	Working Instructions (WI)	No: WI 001
Title: Recommended method for the determination of hydrocarbons in gas cylinders		Issue: 2009/07 Rev. No. 4

1 Scope

This working instruction describes the method for the determination of non volatile hydrocarbons in metallic gas cylinders and metallic liners of composite cylinders.

2 Sampling

The sample cylinder shall be taken out of the production flow after final cleaning (shot blasting and /or washing). Prior to testing the cylinder should be visually checked to ensure that all surfaces are free from visible deposits, loose debris and are dry.

3 Test Equipment

- calibrated balance with mg resolution
- 2 glass beakers 1 litre
- Glass funnel
- Pipette 100ml
- Glass evaporating basin
- Measuring glass
- Glass siphon
- Filter apparatus


All equipment should be suitable for the used solvent and well cleaned and rinsed with pure solvent

4 Solvent

Fresh Dichloromethane.

5 Method

- a) 20 ml of the solvent per litre cylinder volume is poured into the standing cylinder through a glass funnel. A minimum of 200 ml should be used
- b) The cylinder is plugged with a clean solvent resistant plug and rolled horizontally for 2 minutes
- c) Suspend the cylinder vertically, neck downwards, for 1 minute with occasional agitation
- d) Stand the cylinder on its base for 2 minutes with occasional agitation
- e) The solvent can be siphoned out of the cylinder, or the cylinder can be drained into a clean glass beaker.
- f) The solvent is filtered through a filter with a micro porosity of 5 μm into another clean glass beaker.

 <small>EUROPEAN CYLINDER MAKERS ASSOCIATION</small> Technical Group for seamless gas cylinders	Working Instructions (WI)	No: WI 001
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- g) 100 ±2 ml of the solvent is taken with a pipette and released into a weighed clean glass evaporating basin.
- h) The pipette is rinsed with approximately 10 ml of unused fresh solvent, which is also released into the glass evaporating basin.
- i) The solvent is allowed to evaporate to complete dryness and the glass evaporating basin is then weighed again.

6 Results

The total amount of non volatile hydrocarbons in the cylinder is then calculated as:

$$M_t = \frac{V}{v} * m$$

where

- M_t total amount in mg of non volatile hydrocarbons
- m weight difference of the glass evaporating basin before and after solvent evaporation
- V total volume of solvent in ml released into the glass evaporating basin
- v 100 ml solvent poured onto the watch glass

The amount of non volatile hydrocarbons per square metre cylinder surface , M_s , is calculated as:

$$M_s = \frac{M_t}{A + B + C}$$

where

- A area of cylinder top approximated as a sphere i.e. $\frac{1}{2} \times 4 \times \pi \times r^2$
- B area of the mid cylinder = $2 \times \pi \times r \times h$
- C area of cylinder bottom depending on base shape
- r cylinder inner radius
- h height of the cylindrical part of the cylinder