

# **B100 Restrain Generator**

# **Ripen**

## **User Manual**

V1.0

Original user manual

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It is mandatory to read this manual before you use the machine.

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Restrain reserves the right to change specifications and/or spare parts without prior notice.

The content of this user manual may also be changed without prior notice.

For information about settings, maintenance and repairs not provided for in this user manual, please contact the technical department of your supplier.

This user manual has been compiled with all possible care. Restrain assumes no responsibility for any errors in this manual and/or the consequences of an erroneous interpretation of the instructions.

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# Preface

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This is the manual for the B100 Restrain Generator for ripening, hereafter referred to as 'the machine'.

This manual is intended for anyone who works with the machine.

This manual contains information and instructions for installation, operation and maintenance of the machine. We recommend that you carefully read this manual before use and follow the procedures and instructions strictly. This will ensure that you get the best out of the machine and prevents possible accidents and serious injury. The application and use of this product is the user's responsibility and should be in accordance with relevant legislation.

## Storing the manual

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This manual is a part of your machine. Store the manual in the immediate vicinity of the machine. Always present a copy of the manual to anyone who works with the machine.

## List of the symbols used in this manual

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For all operations in which the safety of the operator and/or technician is at stake and where caution should be exercised, the following symbols are used.



Indicates a hazardous situation that, if not avoided, could result in serious injury or death and/or material damage if one does not obey the safety instructions.



Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury and/or material damage if one does not follow the safety instructions.



Provides additional information that is helpful to do a task or to avoid problems.

## Version history

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During the lifetime of the machine, engineering improvements may result in the need to revise this manual. It is then at the discretion of Restrain, if a revision or new version of this manual is required. The following table describes the main changes for each document version of this manual.

Version	Date	Changes
V1.0	August 2019	Original

## Regulatory information

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The B100 Restrain Generator is designed to comply with the following directives:

- 2014/30/EU: EMC Directive



The CE Declaration is available upon request. Please contact the manufacturer.

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# 1 Introduction

The machine is a leased product.



- It is not allowed to make any changes to or replace any parts of the machine. Any modification may result in hazardous situations that can cause personal injury and damage the machine. Furthermore, this will void the warranty and lease contract. Contact the manufacturer if anything needs replacement.
- Always use Restrain ethanol supplied by the manufacturer. The machine has been thoroughly tested with this specific ethanol. If you use any other type of ethanol, this may negatively affect the operation and life expectancy of the machine. Furthermore, it will damage the crops, may damage the machine and cause personal injury.



## 1.1 Intended use

The machine is intended for indoor use only. The maximum store size depends on the standard of construction, room air leakage, and the target level of ethylene concentration.



When the room is too small, too much ethylene will remain inside. This will damage the crops.

