



Canadian Standards Association  
Etobicoke, Ontario  
**To the Part I Committee**

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Subject No. 3052

Chair: V. Rowe

Date: September 23, 2003

Title: Cutoff Limit for No Ventilation, Rule 18-070(a)

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**Submitted by:** Eddie Fisher of Power Ignition Controls Ltd., 6815B-40 Street SE, Calgary, Alberta, Tel: (403) 236-2115, Fax: (403) 236-2147 on January 7, 2002.

**Proposal:** Amend Rule 18-070(a) to read as follows:

- (a) (i) Will actuate ventilating equipment or other means designed to prevent the concentration of gas from reaching the lower explosive limit when the gas concentration reached 20% of the lower explosive limit; or  
  
(ii) **Where it is not possible to increase the ventilation rate, the equipment not suitable for location use shall automatically be de-energized at 20% of the lower explosive limit; and**

**Reasons for Request:** In small remote gas driven compressor applications, the additional power requirements for fans and ventilation are not always practical or affordable. Many of these engines use magneto ignition systems that are self-powered. The control components operate using ignition voltage. This voltage is approximately 150 VDC @ three milliamps output. In areas where AC line voltage is available, ventilation can be installed using fans, etc. as the current demand is available. In remote applications, this demand is not easily obtained.

**Supporting Information:** The current wording states that if ventilation is actuated, then power to non-suitable equipment is okay up to 40% LEL. By removing power at 20% with no ventilation, then the degree of safety should be increased.

**Chair's Comments:** I had a discussion with the submitter before he sent the item in. The item is intended to deal with a common problem in oil and gas production. Often natural gas fueled engine driven compressors are located in remote sites where there is limited or no power available. The ignition system is powered from an alternator on the engine and the control systems are powered from batteries charged by solar cells or a small thermo-electric generator. The building or housing is naturally ventilated and there is not sufficient power available to drive exhaust fans. Often these buildings will be classified as Class I, Zone 1 locations and the ignition system and control system will be suitable for use in a Class I, Zone 2 location. There are hundreds of these installations in the oil and gas fields. As the ventilation cannot be increased mechanically, the alternative will be to power down the equipment at 20% of LEL. I believe this is the most practical solution to these situations.

The submitter wrote the rule based on the 1998 version of the CEC so it will need to be modified to match the format in the 2002 CEC. Also I believe the wording should be slightly modified to make it consistent with other wording in the rule. The proposal for balloting will therefore read:

Proposal: Add a new Subrule (d) to Rule 18-070 to read as follows:

- (d) Notwithstanding Subrule (c), where it is not possible to increase the ventilation rate as required in Subrule (c)(i):
  - (i) The equipment being protected shall be automatically de-energized when the gas concentration reaches 20% of the lower explosive limit; and
  - (ii) The equipment being protected will be automatically de-energized upon failure of the gas detection instrument.

This change will also apply to Rule J18-070.

**Chair's Comments (Second Round):**

There were a number of negatives to the first ballot, not so much in disagreement with what the submitter was trying to accomplish but more in the wording and format. A summary of the concerns is:

- The wording “where it is not possible to increase ventilation” is vague and open to interpretation. Better wording would be where ventilation is not available.
- Concern that the rule appears inconsistent. 40% LEL is the shutdown requirement in one case and only 20 in the other. This makes the rule more complicated.
- The rule currently requires at 20% LEL to activate an alarm and actuate ventilating equipment *or other means* to prevent the gas concentration from reaching 100% LEL. Other means could include natural ventilation. In any case at 40% LEL the equipment will be de-energized. This new requirement could impose unnecessary interruption of vital or costly processes.
- The submitter hasn't taken into account there are other ways of controlling gas concentration other than ventilation. Shutting down the equipment at 20% LEL would be premature. The rule is OK as is.
- Agree with the principle of the proposed change but there is too much wrong with the proposal as written. It needs another round of balloting.

I had discussed this proposal with the submitter. He is dealing with a real life problem that occurs many times in the oil and gas producing Provinces so I believe it is important we try to find a solution. The situation he and many other assemblers and operating companies are in is as follows:

Small gas engine driven compressors, which are frequently installed in remote locations where a source of AC power is not available to run ventilating equipment, typically use magneto powered ignition systems. Ventilation is supplied by naturally occurring means. The ventilation required to get rid of the heat radiated by the engine and the exhaust is typically in excess of the requirements to achieve “adequate ventilation”. However if an abnormal release of gas occurs, the ventilation may not be sufficient to prevent the gas concentration reaching explosive

concentrations. As there is no power to increase the ventilation rate in accordance with the current requirements of 18-070.

