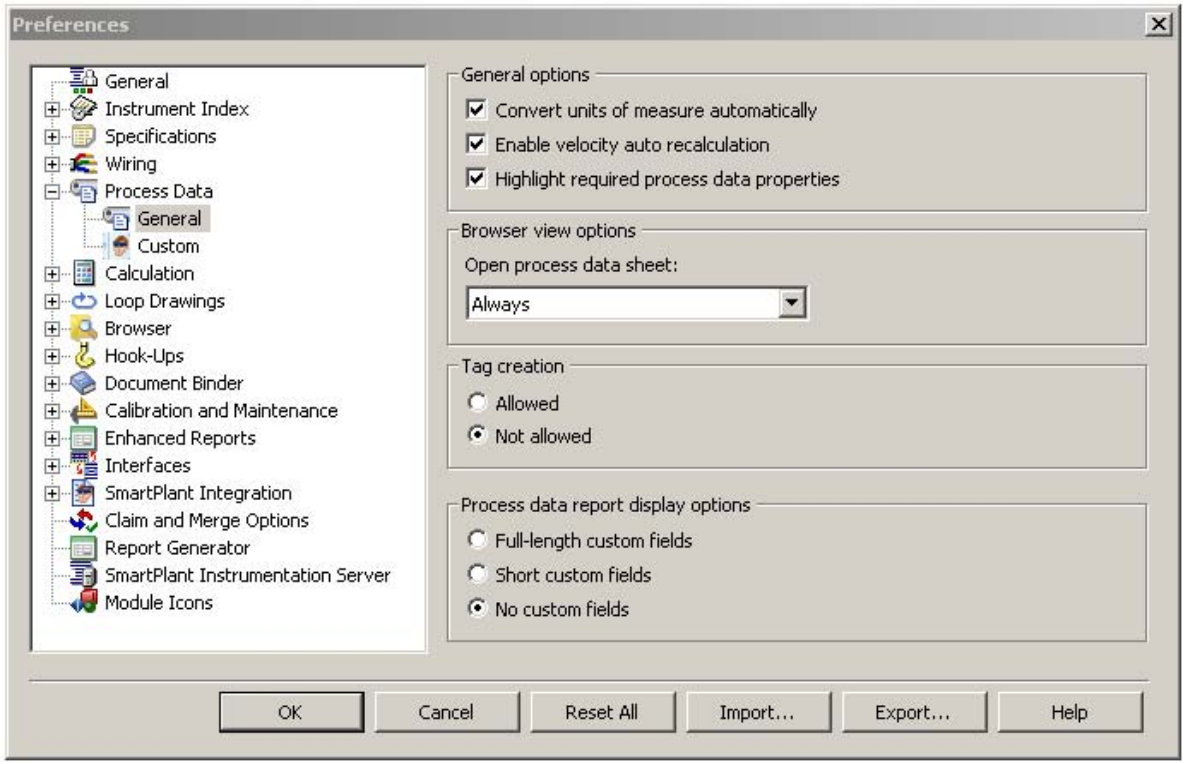
Process Data User Preferences

- Open Process Data from Browsers
- Tag Creation NOT allowed from Process Module
- No Custom Fields results in better Process Data Reports



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Instrument Spec Module

- Instrument Specification
  - Form for each Spec Type
  - Edit Forms in SPI
  - Drop Down Data Windows
  - External Form Editor
  - Multi-Item forms
  - Multi-Sheet forms
  - Revision control
  - Show data from Index table
  - Link directly to Process Data
  - Export Specs to Excel or Intergraph External Editor

GENERAL	1	Tag No.			101-FV -100	
	2	Service			Feed from V-8	
	3	Line No.			4"-P-1501-11H	
	4	Area Classification			Class 1, Division 2, Groups C&D	
	5	Ambient Temperature:	Min.	Max.	Class 1, Division	
	6	Allowable Sound Pressure Level dBA			90	
	7	Tightness Requirements			ANSI IV (standard)	
	8	Available Air Supply Pressure:	Min.	Max.	60 psi-g	
	9	Power Failure Position			Close	
	10					
PIPE LINE	11	Line Size and Schedule	Inlet	Outlet	4 in 80	4" 80
	12	Pipe Material			Carbon steel	
	13	Pipe Insulation			no	