## 1.2 Technical specifications

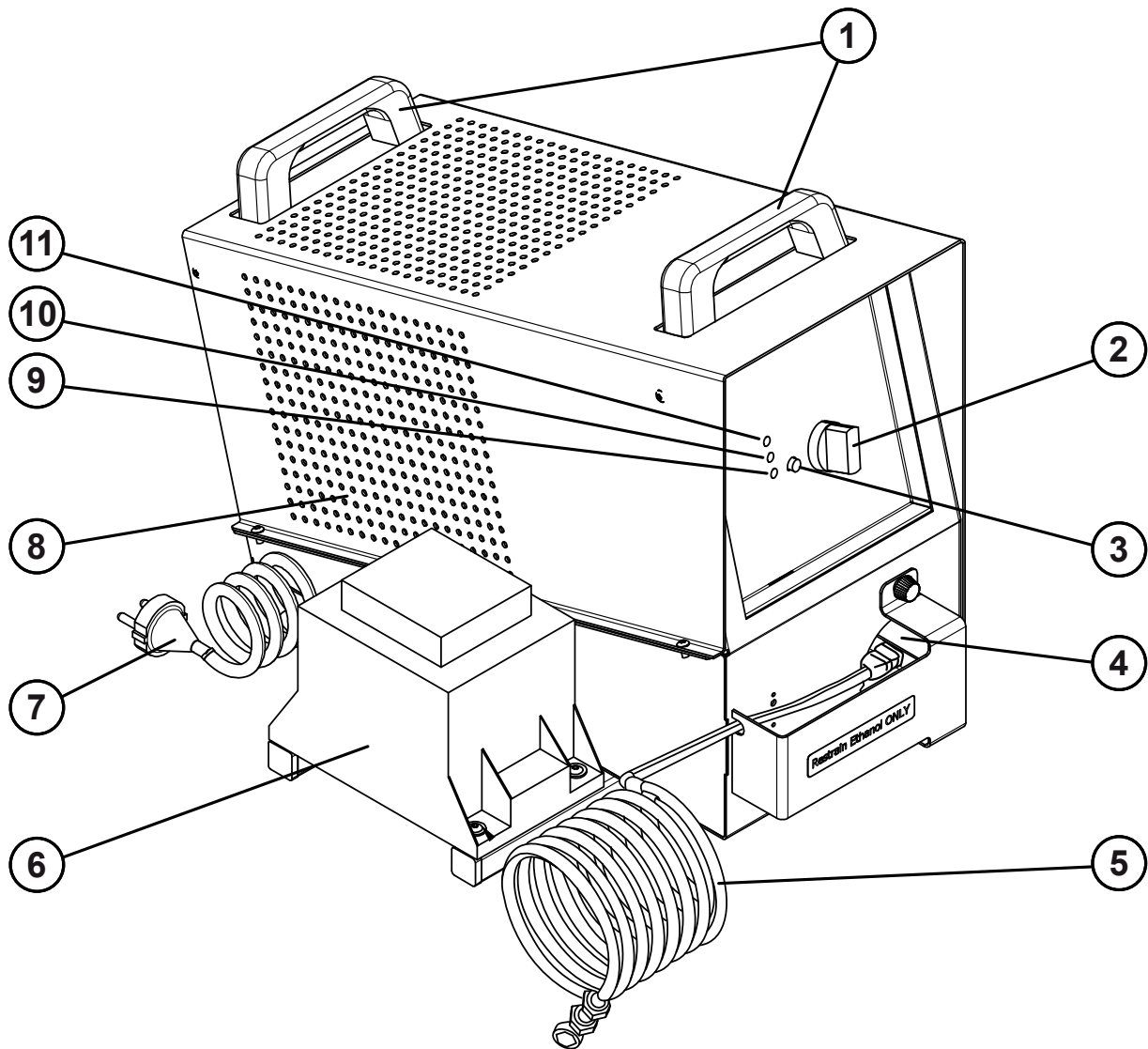
The following specifications apply to the machine:

Description	Value
Length	50 cm
Width	32 cm
Height	40 cm
Weight	21 kg
Sound emission	Max. 40 dB(A)
Minimum ambient temperature when in use	-1 °C
Maximum ambient temperature when in use	30 °C
Maximum relative humidity when in use	95%



## 2 Description

This chapter describes the B100 Restrain Generator and its functions.



No.	Item	Function
1.	Handles	Use the handles to carry the machine.
2.	Programme selection knob	Use the programme selection knob to select the required pump speed.
3.	Reset button	Use the reset button to restart the machine after a thermal error. Refer to <i>Troubleshooting</i> on page 20 for more information.

No.	Item	Function
4.	Ethanol pump	The ethanol pump pumps the ethanol from the jerrycan to the machine.
5.	Ethanol tube	The ethanol tube transports the ethanol from the jerrycan to the machine.
6.	Power converter	The power converter converts the voltage from the mains power supply.
7.	Mains power supply cord	Use the mains power supply cord to turn the machine on or off.
8.	Exhaust	The exhaust expels hot air from the heater.
9.	<b>Thermal error</b> light	The <b>Thermal error</b> light blinks red when the catalyst has reached its upper limit.
10.	<b>Pump</b> light	The <b>Pump</b> light tuns yellow when the pump is on.
11.	<b>Power</b> light	The <b>Power</b> light tuns green when the machine is powered.

## 2.1 Workings of the machine

The machine has an internal catalyst. The temperature of the catalyst reaches a high temperature. The ethanol is pumped into the machine, the heat of the catalyst will vaporise the ethanol, which then turns into ethylene.

