



Resources Worldwide, Inc.

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Report on **NITRO GUARD**, a new fire prevention system using hypoxic air, created by Resources Worldwide, Inc. (www.resourcesworldwideinc.com)

“SYSTEMS AND METHODS FOR PREVENTING IGNITION AND FIRE VIA A MAINTAINED HYPOXIC ENVIRONMENT”

INVENTION

The present invention relates to systems and methods for preventing ignition and fire via maintained hypoxic (low oxygen levels) environment, wherein humans can safely breathe and work. Said hypoxic environment (NITRO GUARD) will be created by on site equipment which consumes only electricity. Venting is provided to prevent over-pressurization and or a maintained pressure of the hypoxic environment. Additional ultra sophisticated fire detection system is implemented to detect invisible by product materials as they degrade during pre-combustion stages of an incipient fire, thereby detecting a fire as early as six hours prior to ignition and sending a warning signal.

NATIONAL FIRE PROTECTION ASSOCIATION

According to the National Fire Protection Association (NFPA) Standard 2001, “Clean agent fire extinguishing systems” page 28, table A-1 6.1.3. “Physiological effects for inert gas agents”

At 12% oxygen there is no observable adverse effect on humans (noael) at 10% oxygen low observable adverse effect (loael)

At fire prevention 15% oxygen concentration used by Resources corresponds to airplane travel or living in LaPaz or Mexico City, Mexico. No impairment of physiological functions in humans was shown at these oxygen concentrations. No special certification is required to introduce Nitro Guard into an environment is required.

THE METHOD

In one aspect of the present invention nitrogen generators are used on site to eliminate the need for on site nitrogen storage. Such nitrogen generators produce virtually pure, commercially sterile nitrogen from a compressed air supply such as that provide by a

standard air compressor. Nitrogen generator creates such nitrogen by separating compressed air into two air streams through use of membrane separation technology. A first stream is virtually pure nitrogen and the second stream is oxygen rich with carbon dioxide and other trace gases. The former air stream is contained within a hollow fiber membrane until it flows through an outlet port of the nitrogen generator, and the latter air stream is discharged through a permeative port. In one aspect of this system nitrogen generator maybe modular to accommodate future expansion of ignition prevention system without replacing entire unit.

Preferably, the facility, vessel, or any enclosed sealed room or the like in which ignition prevention system will be installed, should be capable of or modified to maintain the hypoxic environment at a slightly positive pressure relative to the environment located external to the facility, vessel or like. Such positive pressurization minimizes the quantity of nitrogen required to maintain the hypoxic environment by preventing the infiltration of non-hypoxic air from outside the area being protected.

Once the environment of a facility has initially been reduced to desired levels, the ignition prevention system maintains this level. Resources Worldwide, Inc. has software available to permit adding hysteresis to our alarm level relay which is built into the oxygen monitor. We have capability of selecting an actual percentage of oxygen to be used to delay the alarm relay. When oxygen goes lower than set level, strobe lights and an audible sound alarm will occur,

THE PROCEDURE/SOFTWARE

1. Select alarm threshold menu to select the alarm set point to turn off the nitrogen valve at 15.2%, this will average oxygen to 15% level.

2. Select the hysteresis menu to select the actual oxygen level percentage .03...15.2% minus 0.3% equals 14.9% when the O₂ monitor reads 14.9% the nitrogen valve will shut off, 15.2% plus 0.3% equals 15.5% when the O₂ monitor reads 15.5% the nitrogen will turn off.

3. We can perform this task at any percentage level, above is simple example. We will be able to change these percentages in the field as different products require.

We also have available software to safely and efficiently deliver pure nitrogen into the facility being protected from fire or ignition of any source or origin. Delivery system is very important so excess nitrogen does not form in pockets creating hazardous conditions for human beings. Our unique software guarantees safety of homogeneously mixing pure nitrogen with ambient air to result in safe breathing and working conditions throughout entire facility. Fire prevention exists from 1,000 cubic feet to 30 million cubic feet.

Resources have available software that correctly selects the size of the nitrogen generators and air compressors that will be used to protect the facility in the most economical fashion. A fan blower test, leakage, product being protected, human activity

etc. will be assimilated which will allow Resources engineers and technicians to give accurate assessment of equipment required to properly protect the facility.