			Units	@ Max. Flow	@ Norm. Flow	@ Min. Flow
PROCESS CONDITIONS	14	Process Fluid	Lean Feed			
	15	Upstream Condition	Liquid			
	16	Differential Pressure	bar			
	17		Units	@ Max. Flow	@ Norm. Flow	@ Min. Flow
	18	Flow Rate	Am^3/h	32	30	25
	19	Inlet Pressure	bar-g	14	13	12
	20	Pressure Drop	bar	3	6	8
	21	Inlet Temperature	°C	150	150	150
	22	Inlet Density / Specific Gravity / Molecular Mass	kg/m^3	890	890	890
	23	Inlet Compressibility Factor	—			
	24	Inlet Viscosity	cP	0	0	0
	25	Inlet Specific Heats Ratio	—			
	26	Inlet Vapour Pressure	bar-g	1	1	1
	27					
CALCULATED RESULTS	28	Flow Coefficient Cv	—	20	13	10
	29	Travel	%			
	30	Sound Pressure Level	dBA	65	69	78

BODY AND TRIM	31	MFR	Model	Fisher	EZ
	32	Body Type		Single Seat Globe	
	33	Body Size	Trim Size	2 in	By Mfr
	34	Rated Cv	Characteris.	By Mfr	By Mfr
	35	End Connec. & Rating		300 # RF	
	36	Body Material		CS	
	37	Bonnet Type	Material	Integral	SS
	38	Flow Direction		By Mfr	
	39	Flow Action To		By Mfr	
	40	Lubricator	Isolat. Valve	No	No
	41	Guiding	No. of Ports	By Mfr	1
	42	Trim Type			
	43	Rated Travel			
	44	Plug/ Ball/ Disk Material		SS	
	45	Seat Material		SS	
	46	Cage	Stem Material		SS
	47	Gasket Material		By Mfr	
	48				
ACTUATOR	49	MFR	Model	Fisher	667
	50	Type		Diaphragm	
	51	Size	Area	By Mfr	By Mfr
	52	Air Failure Valve:		Close	
	53	Handwheel Location		not required	
	54	Bench Range		By Mfr	
	55				

Notes: 1. Valve to be supplied fully assembled, marked , with certificate

POSITIONER	56	MFR	Model	By Mfr	By Mfr
	57	Signal: Inlet	Outlet	3-15 psig	By Mfr
	58	Increase Signal Valve:		Opens	
	59	Cam Characteristic		=%	
	60	Bypass	Gauges	Yes	Yes
	61				
	62				
SOLENOID VALVE	63	MFR	Model		
	64	Type			
	65	When De-Energ.Valve:			
	66				
SWITCHES	67	MFR	Model		
	68	Type	Quantity		
	69	Contacts / Rating			
	70	Switching Position			
	71				
AIR SET	72	MFR	Model	By Mfr	By Mfr
	73	Set Pressure		By Mfr	
	74	Filter	Gauge	Yes	Yes
	75				
TESTS	76	Hydro. Pressure			
	77	Leakage			
	78				
PURCHASE	79	Manufacturer		FISHER	
	80	Model		ES	
	81	Purchase Order Num.		T-R-ESP-002/98	
	82	Price	Item Number	3250 $	3
	83	Serial Number			

No.	By	Date	Revision
0	MS	11/22/1998	For bids

INSTRUMENT SPECIFICATION

Control Valve

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Sheet 1 of 1

Code: 1 | Dwg. No.: 101-21-199901 | Rev.: 0

Spec Sheet Module

- Given proper rights – the process data may be edited from the Spec Sheets
  - Automatic Unit conversion does NOT work from Spec Sheets
  - Only selected process data is visible on Spec Sheets
  - Rights can be set to prohibit editing of process data from Spec Sheets
  - Multi case process data can be accessed on the Spec Sheet from the process Module
- **Editing Process Data From Spec Sheets is NOT Recommended**

PROCESS CONDITIONS	7	Fluid		Light Naphtha			
	8	Oper. Temperature	Max. Temperature	85	°C	85	°C
	9	Oper. Pressure	Max. Pressure	12	bar-g	12	bar-g
	10	Vibrations					
	11						

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Spec Sheet Module

- **Type and number of Process variables available for Spec Sheets are different for each process function**
- **Units of Measure (UID) are separated from the variable**
- **Some Units of Measure are Computed fields**
  - **Pressure unit of measure psi-g is two fields**

if (pd_press_uflg = 'G', rightTrim (pd_press_uid) + '-g', if (pd_press_uflg = 'A' , rightTrim (pd_press_uid) + '-a', ''))

PROCESS CONDITIONS	9	Fluid		pd_fluid_name			
	10	Pressure Max	Oper.	pd_press_max	if (pd_press_uflg	pd_press_nor	if (pd_press_uflg
	11	Temperature Max.	Oper.	pd_temp_max	pd_temp_uid	pd_temp_nor	pd_temp_uid
	12	Oper. Spec. Gravity	Oper. Viscosity	pd_spec_grav_nor		pd_visc_nor	pd_visc_uid
	13	spec_udf_c51		spec_udf_c07			
	14	spec_udf_c15		spec_udf_c16			

