

A Comparison of Nonmetallic Piping Systems for Underground Installation at Gas Stations



Piping Systems

- Fiberglass
- SMARTFLEX
- “Flexibles”

Quality Indicators

- Lifetime/Design
- Track Record
- ISO 9000
- Installation

Lifetime/Design

"Flexibles"	Poor
SMARTFLEX	Excellent
Fiberglass	Excellent

- No design standard available for “Flexibles”
- “Flexibles” are designed at burst (thermo-set) but they are subject to creep (thermoplastic) !
- SMARTFLEX design is based on ASTM D2837 (ISO9080)
- Fiberglass design is based on ASTM D2996

Track Record

"Flexibles"	Sufficient
SMARTFLEX	Excellent
Fiberglass	Excellent

- “Flexibles” have boomed in the ‘90s thanks to the “underground” package concept. Nice marketing, but they have now accumulated a substantial number of failures (biological attack, installation problems, chemical resistance).
- SMARTFLEX and Fiberglass have never had any failure associated with the design of the product.

ISO 9000

"Flexibles"	Sufficient
SMARTFLEX	Excellent
Fiberglass	Excellent

- SMARTFLEX and Fiberglass are the only products which have been **designed, tested, manufactured, marketed and sold** in compliance with ISO 9000 certified procedures.

Installation QC

"Flexibles"	Sufficient
SMARTFLEX	Excellent
Fiberglass	Sufficient

- Fiberglass is prone to brittle failures.
- Fiberglass adhesives are temperature sensitive.
- “Flexibles” outer jacket can be easily punctured.
- “Flexibles” mechanical fittings induce stress cracking
- Cemented and mechanical fittings are “manually” installed. Only destructive QC tests are possible.

SMARTFLEX Installation

- SMARTFLEX is a very forgiving product as far as handling is concerned.
- The use of Bar Code makes SMARTFLEX electro-fusion a fully automated process.
- The SMARTFLEX Multi-function Welding Unit can provide both welding and pressure test reports.
- Through the use of the Interactive Tracking System (ITS) Total Quality can be implemented throughout the whole supply chain.



SMARTFLEX Installation

- The ITS is also an effective tool to streamline communications among the different parties involved in the construction of a SS.

In only 60 days and using the ITS, NUPI and one of its customers could design, prepare MTO's and ship product for the construction of 150 sites in 20 different countries

The product was released from the 3 warehouses that NUPI runs in Europe and in the USA.



SMARTFLEX Installation

- SMARTFLEX d/w system is compatible with any type of monitoring system (pressure, vacuum, nitrogen, brine, etc.)



Machine : SMARTFLEX SSEL8403

Serial Number : 00000001

n.	DATE	HOUR	TEMP	OPERATOR	PLACE	INFO	FITTING	DIAM.	WV	N.T.	E.T.	ERR
	dd/mm/yy	hh:mm	°C					[mm]	V	sec.	sec.	
1	9/9/2003	12:24	26.5	ID1008	IMOLA	TEST A	ELBOW	50	20	120	116	0
2	9/9/2003	12:28	27	ID1009	IMOLA	TEST A	ELBOW	50	20	120	116	0
3	9/9/2003	12:32	27	ID1010	IMOLA	TEST A	ELBOW	63	30	80	77	0
4	9/9/2003	13:40	27	ID1011	IMOLA	TEST A	ELBOW	63	30	80	77	0
5	9/9/2003	13:48	27	ID1012	IMOLA	TEST A	ELBOW	63	30	80	77	0
6	9/9/2003	13:56	27	ID1013	IMOLA	TEST A	COUPLER	63	40	220	215	0
7	9/9/2003	14:04	27	ID1014	IMOLA	TEST A	ELBOW	63	30	80	77	0
8	9/9/2003	14:12	27	ID1015	IMOLA	TEST A	ELBOW	63	30	80	77	0
9	9/9/2003	14:20	27	ID1016	IMOLA	TEST A	COUPLER	63	40	220	215	0
10	9/9/2003	14:28	27	ID1017	IMOLA	TEST A	COUPLER	63	40	220	215	0
11	9/9/2003	14:36	27	ID1018	IMOLA	TEST A	COUPLER	63	40	220	215	0
12	9/9/2003	14:44	27	ID1019	IMOLA	TEST A	ELBOW	63	30	80	77	0
13	9/9/2003	14:52	27	ID1020	IMOLA	TEST A	ELBOW	63	30	80	77	0