Normally the interiors of these compressor enclosures are classified as Class I Zone 1 (or Division 1) areas. Because the ignition systems available are only rated for Class I, Division 2, the only choice is to use 18-070. Actually the need to put Div 2 ignition systems in Div 1 was one of the main uses for this rule for larger compressors where power for ventilating equipment was available. However the need to produce from depleted or low-pressure gas wells is seeing more of the remote installations where AC power is not available. Gas detection systems are run off a solar powered battery system or a battery system charged with a small fuel cell.

What the submitter is asking to be allowed to do is to shut the ignition system down (which of course also shuts the compressor down) if the gas concentration reaches 20%. As the gas concentration in these types of installations is normally 1% or 2% of LEL or lower, the occurrence of 20% LEL is the result of some very abnormal situation causing a gas release. In IEC 60079-10 standard titled "Classification of Hazardous Areas and Installation Requirements" the following extract from the section on safety principles seems to apply to the situation we are trying to deal with. It reads as follows:

*In a situation in which there may be an explosive atmosphere, the following steps may be taken:*

- a) Eliminate the likelihood of an explosive gas atmosphere occurring around the source of ignition, or*
- b) Eliminate the source of ignition.*

What this proposal is attempting to do is to meet the requirement of (b). The way the rule currently reads, if the gas concentration in the air reaches 20% LEL, it is allowable to increase ventilation in an attempt to meet (a). If the concentration continues to increase, when it reaches 40% of LEL, the equipment being protected must be shut down. What the submitter is trying to do is to change the rule to give him the choice to meet (b) if he cannot meet (a). As there is no means to increase the ventilation, the action taken at 20% LEL will be to eliminate the source of ignition.

As I believe this proposal has merit and is attempting to meet a legitimate requirement I propose to try a second round with wording suggested by Mr. Lobay in his negative ballot as follows:

Revise subrule (c) of 18-070 to read:

- (c) The location is continuously monitored by a combustible gas detection system that:*
  - i. Will activate an alarm when the gas concentration reaches 20% of the lower explosive limit; and*
  - ii. Will activate ventilating equipment or other means designed to prevent the concentration of gas from reaching the lower explosive limit when the gas concentration reaches 20% of the lower explosive limit, where such ventilating equipment or other means is provided; and*
  - iii. Will automatically de-energize the electrical equipment being protected when the gas concentration reaches 40% of the lower explosive limit, where the ventilating equipment or other means referred to in Subrule (c)(ii) is provided; and*
  - iv. Will automatically de-energize the electrical equipment being protected when the gas concentration reaches 20% of the lower explosive limit, where the ventilating equipment or other means referred to in Subrule (c)(ii) cannot be provided; and*
  - v. Will automatically de-energize the electrical equipment being protected upon failure of the gas detection instrument.*

**Chair's Comments:**

I only received seven ballots on this subject, however all were in favor of the change. I believe we have consensus on the latest proposal.

**Subcommittee Recommendation:** Accept the wording in the second round of balloting as follows. The changes to Rule 18-070 also applies to Rule J18-070.

Revise subrule (c) of 18-070 to read:

- (c) The location is continuously monitored by a combustible gas detection system that:
- i. Will activate an alarm when the gas concentration reaches 20% of the lower explosive limit; and
  - ii. Will activate ventilating equipment or other means designed to prevent the concentration of gas from reaching the lower explosive limit when the gas concentration reaches 20% of the lower explosive limit, where such ventilating equipment or other means is provided; and
  - iii. Will automatically de-energize the electrical equipment being protected when the gas concentration reaches 40% of the lower explosive limit, where the ventilating equipment or other means referred to in Subrule (c)(ii) is provided; and
  - iv. Will automatically de-energize the electrical equipment being protected when the gas concentration reaches 20% of the lower explosive limit, where the ventilating equipment or other means referred to in Subrule (c)(ii) cannot be provided; and
  - v. Will automatically de-energize the electrical equipment being protected upon failure of the gas detection instrument.