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Spec Sheet Module

- **Different Process variables available for Process Function**

Process Fluid	PD_FLUID_NAME
Max. Pressure	PD_PRESS_MAX
Oper. Pressure	PD_PRESS_NOR
Max. Temperature	PD_TEMP_MAX
Oper. Temperature	PD_TEMP_NOR
Temperature Unit Of Measure	PD_TEMP_UID
Process Vibrations	PD_VIBRATION

TEMPERATURE

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Spec Sheet Module

- **Different Process variables available for Process Function**

Process Fluid	PD_FLUID_NAME
Max. Pressure	PD_PRESS_MAX
Oper. Pressure	PD_PRESS_NOR
Max. Temperature	PD_TEMP_MAX
Oper. Temperature	PD_TEMP_NOR
Temperature Unit Of Measure	PD_TEMP_UID
Oper. Viscosity	PD_VISC_NOR
Viscosity Unit Of Measure	PD_VISC_UID
Max. Range	PD_P_RANGE_MAX
Oper. Spec. Gravity	PD_SPEC_GRAV_NOR
Calibration Range	PD_P_RANGE_MIN

PRESSURE

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Spec Sheet Module

- **Different Process variables available for Process Function**

Reference Leg Fluid Density Level	PD_ABOVE_REF
Density Upper	PD_DENS_NOR
Density Unit Of Measure	PD_DENS_UID
Designed Temperature	PD_DESIGN_TEMP_MIN
Temperature Unit Of Measure	PD_DESIGN_TEMP_UID
Fluid Upper	PD_FLUID_NAME
Density Lower	PD_LOWER_DENSITY
Density Unit Of Measure	PD_LOWER_DENSITY_UID
Fluid Lower	PD_LOWER_FLUID_NAME
Designed Pressure	PD_PRESS_DES
Max. Pressure	PD_PRESS_MAX
Oper. Pressure	PD_PRESS_NOR
Reference Line (Tangent / Center)	PD_REFERENCE
Max. Temperature	PD_TEMP_MAX
Oper. Temperature	PD_TEMP_NOR
Temperature Unit Of Measure	PD_TEMP_UID

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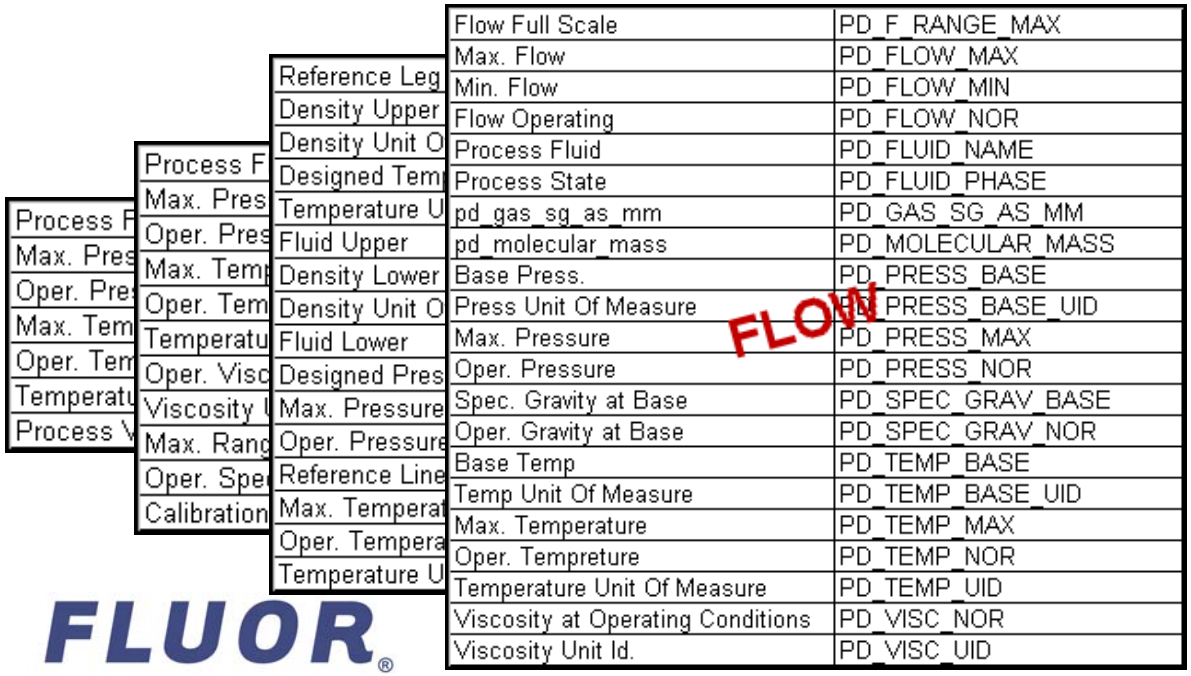
Spec Sheet Module