Welding Voltage
Nominal Welding Time
Actual Welding Time



PRINT PRESSURE RECORD DATE 06/11/2003 HOUR 11:54

Machine : SMASEL8403
Serial Number 00200117

Data from memory n. 1
Test executed on : 06/11/2003
Operator : ID1006
Test Identification : NVPI 3001 Gas
Site : IMOLA-----
Information : STATION-1-
Test Unit : #2
Units of Pressure : PSI
Units of Temperature : °F
Test Duration : 5 Hours
Num. of records requested : 300
Number of records stored : 8

n.	HOUR hh:mm:ss	PRESS	TEMP	dPRESS %	dTEMP %
1	11:46:07	75.45	70	0	0
2	11:47:07	75.35	70	-0.13	0
3	11:48:07	75.25	69	-0.14	-0.17
4	11:49:07	75.18	69	-0.09	0
5	11:50:07	75.11	69	-0.08	0
6	11:51:07	75.03	68	-0.11	-0.17
7	11:52:07	75.00	68	-0.05	0
8	11:53:07	74.94	68	-0.08	0

Test Result : OK

Operator signature



Primary, 75 psi, 5h



4452463903001605610750732

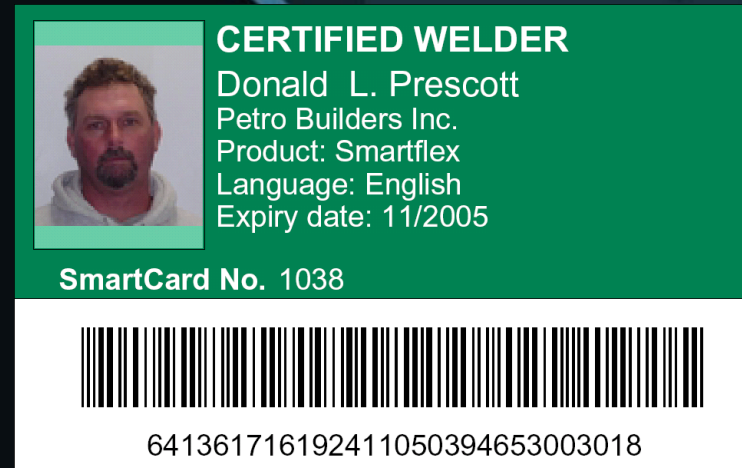
Secondary, 60 psi, 4h



4452463903002604610600582

Traceability

- Welder SMARTCARD
- Fitting bar codes
- A proprietary welding unit featuring an Interactive Operating System which allows downloading of the welding parameters and the pressure test data
- A web based application which allows the end user to enter, store and retrieve all the specific site installation data into NUPI's Interactive Tracking System



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Corporate Offices: Via dell'Artigianato, 13 I-40023 Castel Guelfo di Bologna (BO)
 Telephone +39 0542 624901 Fax +39 0542 624900 infoid@nupinet.com

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File Modifica Visualizza Preferiti Strumenti ?

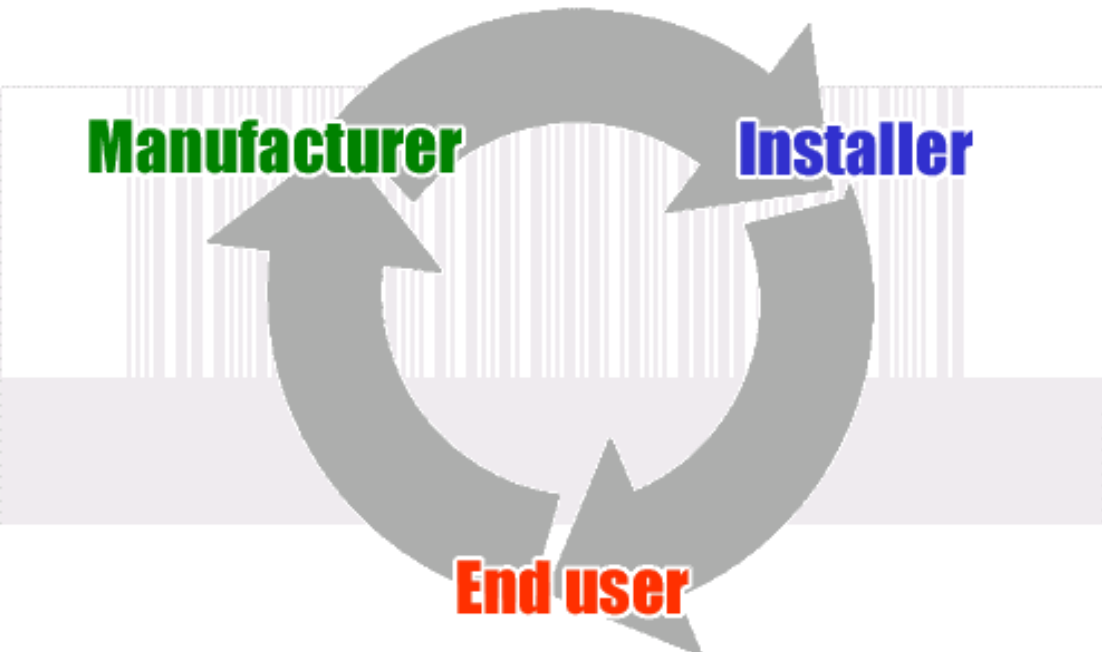
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Indirizzo <http://its.nupinet.com/> Vai



