

**PETROLTECH N.V**  
**Font Saint Laundry 9**  
**1120 BRUSSELS**  
**Fao. Mr. Schelfhout André**

2002.11.21

<b>Y.Ref :</b>	
<b>O. Ref :</b>	Petroltech N.V.
<b>Report No. :</b>	2002.2111.1242.P.919

Dear Sir,

**Re : Alternative system, referred to in art. 5.17.1.4 §2 Vlare II.**

In response to your request we have drawn up a report regarding the above-mentioned study.

**1. General information**

- 1.1 Client: **PETROLTECH N.V. Sint Lendriksborre 9, 1120 BRUSSELS**
- 1.2 Inspection period : September - October - November 2002
- 1.3 Place of inspection : **PETROLTECH N.V., Brussels**  
**NUPI S.p.A, Italy**

**2. Applicable legislation: text of art. 5.17.1.4 § 2 Vlare II.**

**Art. 5.17.1.4.**

*§ 2. The non-accessible pipes must be installed in a trench filled with a fine-grained inert material. This trench must be impervious to liquids and installed at a slope towards a liquid-tight sump.*

*This system may be substituted by an alternative system which offers the same guarantees with regard to prevention of soil and/or groundwater pollution. The alternative system must be approved by an environmental expert accredited for the inspection and approval of gasholders or hazardous substance containers. A certificate of this acceptance will subsequently be drawn up and signed by the afore-mentioned environmental expert. This certificate is kept available for perusal by the supervisory official. The proprietor shall send a copy of this certificate to the Environmental Permits department.*

### 3. Description of pipes and fittings

Smartflex "Y" barrier pipes are black polyethylene pipes with an inner layer or liner. This inner layer or liner is made of polyamide and has a green colour. Such pipes may only be used as filling lines and suction lines. The pipes with a yellow-coloured liner may only be used as vent lines or vapour recovery lines.

Smart X2 fittings are made of polyethylene/polyamide and have a green outer surface, whereas the inner surface is colour coded black.

### 4. Use and colour coding of the pipes

The purpose of the colour coding of the pipe's liner is to allow easy and quick identification of the pipe material.

**Pipes for the conveyance of fuel (code TSMA).** These pipes have a black external surface, whereas the inner surface (liner) is colour coded green.

The pipes' external surface features two green lines, which are spaced 180°. These green lines are dotted to allow for marking.

**Pipes for vapour recovery lines (code TSMAU).** These pipes have a black external surface, whereas the inner surface (liner) is colour coded yellow.

The pipes' external surface features two yellow lines, which are spaced 180°. These yellow lines are dotted to allow for marking.

### 5. Manufacturer

Manufacturers of such pipes and fittings are:

NUPI S.p.A  
 Via Dell' Artigianato 13  
 40023 Castel di Bologna  
 Italy

NUPI S.p.A  
 Via Colombarotto 58  
 40026 Imola  
 Italy

GECO SYSTEM S.p.A  
 Via Magenta 43  
 21015 Lonate Pozzolo  
 Italy

### 6. Importer for the Belgian market

The following company is the importer for the Belgian market:

**PETROLTECH N.V.**  
 Font Saint Laundry - Sint Lendriksborre 9  
 1120 BRUSSELS  
 Tel: 02 / 263 20 90

Fax: 02 / 267 84 89

### 7. Quality system

All production units have an **ISO 9002** approved quality system with an ISO certificate issued by IQNet and CISQ

## 8. Testing and certification

"Smartflex" pipeline systems with a diameter of 50, 63, 90, and 110 mm were tested by:

**ERA Technology Ltd Cleeve Road Leatherhead Surrey KT 22 7SA United - Kingdom**

In accordance with the following specifications:

**"Institute of Petroleum Performance Specifications for Underground Pipework" Systems at Petrol Filling Stations". ISBN 0 85293 1946, November 1995.**

**"Shell Retail International - Pipework performance specification and supplier evaluation - version 2"**

**The following tests were carried out with good results by ERA Technology Ltd Cleeve Road Leatherhead Surrey KT 22 7SA United - Kingdom – independent and accredited research centre:**

- External leakage test and hydrostatic strength;
- Vacuum test;
- Cyclic pressure test;
- Mechanical integrity tests;
- Fuel compatibility tests;
- Permeability;
- Fuel absorption swell test;
- Ageing test.
- Checking of identification, quality system and installation instructions.