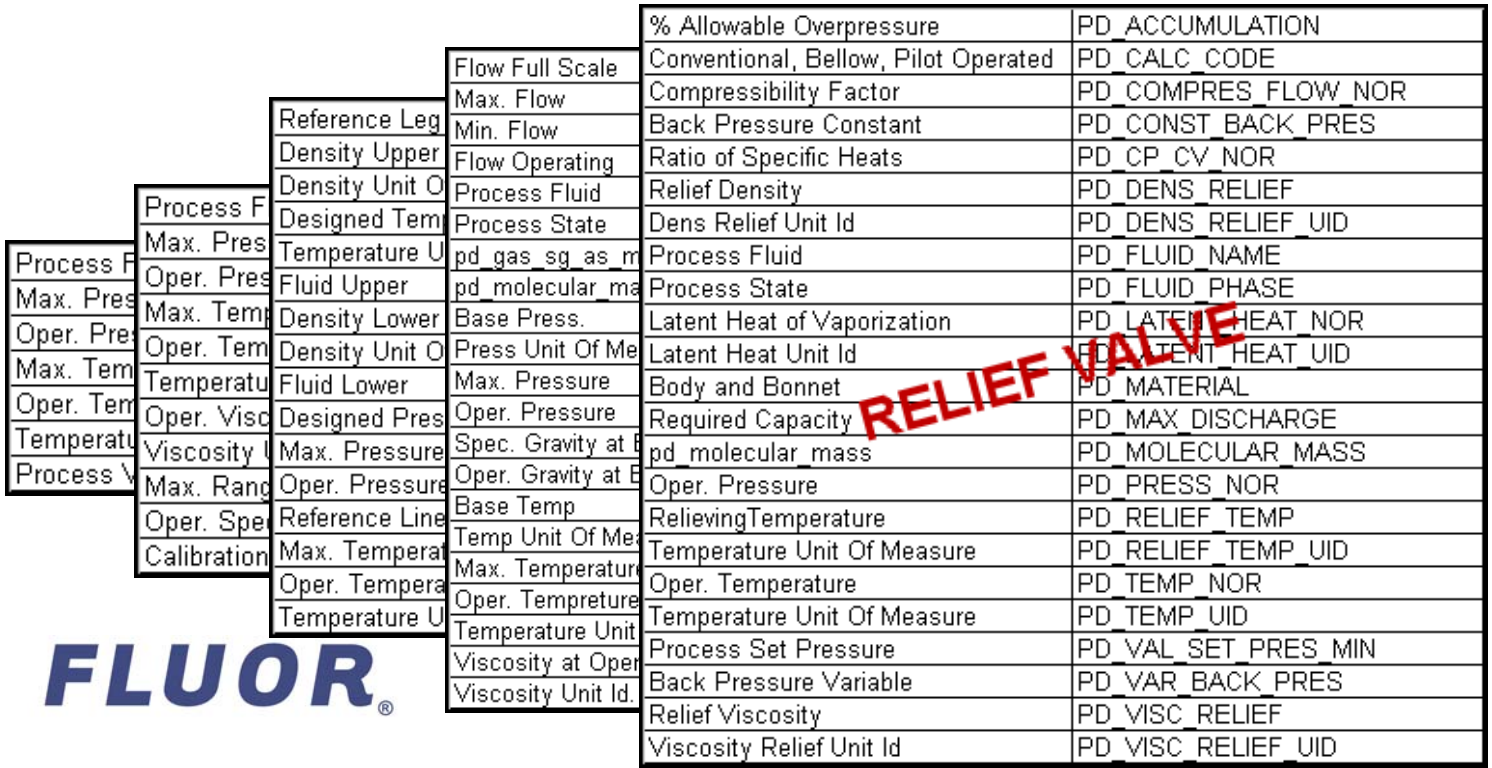
- **Different Process variables available for Process Function**



Flow Full Scale	PD_F_RANGE_MAX
Max. Flow	PD_FLOW_MAX
Min. Flow	PD_FLOW_MIN
Flow Operating	PD_FLOW_NOR
Process Fluid	PD_FLUID_NAME
Process State	PD_FLUID_PHASE
pd_gas_sg_as_mm	PD_GAS_SG_AS_MM
pd_molecular_mass	PD_MOLECULAR_MASS
Base Press.	PD_PRESS_BASE
Press Unit Of Measure	PD_PRESS_BASE_UID
Max. Pressure	PD_PRESS_MAX
Oper. Pressure	PD_PRESS_NOR
Spec. Gravity at Base	PD_SPEC_GRAV_BASE
Oper. Gravity at Base	PD_SPEC_GRAV_NOR
Base Temp	PD_TEMP_BASE
Temp Unit Of Measure	PD_TEMP_BASE_UID
Max. Temperature	PD_TEMP_MAX
Oper. Tempreture	PD_TEMP_NOR
Temperature Unit Of Measure	PD_TEMP_UID
Viscosity at Operating Conditions	PD_VISC_NOR
Viscosity Unit Id.	PD_VISC_UID