Interactive Tracking System

Certified Installers



```
graph TD; Manufacturer[Manufacturer] --> Installer[Installer]; Installer --> EndUser[End user]; EndUser --> Manufacturer;
```

INDUSTRIAL DIVISION

javascript:popup('applicant.php') Internet



Welcome, ChevronTexaco

Site management: **NEW**

End User:	ChevronTexaco
Site Number:	<input type="text"/>
Address: <i>(optional)</i>	<input type="text"/>
City:	<input type="text"/>
ZIP Code: <i>(optional)</i>	<input type="text"/>
State / Province:	- Choose one - ▼
Other State / Province: <i>(optional)</i>	<input type="text"/>

Country:	- Choose one - ▼
Contractor's Name: <i>(optional)</i>	- Not yet specified - ▼
Project Manager E-Mail:	<input type="text" value="l.toni@e-mind.it"/>
Distributor: <i>(optional)</i>	<input type="text"/>

Click here to obtain piping drawing and MTO
from Nupi's technical support

Insert

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http://its.nupinet.com/temp/Packai - Layout.pdf - Microsoft Internet Explorer

Indirizzo <http://its.nupinet.com/temp/Packai%20-%20Layout.pdf>

Operazione completata

Microsoft Internet Explorer

29/08/02

Texaco Panama: Estacion de servicio de Packai

Codigo	Descripcion	Linea de producto	Linea de vonko	Piezas extra consejadas	Total cantidades
Pasa muros					
BEB63	PASA MUROS - ø 63	24		2	26
Accesorios					
BAF632	ADAPTADOR HEMBRA - 63 x 2"		4	1	5
BAF632	ADAPTADOR MACHO - 63 x 2"		4	1	5
BE633	CODO ELECTRICO 90° - ø 63		14	2	16
BE633	CODO ELECTRICO A 45° ø 63		5	1	6
BE633	MANGUITO ELECTRICO - ø 63		10	1	11
BE630	TEE ELECTRICO - ø 63		8	1	9
BE630	CODO ELECTRICO 90° - ø 63		4	1	5
BRTF630	TERMINAL PARA DOBLE PARED - 50 X 1 1/2" ancho		24	2	26
BACM60112	ADAPTADOR MACHO ESPIGA LARGA - 112"		12	1	13
BRCF650112	CONEXION UNION - ø 50 x 112"		4	1	5
BME60	MANGUITO ELECTRICO - ø 60		2	1	3
Tuberia					
TSMAL33B6	TUBERIA PARA RECUPERACION DE VAPORES VENTEO LLENADO BARRAS - ø 63		84,8	8	92,8
TSMAD60R75	TUBERIA DOBLE PARED PARA LINEA DE PRODUCTO ROLLOS 75 ml - ø 60	136		14	150




2

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Comments:
(optional)

Date: (mm/dd/yyyy)	<input type="text" value="09/06/2002"/>
Welding Report:	<input type="text"/> <input type="button" value="Sfoglia..."/>
Pressure Test Report:	<input type="text"/> <input type="button" value="Sfoglia..."/>
Warranty request form:	I hereby certify that the above information is correct, and that I am a certified Smartflex Qualified Installer (Smartcard No. <input type="text"/>) and that this installation has been carried out as per the correct installation procedures for Smartflex Piping.

STEP 

3

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	<input type="text"/>) and that this installation has been carried out as per the correct installation procedures for Smartflex Piping.
Confirm:	<input checked="" type="checkbox"/> YES
Comments: (optional)	<input type="text"/>

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D/W Monitoring System

The interstitial space in double wall pipe is pressurized with nitrogen.

