# SPIRAL WOUND GASKETS WITH PV370

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## 1. Scope

Comparative testing of a Mica-Graphite based material to be used as a filler for Spiral Wound Gaskets in applications up to 232ºC (450ºF).

## 2. Foreground

The worldwide trend towards the complete replacement of Asbestos products has lead to the development of alternative fillers for Spiral Wound Gaskets. The Flexible Graphite, due to its outstanding sealability and high chemical resistance, has become the most used non Asbestos material. However, gaskets filled with Flexible Graphite are more expensive than with Asbestos. For services where there is no need for high temperature or chemical resistance, Mica-Graphite and Nitrile Latex Beater Addition material, has been used due to its lower cost compared with Flexible Graphite.

This Paper compares Spiral Wound gaskets manufactured with Asbestos filler, Mica-Graphite filler made in the USA and the PV-370, a Teadit Mica-Graphite based material specially developed for this application.

## 3. Materials Tested

3.1 PV 370: Mica-Graphite with Nitile Latex. The Physical characteristics are shown in Annex 3.
3.2 Chlorite- Graphite with Nitrile Latex used by most USA manufactures.
3.3 PV J3: Asbestos fiber bonded with Niltrile Latex, normally used as filler for gaskets.

## 4. Test Procedure

4.1 Test description

Were tested Spiral Wound Gaskets Teadit Style 913 manufactured with the filler materials defined in Item 3, dimensions per ASME B16.20, 2 inches Class 300. Tests were performed using the Shell test stand. The gasket is installed tightening with a known Torque value, the system is pressurized with Nitrogen and the pressure drop is recorded according the Teadit Procedure POQ-006-Rev. ).

4.2 Test temperature

All gaskets were tested at the room temperature and at 232ºC (450ºF), which is the Fluid Sealing Association (FSA) maximum recommended temperature for Mica-Graphite filled gaskets.

4.3 Test Pressure

Initial test pressure 27 bar (300 psi).

4.4 Tightening Torque

The tightening torque is 39.24 N-m for all tested gaskets. With this torque value the flange sealing surfaces touch the gasket guide ring. Higher torque values do not increase the gasket surface pressure, not increasing the its sealability. The minimum torque value calculated per ASME Boiler and Pressure Vessel Code is 25.4 N-m.

4.5 Gaskets tested

Three gaskets of each filler were tested in each test temperature.

## 5. Test results

The Annexes 1 and 2 show the pressure drop for each gasket tested.

Charts at the Room Temperature show that both gaskets with PV 370 and Mica-Graphite have similar performance and very low leakage. They also show better results than gaskets with Asbestos filler with a higher pressure drop.

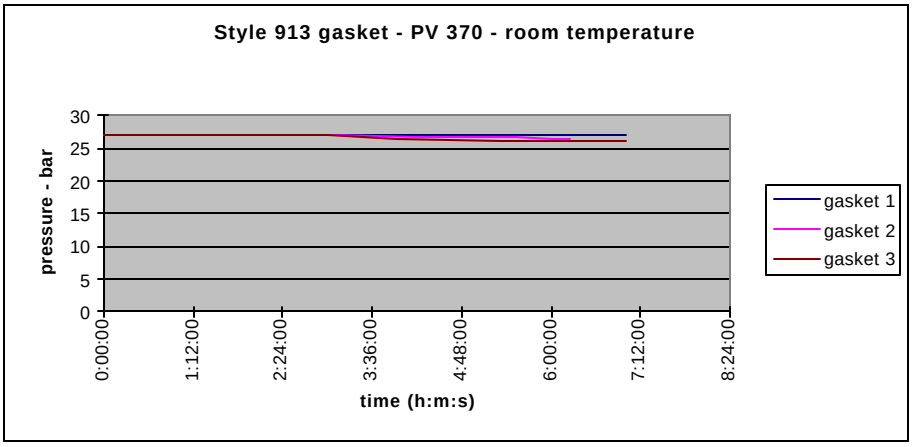
At 232$^{o}$ C, the PV 370 has a superior performance showing a lower and constant pressure drop. The Mica-Graphite filler in addition to a higher pressure drop has greater variations among the gaskets.