Spec Sheet Module

- **Different Process variables available for Process Function**



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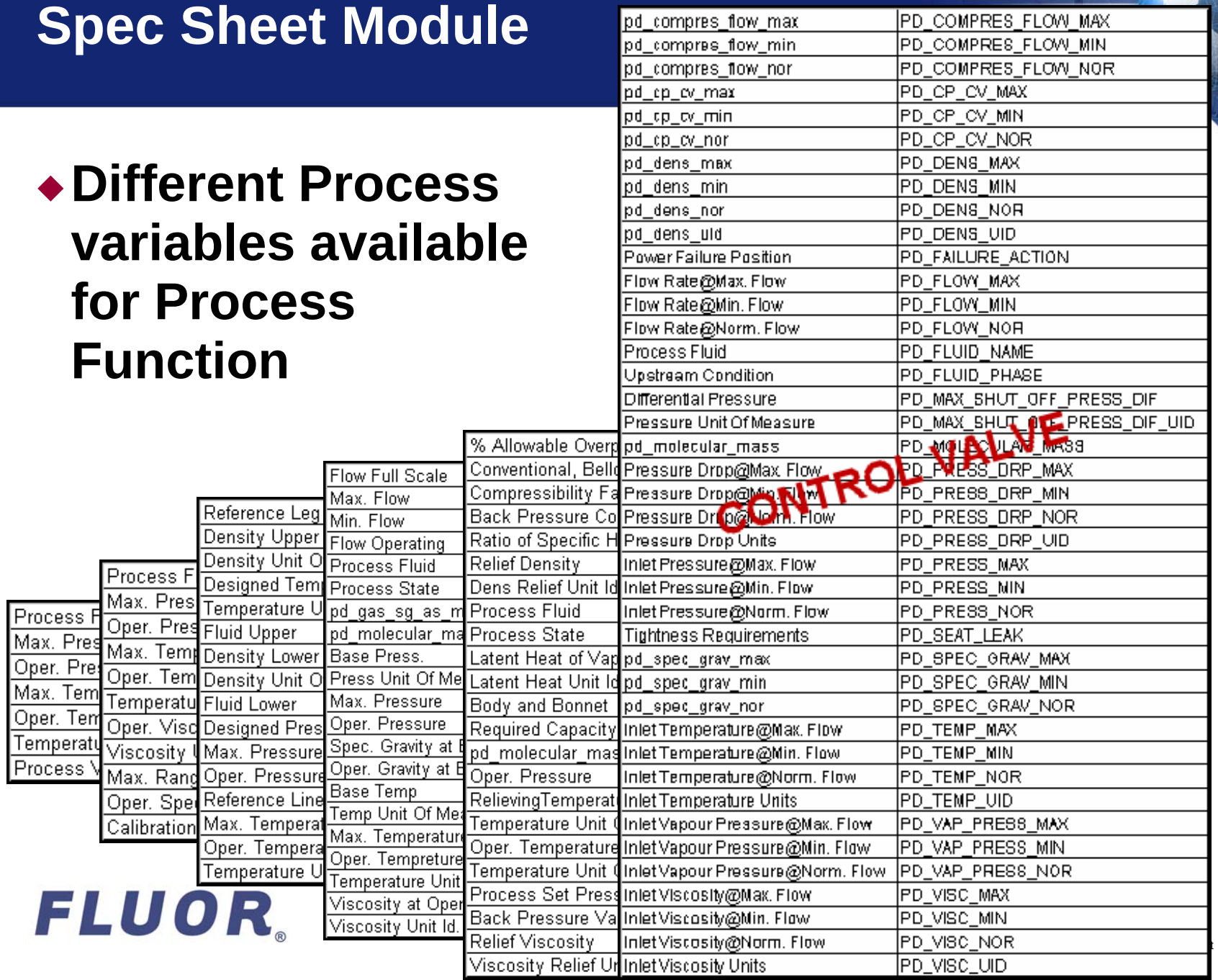
Spec Sheet Module