## 2.2 Programmes

There are three programmes you can choose for the product you want to ripen:




- A pump speed of 1.44 litres per 24 hours
- A pump speed of 2.88 litres per 24 hours
- A pump speed of 4.32 litres per 24 hours

## 3 Safety

Your machine has been carefully designed and expertly built to be operated safely. This is corroborated by the CE Declaration of Conformity. However, there are always dangers and safety risks that cannot be eliminated. These dangers and risks are the result of the use functions of the machine and operation of the machine by the user. This section discusses safety instructions and precautions, how they will be pointed out to you and the requirements the user must meet. It is essential that you are well aware of these safety instructions and requirements and observe them at all times!

### 3.1 Safety signs on the machine

Pictograms and warnings have been fitted on the machine to warn users of the possible risks.

Pictogram	Explanation	Location
	Warning sign "Heat"	At the rear of the machine
	Warning sign "This side up"	At the right side of the machine
	Text sign "Restrain Ethanol ONLY"	At the front of the machine



Make sure that the safety signs are always clearly recognisable and legible. Replace them if this is not the case.

## 3.2 Safety measures

Your machine has been equipped with the following internal safety measures:

### Heating system sensors

The heating system is supplied with two internal sensors. One sensor measures the temperature of the heater, the second sensor operates as a safety device. When the two sensors measure different values or one of the sensors fails to operate, the machine will stop the vaporisation cycle automatically. The **Thermal error** light will blink red. Refer to *Troubleshooting* on page 20 for more information.

## 3.3 General safety warnings

Always adhere to the safety warnings in this manual. Failure to do so may result in serious personal injury or material damage.



- Ethanol is extremely flammable. Do not smoke or use open fire, a radio or a mobile phone when you handle the fuel.
- Do not place the machine in the vicinity of an ignition source.
- Make sure that there is a minimum of 0.6 m free space around the machine. The exhaust becomes very hot and may cause an ignition hazard.
- Make sure that cables and wires cannot come into contact with the exhaust. The exhaust becomes very hot and may cause an ignition hazard.
- Children must not play with the machine or the ethanol and the machine, the mains power supply cord and the ethanol must be out of reach of children less than 16 years old. Ethanol is extremely flammable and an irritant.
- Persons with reduced physical, sensory or mental capabilities or lack of knowledge must not use the machine. Ethanol is extremely flammable and an irritant.
- Immediately disconnect the machine from the power supply in case of damage to or broken parts of the mains power supply cord or power converter. Damaged or broken parts of the electrical system may cause serious personal injury.
- Do not remove the covers at any time. This may cause serious personal injury or material damage.



- Ethanol is an irritant, wear gloves and safety goggles when handling ethanol. Also refer to the *Material Safety Data Sheets* on page 23.
- Make sure that the location in which the machine is placed, has a minimum volume of 200 m<sup>3</sup>. Too much ethylene in the room will damage the crops.
- Make sure that the machine is kept free from moisture. Water ingress in the machine may cause material damage.
- The machine contains a heater that becomes very hot. When you turn off the machine, wait a minimum of 6 hours before you handle or move the machine.

## 4 Transport

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- The machine weighs 21 kg. Always carry the machine with two hands and keep the machine upright.
- Do not drop the machine. This may cause personal injury or material damage.
- The machine has a cool down period of 6 hours. Turn off the machine hours before shipment.

## 5 Installation

This chapter describes the correct unpacking and installation procedures.

### 5.1 Unpacking

You receive the machine in special packaging.



Keep the packaging intact and store the packaging in a dry location. You need this packaging when you return the machine to the manufacturer.

1. Carefully open the packaging.
2. Remove all materials from the box.
3. Make sure that all ordered parts have been delivered:
  - B100 Restrain Generator

### 5.2 Place the machine

This task describes where and how to place the machine.

1. Place the machine in the premises that needs treatment.
2. Make sure that the location meets the following requirements:
  - Place the machine at floor level.
  - Place the machine at a location with good air circulation.
  - Place the machine in a location away from normal loading activities.