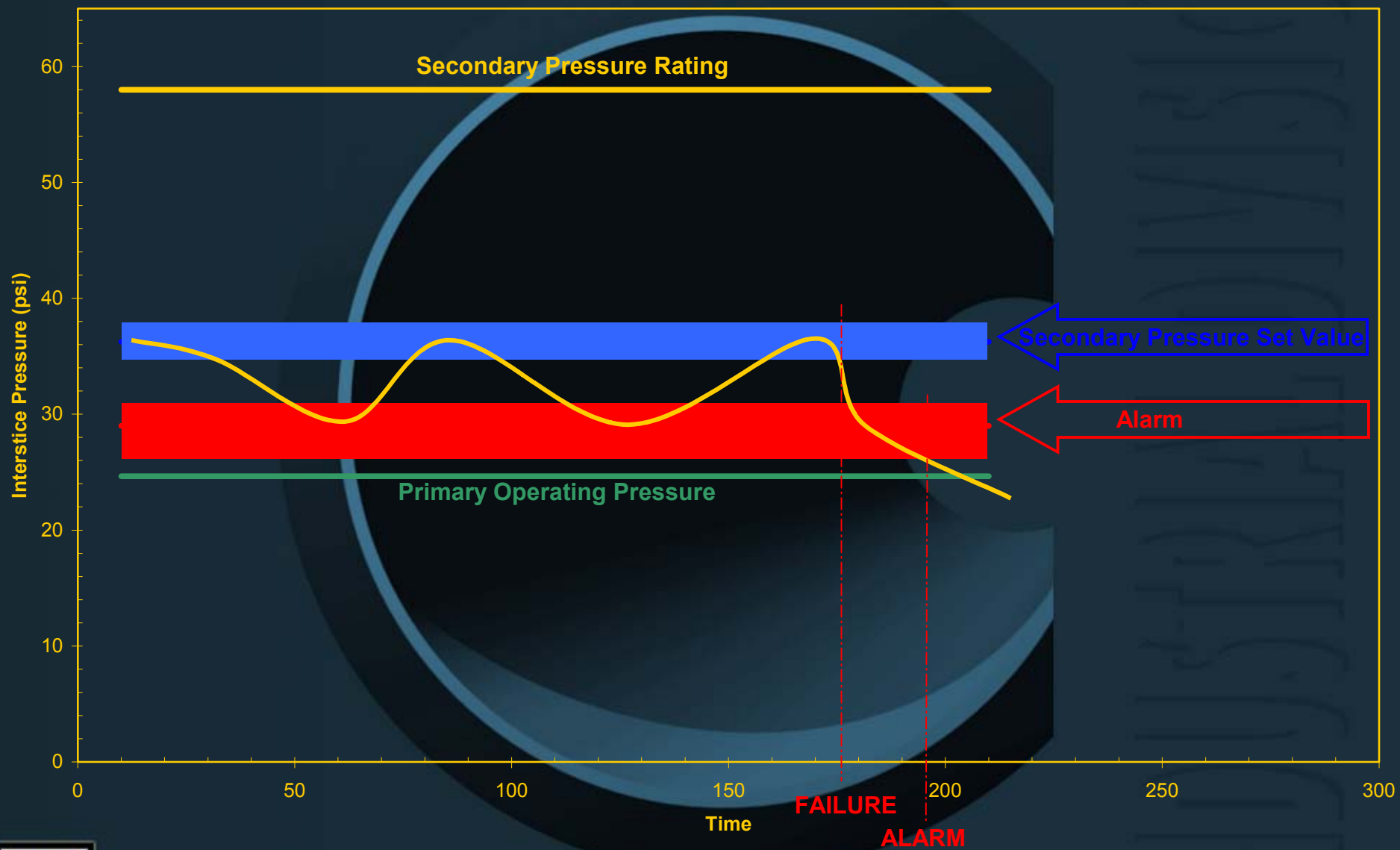
Refill rate is set to 100 l/h to achieve good sensitivity and limit spurious alarms.

Alarm goes off when the interstitial pressure is lower than the alarm threshold.

Refill zone

SET POINT

Alarm



SMARTFLEX D/W Monitoring System

- SMARTFLEX Monitoring System:
 - Control unit (item SMS)
 - Manifold (item SMF.... according to S.S. lay-out)
 - RILSAN tubing (item STT6....)
- The SMS is a “Class 1” system (intrinsically safe) and allows 24/7 monitoring
- Pre-requisites:
 - Compressed nitrogen bottle (200 bars/3000 psi)