- **Different Process variables available for Process Function**



Spec Sheet Module

- **Supplemented with Computed and Process Function Fields**

Flow Rate Units	COMP_FLOW_UOM
Inlet Pressure Units	COMP_PRESS_UOM
Inlet Vapour Pressure Units	COMP_VAP_PRESS_UOM
No. of Ports	CV_NUM_PASSAGES
Sound Pressure Level@Max. Flow	CV_SOUND_LVL_MAX
Sound Pressure Level@Min. Flow	CV_SOUND_LVL_MIN
Sound Pressure Level@Norm. Flow	CV_SOUND_LVL_NOR
Travel@Max. Flow	CV_TRAVEL_MAX
Travel@Min. Flow	CV_TRAVEL_MIN
Travel@Norm. Flow	CV_TRAVEL_NOR
Body Size	CV_VALVE_DIAM
Size Unit Of Measure	CV_VALVE_DIAM_UID
Body Type	CV_VALVE_TYPE
Flow Coefficient Cv@Max. Flow	CV_VLV_CV_MAX
Flow Coefficient Cv@Min. Flow	CV_VLV_CV_MIN
Flow Coefficient Cv@Norm. Flow	CV_VLV_CV_NOR

Computed & Process Function

CONTROL VALVE

pd_compres_flow_max	PD_COMPRES_FLOW_MAX
pd_compres_flow_min	PD_COMPRES_FLOW_MIN
pd_compres_flow_nor	PD_COMPRES_FLOW_NOR
pd_cp_cv_max	PD_CP_CV_MAX
pd_cp_cv_min	PD_CP_CV_MIN
pd_cp_cv_nor	PD_CP_CV_NOR
pd_dens_max	PD_DENS_MAX
pd_dens_min	PD_DENS_MIN
pd_dens_nor	PD_DENS_NOR
pd_dens_uid	PD_DENS_UID
Power Failure Position	PD_FAILURE_ACTION
Flow Rate@Max. Flow	PD_FLOW_MAX
Flow Rate@Min. Flow	PD_FLOW_MIN
Flow Rate@Norm. Flow	PD_FLOW_NOR
Process Fluid	PD_FLUID_NAME
Upstream Condition	PD_FLUID_PHASE
Differential Pressure	PD_MAX_SHUT_OFF_PRESS_DIF
Pressure Unit Of Measure	PD_MAX_SHUT_OFF_PRESS_DIF_UID
pd_molecular_mass	PD_MOLECULAR_MASS
ssure Drop@Max. Flow	PD_PRESS_DRP_MAX
ssure Drop@Min. Flow	PD_PRESS_DRP_MIN
ssure Drop@Norm. Flow	PD_PRESS_DRP_NOR
ssure Drop Units	PD_PRESS_DRP_UID
t Pressure@Max. Flow	PD_PRESS_MAX
t Pressure@Min. Flow	PD_PRESS_MIN
t Pressure@Norm. Flow	PD_PRESS_NOR
htness Requirements	PD_SEAT_LEAK
_spec_grav_max	PD_SPEC_GRAV_MAX
_spec_grav_min	PD_SPEC_GRAV_MIN
_spec_grav_nor	PD_SPEC_GRAV_NOR
t Temperature@Max. Flow	PD_TEMP_MAX
t Temperature@Min. Flow	PD_TEMP_MIN
t Temperature@Norm. Flow	PD_TEMP_NOR
t Temperature Units	PD_TEMP_UID
Inlet Vapour Pressure@Max. Flow	PD_VAP_PRESS_MAX
Inlet Vapour Pressure@Min. Flow	PD_VAP_PRESS_MIN
Inlet Vapour Pressure@Norm. Flow	PD_VAP_PRESS_NOR
Inlet Viscosity@Max. Flow	PD_VISC_MAX
Inlet Viscosity@Min. Flow	PD_VISC_MIN
Inlet Viscosity@Norm. Flow	PD_VISC_NOR
Inlet Viscosity Units	PD_VISC_UID

