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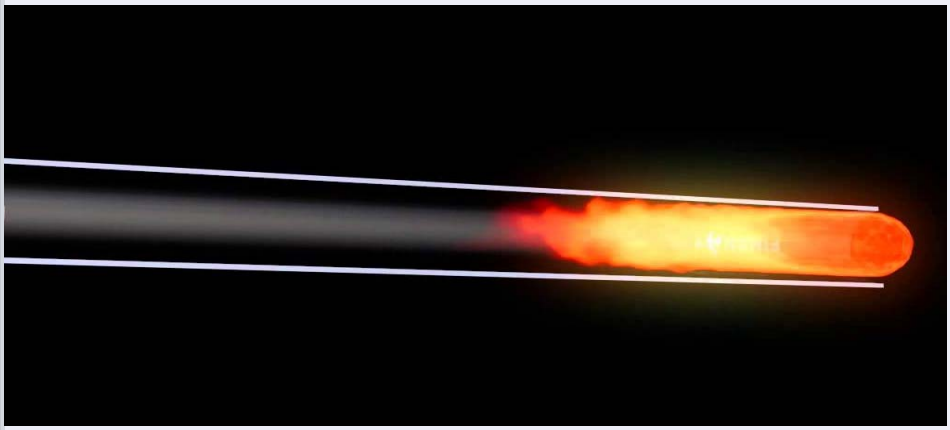

Técnicas de Aislamiento y Estándares aplicables

J.Martín - 2017

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[redacted]

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Justificación Legislativa según RD 681-2003

CAPÍTULO II
Obligaciones del empresario

Artículo 3. Prevención de explosiones y protección contra éstas.

Con objeto de prevenir las explosiones, de conformidad con el artículo 15.1 de la Ley de Prevención de Riesgos Laborales, y de proporcionar una protección contra ellas, el empresario deberá tomar medidas de carácter técnico y/u organizativo en función del tipo de actividad, siguiendo un orden de prioridades y conforme a los principios básicos siguientes: impedir la formación de atmósferas explosivas o, cuando la naturaleza de la actividad no lo permita, evitar la ignición de atmósferas explosivas y atenuar los efectos perjudiciales de una explosión de forma que se garantice la salud y la seguridad de los trabajadores.

Estas medidas se combinarán o completarán, cuando sea necesario, con medidas contra la propagación de las explosiones. Se revisarán periódicamente y, en cualquier caso, siempre que se produzcan cambios significativos.

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Justificación Normativa según EN 14491

Interconnected enclosure systems shall normally be protected by isolating each separate enclosure so that an explosion in one protected enclosure is stopped from propagating into a second one. Isolation methods have been discussed in prEN 15089.

5.4 Protection of pipelines and interconnected enclosures

5.4.1 Protection of interconnected enclosures

Vent areas determined by the Equations (1) through (4) are too small if a dust explosion propagates from one vessel into another through a pipeline. Increased turbulence, pressure piling and broad flame jet ignition may result in an increased explosion violence, especially with duct length > 6 m. This results in an elevated maximum reduced explosion overpressure. Measures for explosion decoupling in the connecting pipeline are therefore needed.

In accordance with the present technology the protective measure explosion venting can be used for pipelines having a nominal diameter up to DN 300 and a connecting length up to 6 m without explosion isolation, in accordance with the following criteria:

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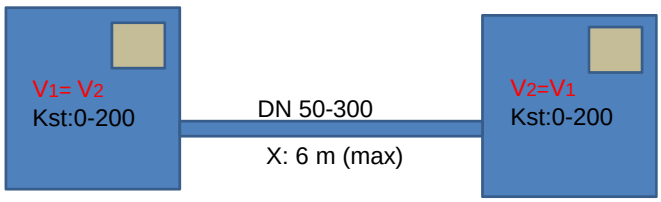
2.Excepción 5.4.2 del uso de aislamiento:

a)