Make sure that the machine does not touch any foreign objects or plastic structures. The vapour from the machine is hot and can damage other surfaces.

3. Place barriers around the machine to protect the machine from potential damage.
4. Place a small amount of absorbent material under the exhaust to collect possible condensation.
5. Plug the mains power supply cord into the electrical socket.

## 5.3 Prepare the Restrain ethanol jerrycan

This task explains how to prepare the Restrain ethanol jerrycan for use with the machine.

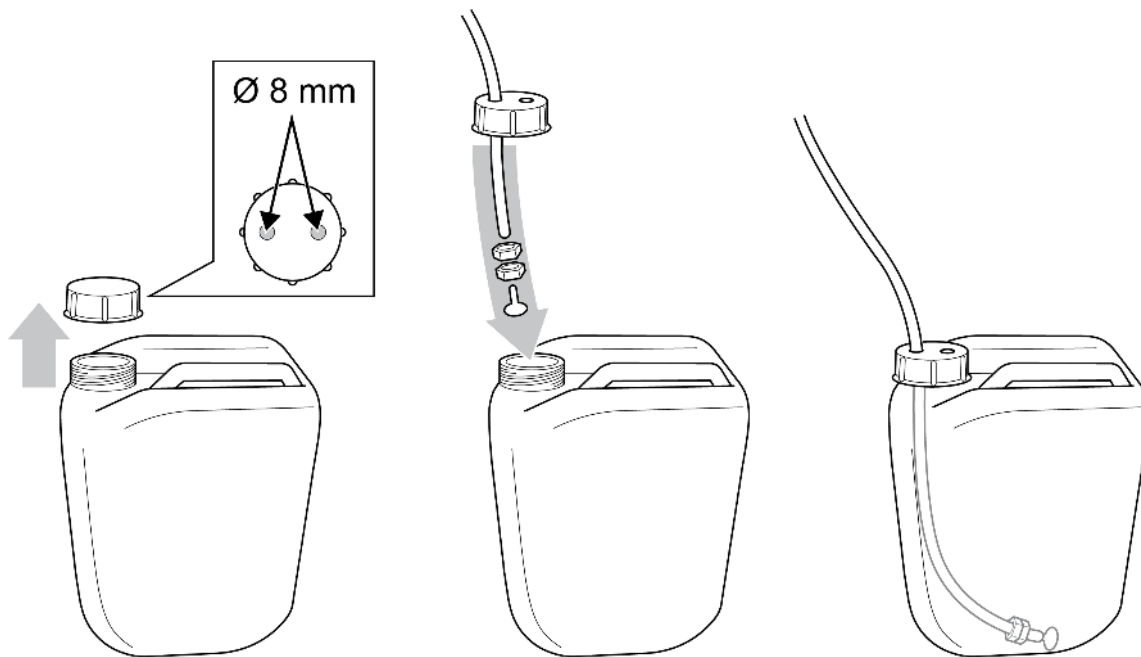


Ethanol is extremely flammable. Do not smoke or use open fire, a radio or a mobile phone when you handle the fuel.



### Tools needed:

- Electric drill
- 8 mm drill bit



1. Remove the cable ties from the ethanol tube.
2. Remove the filter and weights from the ethanol tube.
3. Remove the cap from the ethanol jerrycan.
4. Drill two holes in the cap: one for the ethanol tube, one for the air.
5. Guide the ethanol tube through one of the holes.
6. Replace the weights and filter on the ethanol tube.
7. Screw the cap back onto the ethanol jerrycan.  
Make sure that the filter touches the bottom of the jerrycan.