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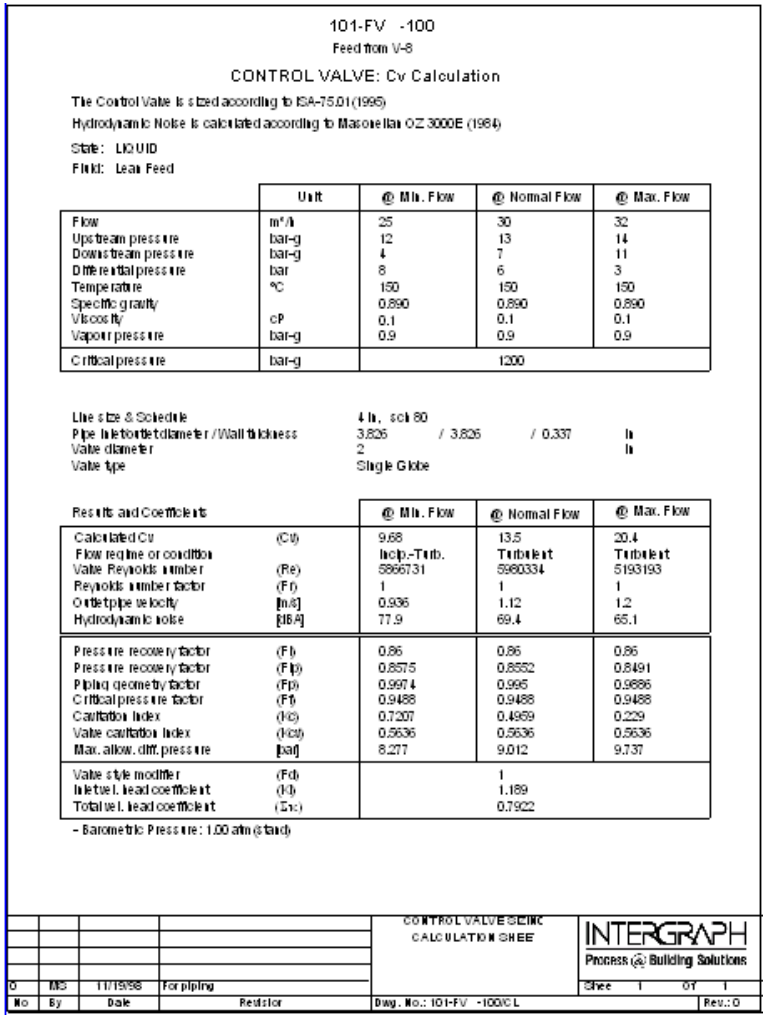
Instrument Calculation Module

- **Control Valve Sizing**
- **Relief Valve Sizing**
- **Flow Meter Sizing**
- **Thermowell Parameters**

- Uses excepted standard formulas
- Documents calculation basis
- Direct access to Process Data
- Generates Calculation Reports with Revisions



101-FV -100

Feed from V-8

CONTROL VALVE: Cv Calculation

The Control Valve is sized according to ISA-75.01(1995)

Hydrodynamic Noise is calculated according to Masoneilan OZ 3000E (1984)

State: LIQUID

Fluid: Lean Feed

	Unit	@ Min. Flow	@ Normal Flow	@ Max. Flow
Flow	m³/h	25	30	32
Upstream pressure	bar-g	12	13	14
Downstream pressure	bar-g	4	7	11
Differential pressure	bar	8	6	3
Temperature	°C	150	150	150
Specific gravity		0.890	0.890	0.890
Viscosity	cP	0.1	0.1	0.1
Vapour pressure	bar-g	0.9	0.9	0.9
Critical pressure	bar-g		1200	

Line size & Schedule		4 in, sch 80
Pipe inlet/outlet diameter / Wall thickness	3.826 / 3.826 / 0.337	in
Valve diameter	2	in
Valve type	Single Globe	

Results and Coefficients		@ Min. Flow	@ Normal Flow	@ Max. Flow
Calculated Cv	(Cv)	9.68	13.5	20.4
Flow regime or condition		Incp.-Turb.	Turbulent	Turbulent
Valve Reynolds number	(Re)	5866731	5980334	5193193
Reynolds number factor	(Fr)	1	1	1
Outlet pipe velocity	[m/s]	0.936	1.12	1.2
Hydrodynamic noise	[dBA]	77.9	69.4	65.1
Pressure recovery factor	(Fl)	0.86	0.86	0.86
Pressure recovery factor	(Flp)	0.8575	0.8552	0.8491
Piping geometry factor	(Fp)	0.9974	0.995	0.9886
Critical pressure factor	(Ff)	0.9488	0.9488	0.9488
Cavitation index	(Kc)	0.7207	0.4959	0.229
Valve cavitation index	(Kca)	0.5636	0.5636	0.5636
Max. allow. diff. pressure	[bar]	8.277	9.012	9.737
Valve style modifier	(Fd)		1	
Inlet vel. head coefficient	(Ki)		1.189	
Total vel. head coefficient	(Σκ)		0.7922	

- Barometric Pressure: 1.00 atm (Std)

No	By	Date	Revision
0	MS	11/15/98	For piping

CONTROL VALVE SIZING CALCULATION SHEET

INTERGRAPH Process & Building Solutions

Sheet 1 of 1

Dwg. No.: 101-FV -100/CL Rev.: 0

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SmartPlant® Instrumentation

Process Data Issues

- Types of Process Data
  - Process Design Conditions
  - Process Operating Conditions
  - Process Ranges
  - Process Alarms and Trips
- Process Workflow needs to be different for Inline vs. Offline Devices
- Process Data Workflow may be circumvented using Process and Spec Browsers
- Process notes often required on Spec Sheet (create spec sheet notes page for Inline devices)