Furthermore, the following audits were carried out to check the electrostatic safety of the "Smartflex" - pipes.

◆ by PTB - " **Physikalisch-technische Bundesanstalt** " , in accordance with:

- Technische Regeln für brennbare Flüssigkeiten" TRbF 40 , Ausgabe 6.97
- Guidelines " Statische Elektrizität" ZH 1/200
- Cenelec report R044-001:1999 "Guidance and recommendations for the avoidance of hazard due to static electricity" abschnitt 5.5.4
- H.L Walmsley - The electrostatic fields and potentials generated by the flow of liquid through plastic pipes" 1996
- PrEN xxx:2000 (TC221/SC2/WG6 ) "Underground pipework for petrol filling stations" abschnitt 5.6 " Static Electricity".

◆ by " **Wolfson Electrostatics** " at the " **University of Southampton** " UK, in their report 257/GLH of 13 November 2000

### 9. Additional tests

We also had the following additional tests carried out:

- Welding of several pipe components with fitting **in accordance with the manufacturer's instructions**. Subsequently, a burst pressure strength test was carried out, as a result of which the minimum burst pressure was determined at 45 bar. In all test cases, the crack occurred in the pipe.
- Welding of several pipe components with fittings of various shapes, **not in accordance with the manufacturer's instructions**. Subsequently, a burst pressure strength test was carried out, as a result of which the minimum burst pressure was determined at 53 bar. In all test cases, the crack occurred in the pipe.

The general conclusion of these tests is that the crack always occurred in the pipe component at a pressure which exceeded 40 bar.

### 10. Requirements for installation and use.

#### General observations:

- It is vitally important that the manufacturer's/importer's instructions for the installation and welding of the components as well as any imperative tests or inspections are observed and carried out at all times.
- The importer is responsible for the professional training of fitters and welders;
- The instructions only apply to the Smartflex pipelines specified above, in accordance with the correct colour coding and accessory fittings;
- Only suitable for the installation of fuel conveyance and distribution systems for motor vehicles;
- Only suitable for underground pipeline systems;
- The pipe lining must be protected from exposure to UV rays;
- The soil surrounding the pipe may not contain any aggressive agent or inadequate backfill material which could affect and/or damage the materials used;
- The only system allowed for filling the tanks is a system based on gravitation;
- The suction line to the distribution pump must be provided with a one-way-valve. This valve must be fitted immediately after the pump inside the distribution pillar and it must be easily accessible;
- All pipes must be placed at a sufficient gradient to the storage tank(s);
- All pipes, fittings, cocks and accessories must be adequately connected and sealed.
- The pipelines may not be used in a condition of overpressure;
- If the proprietor or his appointee should find any defects or flaws in the installation or pipes, he is to inform the manufacturer/importer and ANDO Consult b.v.b.a without delay.

#### Obligatory tests to be carried out by the environmental expert:

- The environmental expert is to carry out the following inspections, after the complete installation of the pipeline system, but prior to backfilling:
  - Visual inspection of the welding indicators on the fittings (if not fully 'popped up': the weld is rejected and must be redone), to ensure:
    - that misalignment between two pipes does not exceed 10°
    - that the correct insertion depth of the pipes in the fitting has been observed
    - that there is no escape of molten material, and that the area from which the oxidation has been scraped off is visible
    - that no parts of the resistor inserted in the fitting protrude
    - that the insulating caps for electrical connections of the weld-on sockets are fitted.

- Strength test, carried out prior to backfilling, at a pressure of 3 bar during 30 minutes, followed by a check for possible deformations;
- Checking whether the gradient of the pipes towards the tank(s) is sufficient;
- Second leakage test, prior to backfilling at 100 mbar, and checking all joints for leaks by means of soapy water;
- Leakage test after backfilling at 100mbar during one hour;
- Checking the certification of the qualified fitter and welding operator;
- Checking the calibration certificate of the welding appliance;
- Leakage test performed on the pipes during each obligatory periodic inspection.