## 6 Operation

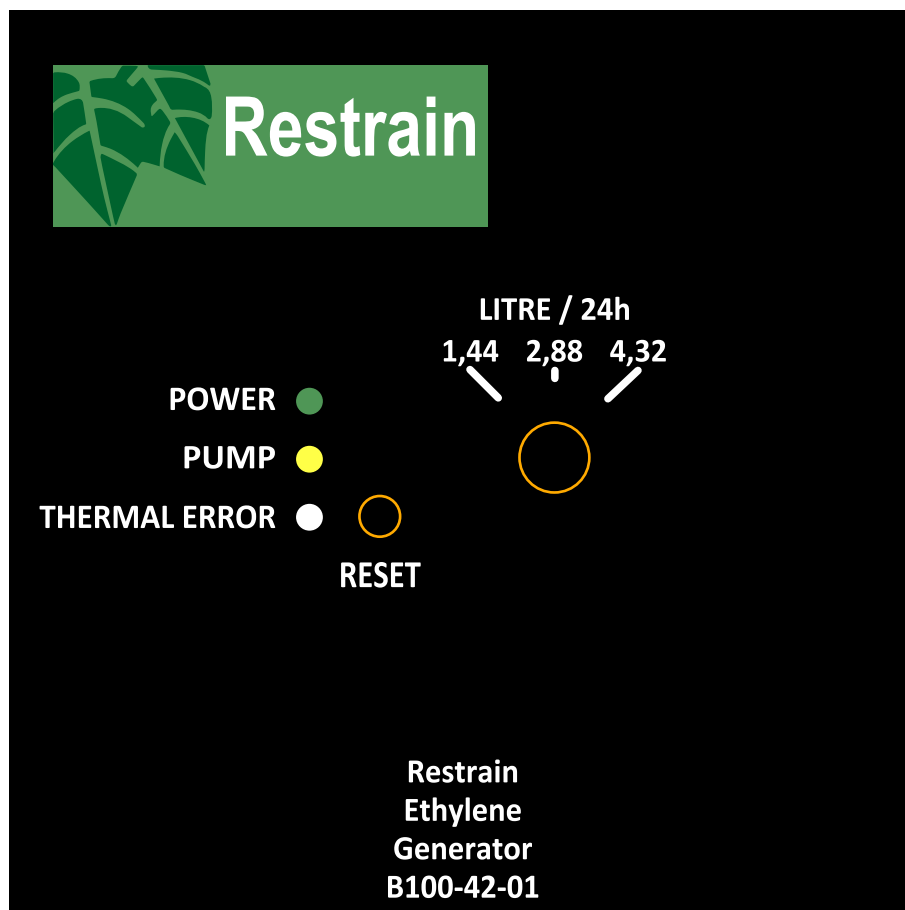
This chapter explains how to operate the machine.

### 6.1 Start the machine

If necessary, start the machine as follows:

1. Plug in the mains power supply cord into the electrical socket.  
The **Power** light will turn green.  
The heater is warming the catalyst. This takes approximately 40 minutes.
2. Select the required programme:
  - Pump speed 1.44 litres per 24 hours
  - Pump speed 2.88 litres per 24 hours
  - Pump speed 4.32 litres per 24 hours

The **Pump** light turns yellow.



### 6.2 Turn off the machine

This task describes how to turn off the machine.

1. Disconnect the machine from the mains power supply.





The machine remains hot for at least 6 hours. Wait until the machine has cooled down sufficiently before you handle or transport the machine.

## 6.3 Emergency situations

In case of an emergency situation:

1. Unplug the machine from the mains power supply.

For any other problem, refer to *Troubleshooting* on page 20.

To restart the machine after an emergency situation:

1. Plug in the mains power supply cord.  
The machine will continue with its programme.

## 7 Maintenance and cleaning

The machine does not require maintenance from the user.

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Never open the machine yourself, this will damage the machine. If the machine requires service or maintenance, contact the manufacturer.

### 7.1 Daily checks

When the machine is in use, make sure that the machine works correctly:

- The **Power** light is green.
- The **Pump** light is yellow.
- The **Thermal error** light is off.
- All cables are connected and undamaged.

### 7.2 Monthly check

When the machine is in use, make sure that all covers are properly secured.

### 7.3 Cleaning

Regularly clean the machine with a clean, soft and moist cloth.

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Do not spray the machine with water or immerse the machine in water. This will permanently damage the machine.

## 8 Storage

You can store the machine for later use.

- Always store the machine indoors. Keep the machine dry and free from weather influences.
- Make sure that the machine is placed upright when in storage.
- Store the machine in its original packaging.

### 8.1 Prepare for storage

This task describes how to prepare the machine for storage.