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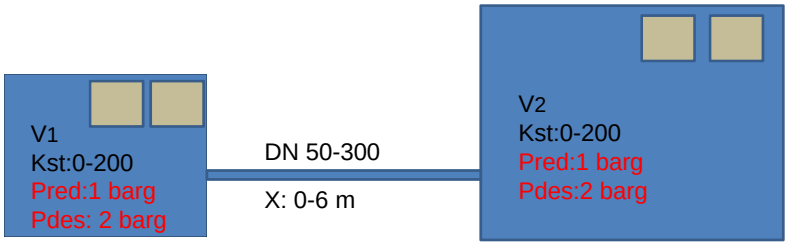
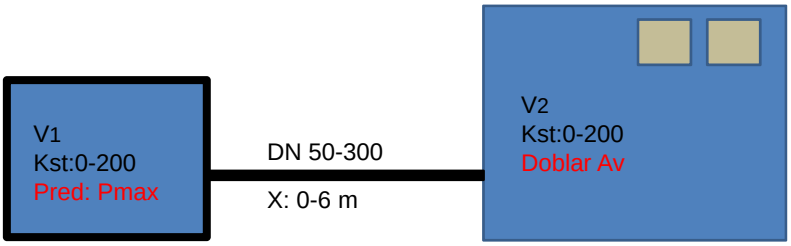
2. Excepción 5.4.2 del uso de aislamiento:

b1)



b2)



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2.Estándar Europeo: EN 15089
Sistemas de Aislamiento de Explosiones

BS EN 15089:2009

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15089

March 2009

ICS 13.230

English Version

Explosion isolation systems

-Sistemas Pasivos y Sistemas Activos
-Sistemas activos: Detección óptica/presión/indicadores ruptura
-Certificación Explosion Isolation System – Organismo Notificado

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3.Concepto de explosión y diferencias

- **Deflagración:**

- **Detonación:**

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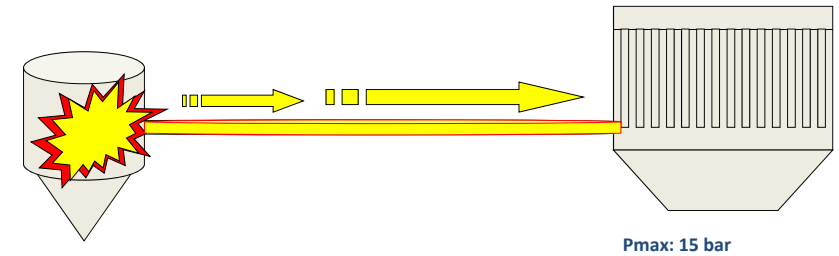
3.Propagación de la explosión y sus fenómenos:

1) Aceleración de la llama en la tubería (*Turbulence*)

2) Aumento de presión en la tubería (*Pressure Piling*)

3*) Jet Flame Ignition*



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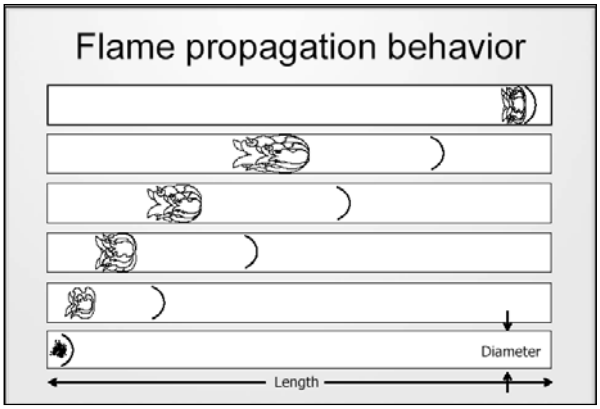
a- Parámetro de proceso: DDT



Propano Kg = 100 bar·m/s
DN 150 mm

Detonación = 0,15 m · 72

Detonación = 11 m

Pipe Diameter	Length/Diameter		
	Propane	Ethylene	Hydrogen
6"	72	66	59
10"	71	69	59

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b- Parámetro de proceso: DN tubería

Tubería DN 80 < baja probabilidad de propagación

Tubería DN 80 > mayor probabilidad de propagación

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c- Parámetro de proceso: Kst

$$K_{St} = (dp/dt)_{max} V^{1/3}$$

Buxton UK, Tests 2002

(b) Dusts with a K_{St} value of 150 bar m s^{-1} are able to develop significant pressures, although the likelihood of explosion propagation through the elevator is low. Vents additional to those at the head and boot may be required on long elevators if the casing is comparatively weak. The graphs in Figs. 7, 8 and 11 should be used to estimate the reduced explosion pressure for a given K_{St} value and vent spacing.