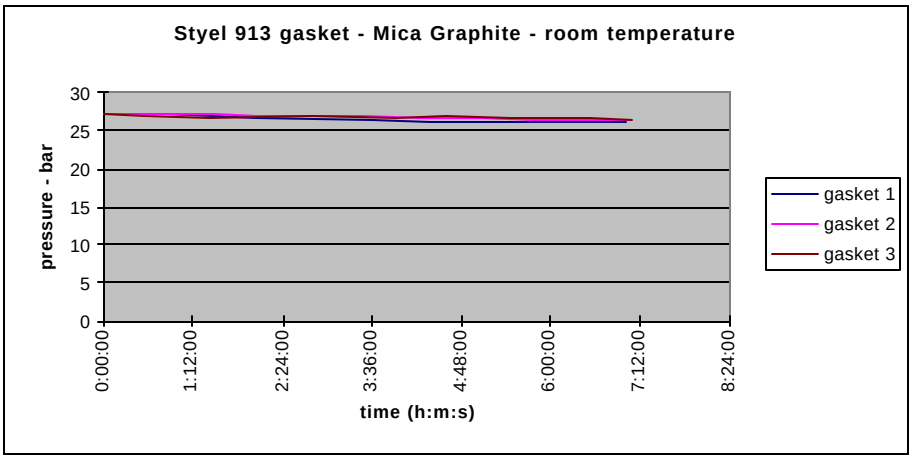
The Asbestos filled gaskets have higher leakage at both test temperatures.

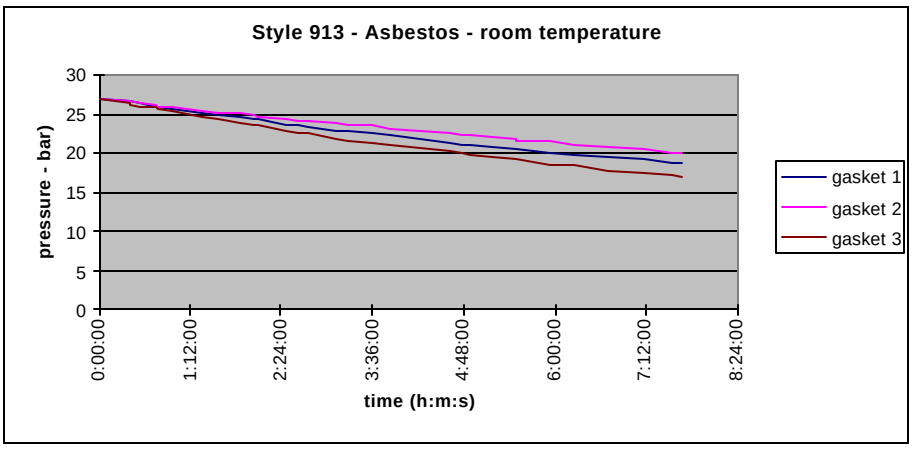
## 6. Final Comments

At the test conditions Spiral Wound gaskets manufactured with PV 370 have a better performance than with both Mica-Graphite and Asbestos.