OPERATING PROCEDURE

The pull down rate of the oxygen is highest during initial purge when the difference between the oxygen level of the room air and the nitrogen purge stream air is the largest. As this difference becomes smaller, oxygen pull down becomes smaller, oxygen pull down becomes slower and less efficient.

The higher the purity level of the nitrogen the faster the room oxygen will reach desired levels. We can also supplement nitrogen purge with portable canisters of nitrogen. The mathematical relationships between the purge gas flow rate, initial and final oxygen concentration, purge gas oxygen level and void storage volume are well known and therefore can be used to calculate the time required to achieve specific levels of oxygen reduction.

FORMULA:

$$T = (V/F) \text{Ln} (C_i - C_p) (C_f - C_p)$$

T = time, hours

V = void volume of storage, cubic feet

F = purge of nitrogen flow rate, CFH

C_p = Purge gas oxygen concentration

C_i = initial storage room oxygen concentration percentage

C_f = final storage room oxygen concentration percentage

This equation does not take into account the oxygen used by employees through respiration, air temperatures, leakage, mixing potential, supply and return flow, pressure differences, effects of weather, workers interaction with hypoxic air, etc.

CURRENT METHODS OF FIRE PROTECTION

Fire suppression with all the current methods of detection and extinguishment rely on one simple fact, a fire must first start. No matter how good the fire protection is some damage will occur. The ultimate form of fire protection is to prevent ignition in the first place. This is how Resources NITRO GUARD system differs from all current existing technology. Our system is pro-active rather than re-active.

If someone offered you medicine that would prevent you from ever being sick again, would you take it? PREVENTION is always better than the cure. An important advantage of Resources NITRO GUARD fire prevention system over all other existing systems is that our prevention agent is the air we breathe, endless supply. This hypoxic air is produced on site by equipment that consumes nothing but electricity. We maintain this permanent atmosphere 24 hours per day 7 days a week.

THE EFFECTS OF NITROGEN MOLECULES

Nitrogen molecules at common flame temperatures do not return the absorbed thermal radiation. Rather it is continuously removed from the combustion zone by the convection process. Because of this increase of nitrogen concentration in the environment, it creates a mass proportional increase in the total loss of emitted thermal energy which inhibits combustion. Increasing the nitrogen content in the gaseous mixture affects its molecular kinetic properties reducing the availabilities of oxygen molecules for combustion.

Reduction of oxygen in the air by replacement with nitrogen effectively extinguishes fire, ignition and combustion. Permanently maintaining this hypoxic level of oxygen in a facility prevents materials from being ignited. This effect is due to a changed mixing ration of oxygen and nitrogen with fewer oxygen molecules available for the combustion process. Although this method of fire prevention was recognized years ago, until recent technological and economic developments, it was monetarily impossible to mass market.

FACTS;

- A... Ability to handle complete range of flammable materials
- B... Only requires small space and simple installation
- C... Complete absence of toxicity, stability under long term storage, it is simply, air
- D... No contribution toward stratospheric ozone depletion and global warming
- E... No electrical conductivity, no metal corrosion, no residue, air
- F... Prevents smoke release prior to fire extinguishing
- G... never runs out of agent never runs out of agent never runs out of agent, air
- H... Can protect small computer rooms to giant distribution centers
- I... The inherent simplicity promises high reliability, proven technology
- J... No transporting or re-setting of gas system
- K... Capable of protecting several rooms simultaneously with same equipment

We have all seen on television or read in the newspapers about tragic fires and the destruction they cause to properties and families. The skill ,dedication ,courage and commitment of firefighters is not always enough to prevent such catastrophes.This,as well as other similar tragedies, is a result of there being no adequate and reliable fire-prevention or fire fighting technology available for human occupied facilities.However,scientific breakthrough inventions give birth to new technologies that can help manage problems previously considered unsolvable. Such is the case with Resources Worldwide fire prevention system, which offers another safer alternative.

CLAIMS

A method of maintaining a hypoxic environment within a sealed space, comprising the steps of:

- Monitoring an oxygen concentration level of said hypoxic environment
- Supplying nitrogen to said enclosure upon a fall in oxygen level

- Concentration level relative to an oxygen concentration level set point wherein said supplying includes the sub steps of distributing nitrogen throughout space being protected and terminating said supply of nitrogen upon rise in oxygen levels relative to materials being protected from fire/ignition and combustion.