1. Disconnect the machine from the mains power supply.
2. Let the machine cool down for 6 hours.
3. Remove the tube from the ethanol jerrycan.
4. Store or dispose of the ethanol according to local laws and regulations. Also refer to the *Material Safety Data Sheets* on page 23.
5. Store the machine indoors.

## 9 Troubleshooting

This chapter describes the possible problems you may have with your machine and how to solve them. Contact the manufacturer if you need assistance or if any other problem arises.

### 9.1 Problems with the machine

Problem	Possible cause	Solution
The machine does not start.	The power supply cord is damaged or not plugged in.	Make sure that the power supply cord is undamaged and plugged in the electrical socket.
	There is no mains power supply.	Wait until the mains power supply comes back or connect the machine to a different power supply (e.g. a generator). The machine will continue with the selected programme.
The <b>Thermal error</b> light blinks red and the heater has turned off.	The temperature inside the catalyst reached the upper limit.	Wait 1 hour, then push the <b>Reset</b> button. After approximately 40 minutes the catalyst is warmed up and the machine will continue with the selected programme.

## 10 End of the lease contract

At the end of the lease contract, you have to return the machine to the manufacturer. Follow the steps below to pack the machine.

1. Disconnect the machine from the mains power supply.
2. Let the machine cool down for 6 hours.
3. Remove the tube from the ethanol jerrycan.
4. Store or dispose of the ethanol according to local laws and regulations. Also refer to the *Material Safety Data Sheets* on page 23.



Do not return ethanol to the manufacturer. Ethanol is highly explosive and can only be shipped under specific conditions.

5. Pack the machine in its original packaging.
6. Contact the manufacturer for the return shipment of the machine.

# 11 Disposal

Never dispose of the machine yourself. Always return the machine to the manufacturer.

Always dispose of ethanol correctly. Refer to the *Material Safety Data Sheets* on page 23 for correct disposal of ethanol.

## 12 Appendices

### 12.1 Material Safety Data Sheets

#### 12.1.1 Identification of the substance

Trade Name: Restrain Ethanol  
Product Trivial Name: Ethyl Alcohol  
Chemical name: Ethanol

#### Identification of the company

Restrain Company Ltd.  
Unit 7 The Forum,  
Minerva Business Park,  
Lynch Wood, Peterborough, PE2 6FT United Kingdom

#### 12.1.2 Composition

CAS No : 64-17-5 200  
EC No: 578-6

#### 12.1.3 Hazards identification



**Flammability:** Highly flammable liquid.

**Eye:** Irritating on contact with the eyes.

**Skin:** Prolonged contact may be irritating to the skin, causing drying and cracking. Dermatitis may result from repeated, prolonged skin contact.

#### 12.1.4 First aid measures

**Eye:** Immediately wash out eye thoroughly with large amounts of water until irritation stops. Seek Medical Advice. Do not wear contact lenses when working with this product.

**Skin:** Should this liquid contact the skin, flush the contaminated area with water promptly. If the liquid penetrates the clothing remove the clothing and flush the skin with water. If irritation persists after washing get medical help.

**Ingestion:** If the liquid has been swallowed, induce vomiting if person is conscious. Get medical attention immediately.

### **12.1.5 Fire-fighting measures**

The liquid is Highly Flammable. Extinguishing Media: Foam, carbon dioxide, chemical powder.

### **12.1.6 Accidental release measures**

Should the Restrain Ethanol be spilled or accidentally released, the following steps should be taken:

1. The area of spillage or release needs adequate ventilation.
2. All sources of heat or ignition must be removed.
3. Clean up personnel must be provided with appropriate respiratory protection and protective clothing.
4. Use sand or vermiculite to absorb the liquid.
5. Place used absorbent materials in closed containers for disposal.
6. Wash spill area with water.

### **12.1.7 Handling and storage**

Keep the Restrain Ethanol away from all sources of heat and ignition. Wear chemical resistive gloves and chemical safety goggles. Protective clothing should be worn as required.

Store in a dry, locked storage area not subject to extremes of temperature.

Keep away from water and foodstuffs.

Store well away from sparks, flames and oxidizing materials.

Smoking is not allowed in the vicinity of either liquid or gas.

