



# SAFETY NEWSLETTER

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EUROPEAN INDUSTRIAL GASES ASSOCIATION

av. des Arts, 3-5, Bte 16 B-1210 Bruxelles. Tel : 32 2 217.70.98 Fax : 32 2 219.85.14

The purpose of this NEWSLETTER is to help EIGA Companies to improve their Safety Performance.

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**CO<sub>2</sub> Ice Plugs**

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When liquid CO<sub>2</sub> pressure decreases below 4.2 barg, dry ice is formed and can plug valves and pipes then, with increasing pressure resulting from solid CO<sub>2</sub> sublimation, dry ice plugs can be violently ejected or pipe can burst. Note that temperature can drop down and make piping materials brittle.

### Facts

Injuries caused by dry ice plugs are periodically reported by EIGA member companies. In particular drivers are injured by high velocity dry ice plugs ejected from transfer hoses when completing liquid CO<sub>2</sub> transfer operations. Also the whip of the hose is hazardous when a plug is ejected.

### Measures to prevent repetition of accidents

#### Safe piping design :

- ☞ Pressure relief devices set at the appropriate pressure are necessary in all parts of the system where liquid CO<sub>2</sub> could be trapped.
- ☞ Ball and gate valves used in liquefied gas service must be designed to relieve internal pressure.
- ☞ Drain valve must be located at the lowest point of the piping.
- ☞ Design should provide CO<sub>2</sub> vapor supply in order to purge liquid CO<sub>2</sub> piping.
- ☞ Piping material embrittlement at low temperature should be taken into consideration.
- ☞ Flexible hoses need be fitted with safety cables.

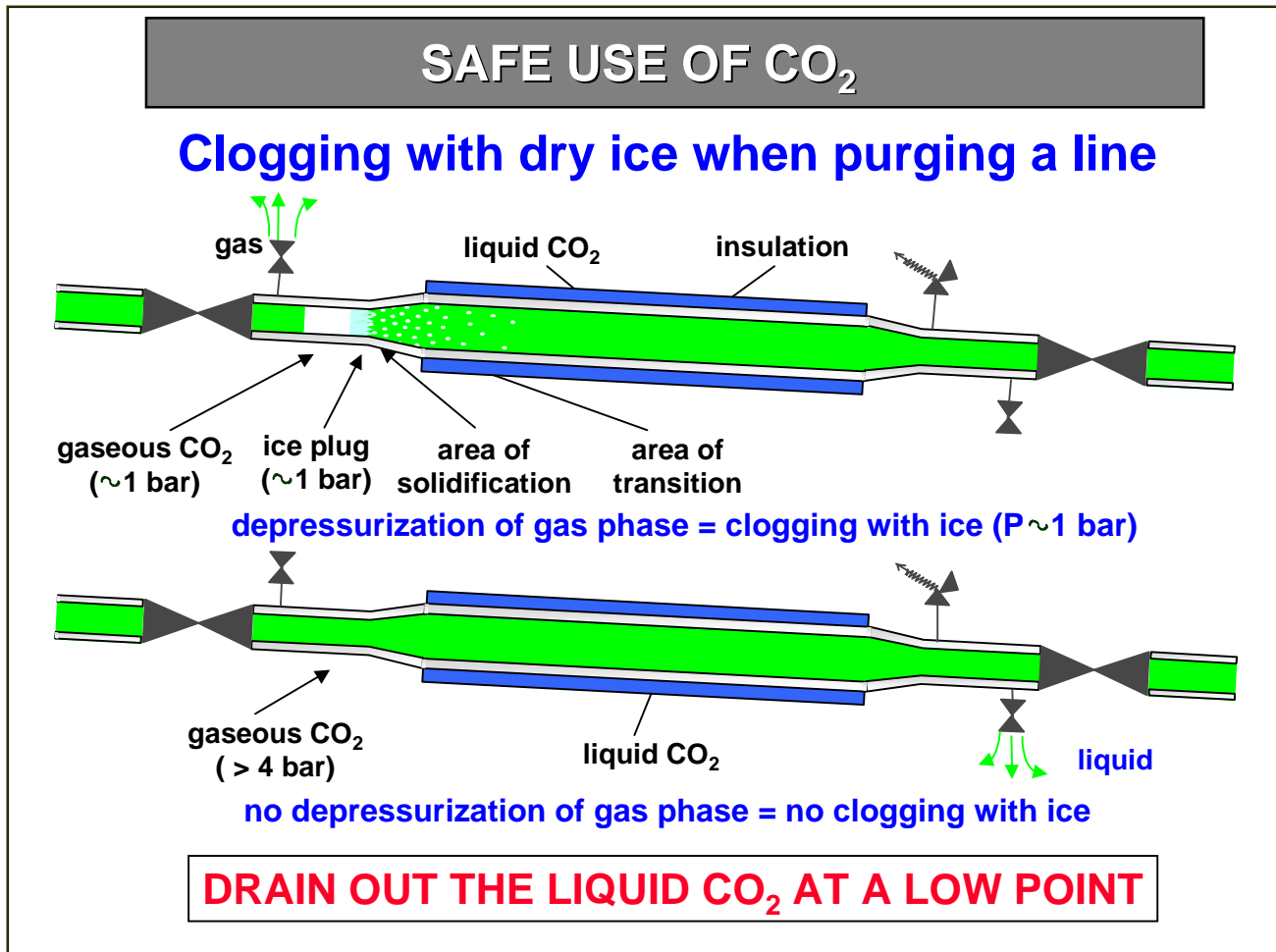
#### Safe draining procedure:

- ☞ Wear adequate clothing and personal protective equipment.
- ☞ Drain hose/pipe through one valve only.
- ☞ Draining takes place from the lowest point of the piping.
- ☞ Keep pressure over 10 bars until all liquid CO<sub>2</sub> has been drained.
- ☞ Use CO<sub>2</sub> vapor to push liquid CO<sub>2</sub> out.
- ☞ Watch the draining process so that one can see and hear when there is no more liquid to drain.
- ☞ Watch the piping or hose: if it remains heavily frosted in one or more areas, dry ice blocks may exist...
- ☞ When draining/purging is "finished" loosen connections at both ends of the transfer hose but do not remove or separate until there is no sign of overpressure. Then disconnect the hose and remove safety cables.
- ☞ When dry ice plugging occurs, keep drain valve open and wait until it blows.
- ☞ Do not remain in the immediate vicinity of a plugged pipe/hose.
- ☞ Using steam or any other source of heat to speed-up the sublimation process must be forbidden.

Also refer to IGC document Doc 56/97/EFDD "CO<sub>2</sub> tanker drivers' manual" (to be issued shortly).

See in Page 2 Annex E of this document.

**IGC Document 56/97/EFD  
“CO<sub>2</sub> Tanker driver’s manual” – Annex E**



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