(c) Dusts with K_{St} values above 150 bar m s^{-1} will propagate explosions, and vents additional to those in the head and boot are required on elevators taller than 6 m. The graphs in Figs. 7, 8 and 11 should be

Kst < 150 menor probabilidad

Kst > 150 alta probabilidad

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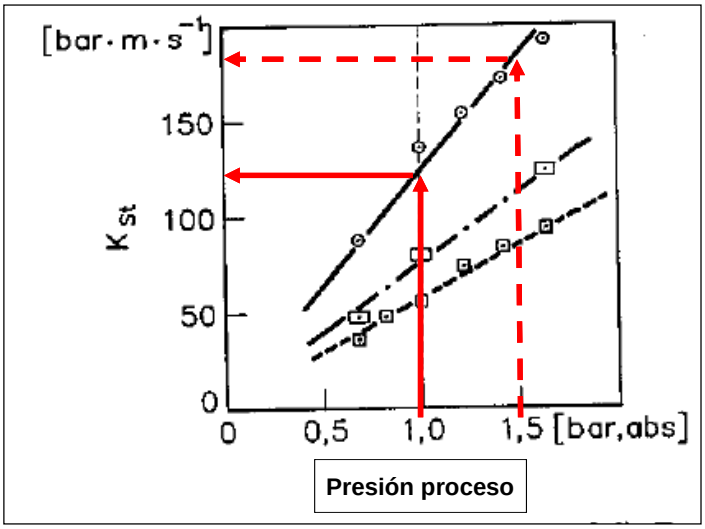
d- Presión operativa del proceso



Bartknecht

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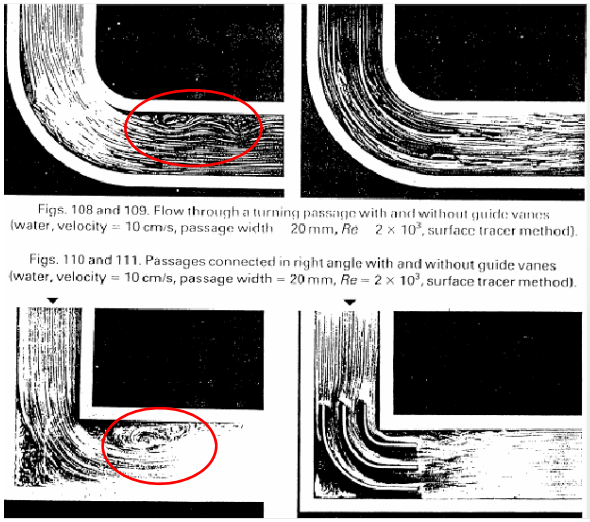
e- Piping de la instalación :



Figs. 108 and 109. Flow through a turning passage with and without guide vanes (water, velocity = 10 cm/s, passage width 20 mm, Re 2 × 10^3, surface tracer method).

Figs. 110 and 111. Passages connected in right angle with and without guide vanes (water, velocity = 10 cm/s, passage width = 20 mm, $Re = 2 \times 10^3$, surface tracer method).

Prandtl
Fluid Dynamics

Aerodynamics of flow around a curved and sharp bend. Note the flow separation and turbulence downstream of a sharp bend.

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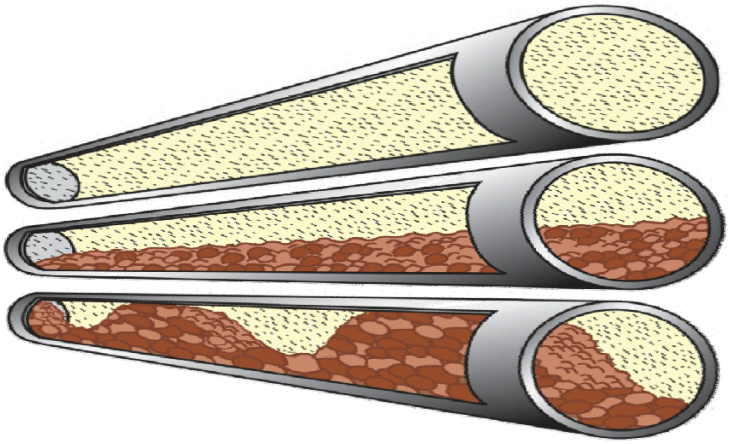
f- Tipo de transporte del sólido y flujo :