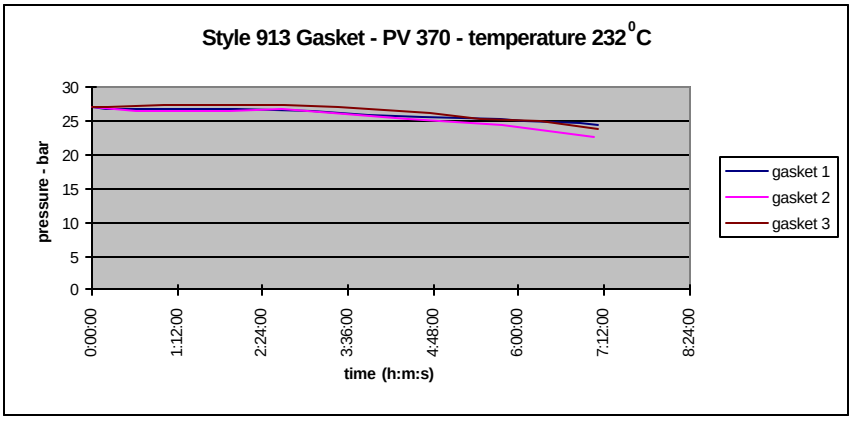
# Appendix 1

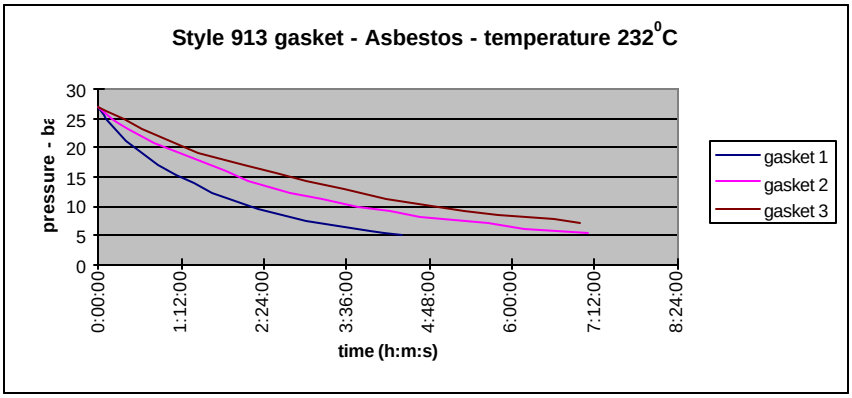

Style 913 gasket - PV 370 - room temperature
pressure - bar
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3

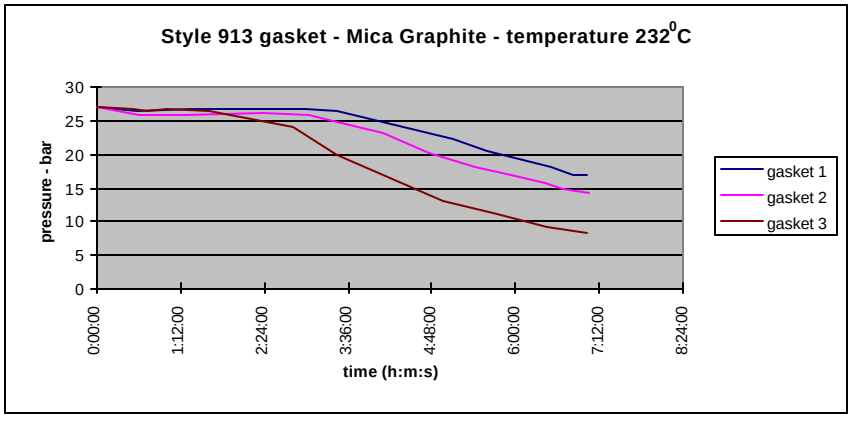

Styel 913 gasket - Mica Graphite - room temperature
pressure - bar
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3


Style 913 - Asbestos - room temperature
pressure - bar)
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3

# Appendix 2


Style 913 Gasket - PV 370 - temperature 232 0C
pressure - bar
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3


Style 913 gasket - Asbestos - temperature 232 0C
pressure - ba
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3


Style 913 gasket - Mica Graphite - temperature 232 0C
pressure - bar
30
25
20
15
10
5
0
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
time (h:m:s)
gasket 1
gasket 2
gasket 3

# DATA SHEET PV 370

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**Description: PV 370** is a medium density Beater Addition material manufactured from cellulose and inorganic fibers, bound by NBR latex.

**Applications: PV 370** is designed as a filler for the spiral wound gasket, at the temperature until 450°F ( 232°C ).

**Availability: PV 370** is supplied in grey color, in rolls of approximately 110 kg each, 1200 mm wide (maximum), thickness from 0,4 to 1,0mm.

**Specification compliance:** ASTM F104 ( F727160E52M3 )

| PRODUCT DATA | |
|---|---|
| Density, g/cm³ | 1.12 |
| Tensile Strength, psi<br>MPa | 650<br>4.5 |
| Compressibility at 5000 psi, % | 41 |
| Recovery, % | 21 |
| Ignition Loss (%) | 26 |
| Resistance after 5 hours immersion<br>ASTM 3 Oil at 300°F (150°C)<br>Tensile Loss, %<br>Compressibility at 5000 psi, %<br>Weight Increase, %<br>Thickness Increase, % | <br><br>23<br>41<br>43<br>4 |
| Resistance after 5 hours immersion<br>ASTM Fuel B at 73°F (23°C)<br>Weight Increase, %<br>Thickness Increase, % | <br><br>36<br>3 |