### **12.1.8 Exposure control and personal protection**

Ensure measures are taken to eliminate possibility of sparks, flames, ignition in area of use.

Observe normal precautions for handling chemicals. Avoid eye and skin contact with the liquid.

Wear appropriate personal protective equipment (as follows).

Wash thoroughly after handling.

Wear Chemical Safety Goggles.

An all in one chemical - resistant suit should be available.

A NIOSH/MSHA approved cartridge respirator can be worn should the gas cause irritation.

### **12.1.9 Physical and chemical properties**

Restrain Ethanol: Virtually colourless with an acetone odour.



### 12.1.10 Stability and reactivity

Stability: Stable under normal handling conditions. Avoid the following conditions: Heat, sparks, open flames, contact with oxidizing materials.

Reactivity: Incompatible with strong oxidizers, potassium dioxide, bromine pentafluoride, acetyl bromide, acetyl chloride, platinum, sodium.

### 12.1.11 Toxicological information

Causes skin irritation.

Causes eye irritation.

Harmful if ingested.

May be harmful if absorbed through the skin.

### 12.1.12 Ecological information

Product should not be allowed to enter drains or water courses. Do not dispose on ground.

Remove to suitable landfill.

### 12.1.13 Disposal considerations

This product is flammable and must be disposed of accordingly. Special landfill or incineration may be used. Do not dispose into waterways or sewers or onto the ground.

### 12.1.14 Transport information

United Nations No : UN 1170

Packaging group: II

Shipping name: Ethanol Highly Flammable

### 12.1.15 Regulatory information



Classification and labelling

#### **Harmful Highly Flammable**

The product is classified in accordance with the Chemicals (Hazard Information and Packaging for Supply) Regulations (CHIP 3).

Highly Flammable Safety: S(1/2) Keep locked up and out of reach of children.

Keep away from sources of ignition - No Smoking

Wear suitable protective clothing, inc. gloves.

In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

### **12.1.16 Other information**

Restrained Ethanol should always be stored in conditions appropriate to a highly flammable liquid.

Up to 50 litres of Restrained fuel may be kept in a working area in a suitable bin or cupboard that is of fire resisting structure, and is designed to retain spills and marked highly flammable.

Quantities of more than 50 litres should be kept in secure areas designated for flammable storage and separate from normal working areas and with good ventilation. Further details can be found in the following Health & Safety Executive publications: available from HMSO:

**L135** Storage of Dangerous substances; Approved code of practice Dangerous Substances and Explosive Atmospheres Regulations 2002.

**HSG51** The storage of flammable liquids in containers.

Empty Restrained fuel containers should be washed out with water and disposed of or recycled as for standard plastic containers.

## 12.2 Fuel COSHH assessment

### Activity

Handling Restrain Ethanol containers.

### Reason For Activity

To maintain a stable atmosphere of ethylene in a store.

### Status Of the Person doing the activity

Store Manager

### Product

Restrain Ethanol

### Hazard Identification



Highly Flammable



Harmful

### Risk Assessment

Causes eye irritation.

Ingestion can cause nausea, vomiting and inebriation.

Contact with the skin is unlikely to cause appreciable irritation even on repeated contact.

Unlikely to be absorbed in harmful amounts through contact with the skin.

### First Aid

<b>Eyes</b>	Irrigate thoroughly with water.
<b>Lungs</b>	Remove from exposure, rest and keep warm.
<b>Skin</b>	Wash with water and remove contaminated clothing.
<b>Mouth</b>	Wash out and give plenty of water to drink.

### Spillage

1. All sources of heat or ignition must be removed.

2. Use sand or vermiculite to absorb the liquid.
3. Place used absorbent materials in closed containers for disposal.

### **Disposal of containers**

Containers should be pierced and placed in appropriate waste disposal.



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Restrained Company Ltd.  
Unit 7 The Forum,  
Minerva Business Park,  
Lynch Wood, Peterborough, PE2 6FT United Kingdom  
+31 (0)653 86 92 21

[www.restrain.io](http://www.restrain.io)  
[dirk.garos@restrain.io](mailto:dirk.garos@restrain.io)