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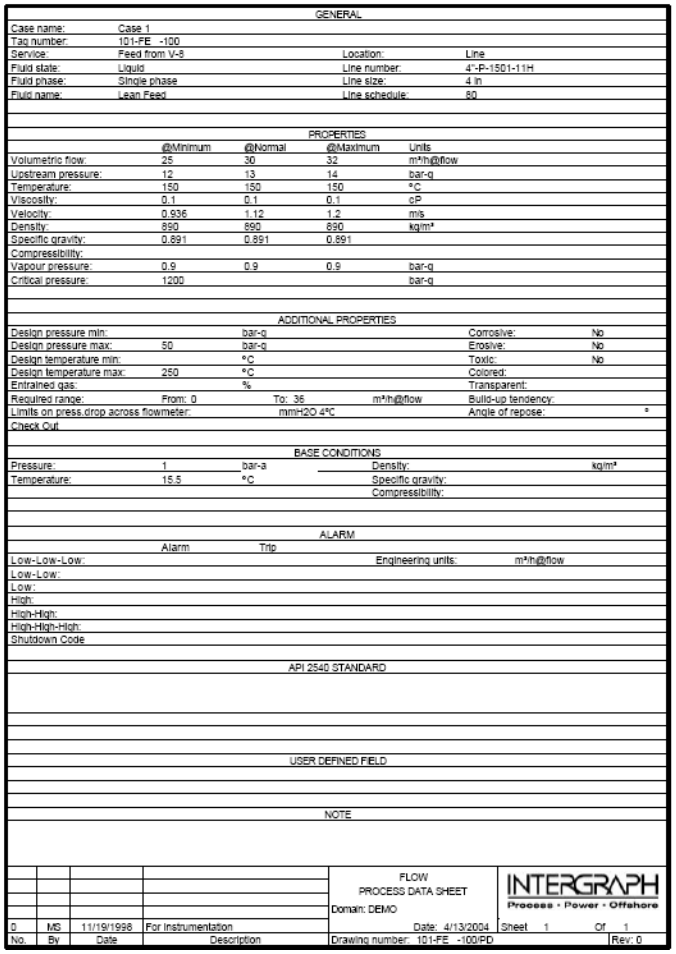
Process Data in SmartPlant Instrumentation

- **Value Added by placing Process Data directly into SmartPlant Instrumentation:**
  - Timely Access to Process Data by Control Systems
  - Data Centric Control of Process Data
  - Management of Change
  - Real Process Data Becomes Deliverable



GENERAL

Case name:	Case 1		
Tag number:	101-FE -100		
Service:	Feed from V-8	Location:	Line
Fluid state:	Liquid	Line number:	4"-P-1501-11H
Fluid phase:	Single phase	Line size:	4 in
Fluid name:	Lean Feed	Line schedule:	80

PROPERTIES

	@Minimum	@Normal	@Maximum	Units
Volumetric flow:	25	30	32	m³/h@flow
Upstream pressure:	12	13	14	bar-g
Temperature:	150	150	150	°C
Viscosity:	0.1	0.1	0.1	cP
Velocity:	0.936	1.12	1.2	m/s
Density:	890	890	890	kg/m³
Specific gravity:	0.891	0.891	0.891	
Compressibility:				
Vapour pressure:	0.9	0.9	0.9	bar-g
Critical pressure:	1200			bar-g

ADDITIONAL PROPERTIES

Design pressure min:		bar-g		Corrosive:	No
Design pressure max:	50	bar-g		Erosive:	No
Design temperature min:		°C		Toxic:	No
Design temperature max:	250	°C		Colored:	
Entrained gas:		%		Transparent:	
Required range:	From: 0	To: 35	m³/h@flow	Build-up tendency:	
Limits on press.drop across flowmeter:		mmH2O 4°C		Angle of repose:	°
Check Out					

BASE CONDITIONS

Pressure:	1	bar-a	Density:	kg/m³
Temperature:	15.5	°C	Specific gravity:	
			Compressibility:	

ALARM

	Alarm	Trip		
Low-Low-Low:			Engineering units:	m³/h@flow
Low-Low:				
Low:				
High:				
High-High:				
High-High-High:				
Shutdown Code				

API 2540 STANDARD

USER DEFINED FIELD

NOTE

No.	By	Date	Description
0	MS	11/19/1998	For Instrumentation

FLOW
PROCESS DATA SHEET
Domain: DEMO

INTERGRAPH
Process · Power · Offshore

Date: 4/13/2004 Sheet 1 Of 1

Drawing number: 101-FE -100/PD Rev: 0

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Process Data in SmartPlant Instrumentation

Best Practice

Process Data directly into SmartPlant Instrumentation

Questions?

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