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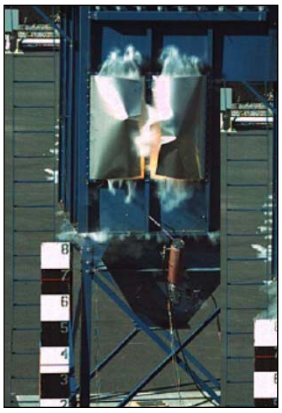
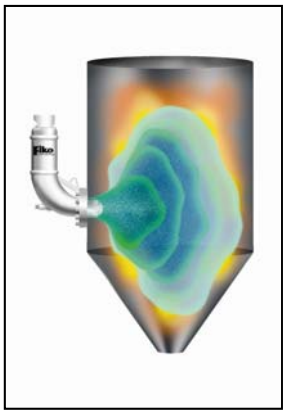
g- Tipo de sistema de protección

Venteo



Supresión



Contención

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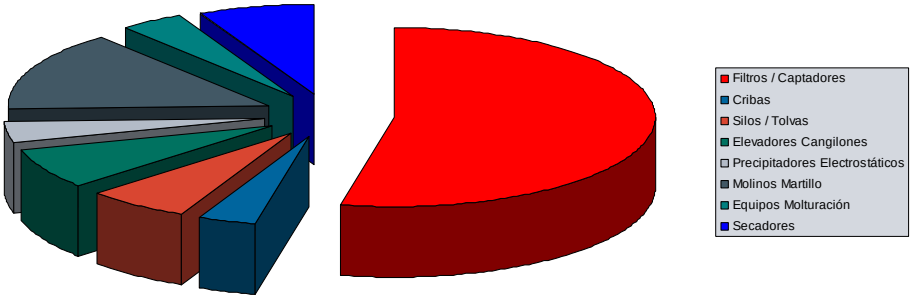
h-Estadísitcas por Equipos de Proceso:



Factory Mutual Data Sheet 7-76

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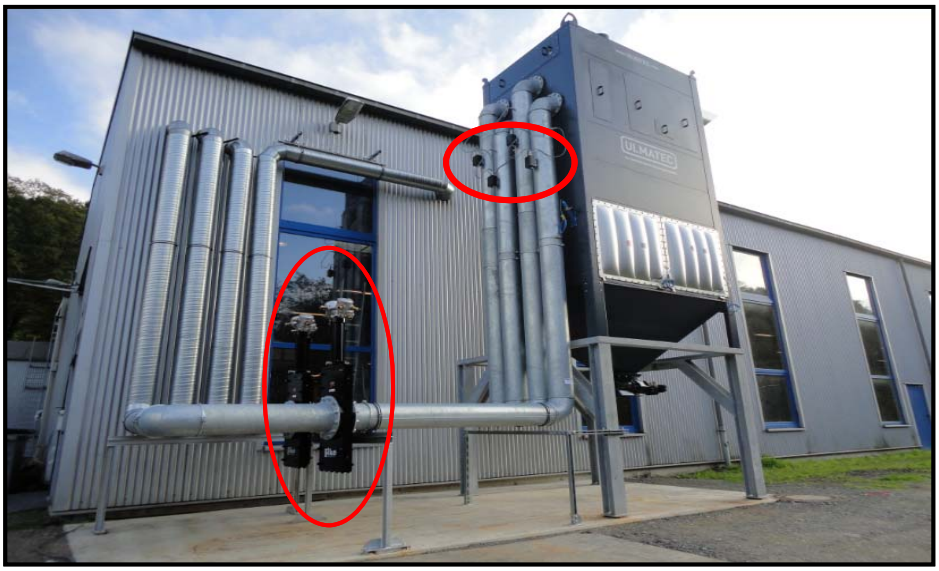
4.¿Qué es un sistema activo de aislamiento?