**Special requirements regarding the electrostatic safety, operation and installation of piping systems:**

1. All metal components of the piping system must be earthed, since they are a suitable source of electrostatic ignition. Components which cannot be earthed – such as weld-on sockets – must be provided with a permanent brush discharge insulation, e.g. leak-proof caps or filling material with satisfactory brush discharge insulation properties.
2. No metal objects or components may be placed or fitted inside the primary pipe, as these elements can act as an electrode and may generate an electrical discharge.
3. The fuel flow rate may not exceed 3.5 m/s.
4. The fuel flowing through the pipes comes in contact with several earthed metal objects/conductors.
5. No filters may be fitted before or inside the plastic pipes (in the direction of the fuel flow).
6. Flammable discharges must be avoided in all sections of the piping system.
7. Personnel entering/working inside a fill box, manifold box or sump must always wear suitable antistatic protective clothing and footwear and be careful not to rub or polish the interior walls of such chambers since an electrical charge may be generated inside these chambers.
8. Personnel entering/working inside a fill box, manifold box or sump must take care not to create an explosive atmosphere.
9. Personnel should not enter fill boxes, manifold boxes, sumps or any other underground chambers during or immediately after fuel flow.
10. Insulated metal parts must always be earthed.
11. The tank lorries delivering fuel must always be connected to a general earth point.

## 11. Restrictions

The following restrictions apply:

- The present report only applies to the pipes, fittings and accessories which are mentioned in this report and which are duly marked and manufactured at:

NUPI S.p.A  
Via Dell' Artigianato 13  
40023 Castel di Bologna  
Italy

NUPI S.p.A  
Via Colombarotto 58  
40026 Imola  
Italy

- The obligation to carry out a leakage test shall remain in effect during all periodic inspections imposed by the Vlare II regulations.
- It is emphasised in the present report that all requirements regarding the installation, use (see annexes) and obligatory tests and inspections must be observed at all times.

The manufacturer and the importer are obliged to inform the registered environmental expert, ANDDO Consult b.v.b.a., without delay of any change in the manufacturing process which may affect the properties and characteristics of the materials.

- A copy of the reports of the periodic tests carried out by ERA must be submitted to us for perusal.
- If there is any change in the composition of the currently available fuels, it is necessary to carry out new tests.
- If there is any change in applicable legislation, standards, regulations or technology, the tests must be redone and reassessed by the registered environmental expert, ANDDO Consult b.v.b.a.
- If any adaptations are required in the future, the environmental expert shall have the right to carry out new inspections at the manufacturer's or importer's expense.
- The undersigned environmental expert shall have the right to revoke the present report/certificate, if pipes and fittings of this type no longer meet the accepted scientific and technological requirements.
- The present rapport is valid for a maximum period of five years. A new assessment is required prior to the expiry of that period.

## 12. Conclusion

In view of the fact that :

- Similar systems have already been approved and accepted in various countries;
- Similar systems have already been approved and accepted within the Flemish Region;
- The pipelines have been approved by ERA in accordance with the following specifications :  
"Institute of Petroleum Performance Specifications for Underground Pipework" Systems at Petrol Filling Stations". ISBN 0 85293 1946, November 1995.  
"Shell Retail International - Pipework performance specification and supplier evaluation - version 2"
- The pipes, fittings and accessories are manufactured in ISO certified production lines;
- The fitters will receive specific training on the installation and use of the pipeline system and the electrowelding of pipes and fittings by the company PETROLTECH N.V. ;
- The fitters / welders have to obtain a qualification certificate issued by the company PETROLTECH N.V.;
- The welding appliances will be supplied with operation instructions enclosed;
- The importer and manufacturer guarantee full technical support;
- All obligatory tests and inspections are to be carried out by a registered environmental expert;

**we believe that the pipeline system referred to in the present report is a suitable alternative in compliance with the provisions of art.5.17.1.4 § 2 of Vlarem II, provided that the restrictions and regulations regarding its installation and use, tests, audits and inspections mentioned in the present report and annexes are strictly observed.**

## 13. Annex

Instructions and technical specifications on the Smartflex system provided by Petroltech N.V., consisting of 18 pages, which constitute an integral part of the present report.

## 14. Note

By virtue of art.5.17.1.4 § 2, the present certificate must be kept available for perusal by the supervisory official. The proprietor shall send a copy of this certificate to the Environmental Permits department

**Johan DOBBELAERE**  
registered environmental expert :  
Flemish Region 98/H008 and 98/KO13  
Brussels Capital Region AGR.041  
Manager

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Annex: Instructions and technical specifications provided by Petroltech N.V., consisting of 18 pages.