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4. Sistema Aislamiento: Químico “SRD”

-Protección bidireccional

-No produce pérdidas de carga

-Usar en combinación con venteo y supresión

-Usa agente supresor

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4. Sistemas activos de Aislamiento de Explosiones Químico SRD:

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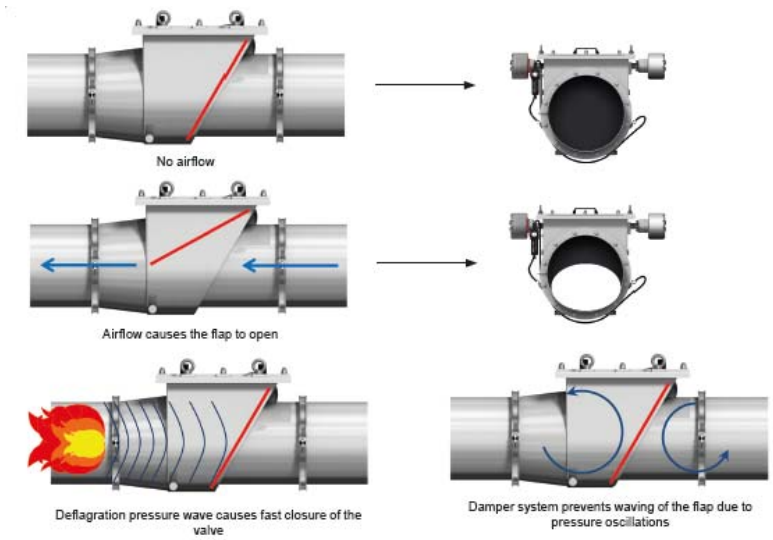
4. Válvulas de Clapeta-Flap Valves EN 16447



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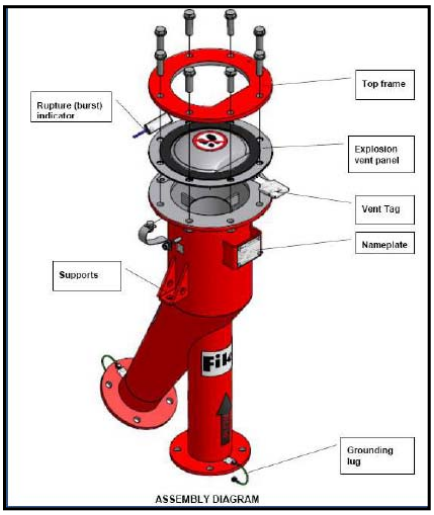
4. Diversor de Explosiones - Diverter



Alivia la presión en la conducción y evita:

1-Acumulación de presión
2-Turbulencia
3-Flame jet ignition

Es una solución para evitar detonaciones

Permite dimensionar el equipo aguas abajo con EN 14491

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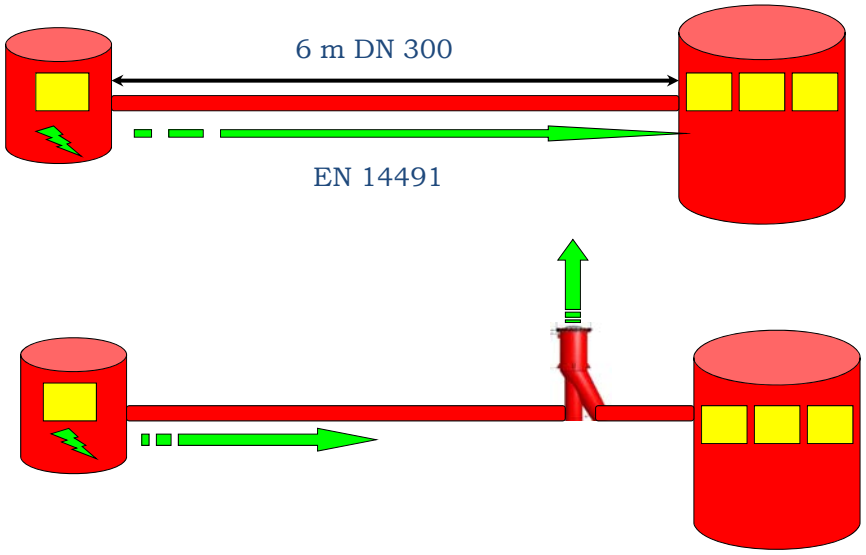
Ventaja del diseño:



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Análisis CFD - Computational Fluid Dynamics

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Conclusión:

Los riesgos de las explosiones son una realidad;

-Pérdida de vidas humanas
-Pérdida de activos
-Pérdida de imagen corporativa

"Safety is no accident, Safety is our passion and we want to share our passion with you"

Fike®

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Muchas Gracias

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