

Risk Assessment Make Workplaces Safer

By

Safety and Health Section

Labour Department

Outline

- Legal basis for Risk Assessment
- Principles of Risk Assessment
- Overview of Risk Assessment techniques
- Practical session









BLEND 90/10

Technical

DANGER!

FLAMMABLE LIQUID AND VAPOR. MAY CAUSE EYE BURNS, MAY ALSO IRRITATE EYES, SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF INHALED OR INGESTED. ASPIRATION HAZARD IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE. Keep away from heat, spark, or flame. Keep container closed. Use with adequate ventilation.

CONTAINER USE: KEEP AWAY FROM FLAMES, SPARKS, AND HEAT. Keep closure up to prevent leakage. Relieve internal pressure when received and immediately thereafter by slowly loosening closure while wearing appropriate personal protective equipment. Re-tighten immediately after use. Never use pressure to empty container into a pressure vessel. Keep lights, fire, and sparks away from container. Container must be grounded and bonded to receiving container when being emptied. Residual vapors might explode on ignition; do not cut, grind, or weld on or near this container, even when empty. Replace closure after each withdrawal and return closure with emphasis on proper disposal or reuse of this container. Empty containers may be dangerous and illegal. Refer to applicable federal, state, and local regulations. Since empty containers contain product residue, follow label warnings even after container is emptied.

HANDLING: Wear goggles or face shield, protective gloves, and protective clothing when handling. Do not get in eyes, on skin, or on clothing. Do not inhale or swallow. Use ventilation adequate to keep exposures below recommended exposure limits. See MSDS.

EMERGENCY RESPONSE

For emergency assistance involving chemicals call CHEMTREC day or night at: 1-800-424-9300

IN CASE OF FIRE: Use water spray, foam, or dry chemicals, or CO2. Vapors of this product are heavier than air and may travel to distant ignition sources and flash back. Do not use water on liquid spill and may reignite on surface of water.

IN CASE OF SPILL: Wear protective equipment including chemical resistant boots, gloves and apron, chemical goggles, and respiratory protection. Extinguish all ignition sources and ensure that all handling equipment is electrically grounded. Absorb spill with inert material (e.g. dry sand or earth), then place in a chemical waste container. For large spills, dike for later disposal. Dispose of according to local, state, and federal regulations.

DISPOSAL: For safe, environmentally responsible disposal contact your local Univar ChemCare® Sales Rep at 1-800-909-4897.

FIRST AID: If swallowed, call a physician immediately. ONLY induce vomiting at the instructions of a physician. Never give anything by mouth to an unconscious person. For eye contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately. For skin contact: Remove material and flush affected area with water. In case of inhalation or suspicion of inhalation move patient at once to fresh air and call a physician. Call a physician immediately in case of burns, especially to eyes, nose, and throat or if patient is unconscious.

EU061805515
PRODUCT NO: 767489

Label Number: PW1672
Revision Date: 08/08/14 - 002 ELT

UN1993, FLAMMABLE LIQUIDS, N.O.S., 3, PG II (CONTAINS N-PROPYL ALCOHOL, PROPYL ACETATE)
CAS NUMBERS: N-PROPYL ALCOHOL 71-23-8 N-PROPYL ACETATE 108-88-4

KEEP OUT OF REACH OF CHILDREN - For Industrial Use Only
FOR ADDITIONAL INFORMATION SEE MATERIAL SAFETY DATA SHEET





OLYMPIA

Objectives for OSH

- **IDENTIFY** risks
- **ANALYSE** & determine nature of risks and problems, how they affect the worker and measures to be taken
- **CORRECT** situations, introduce improvements
- **FOLLOW UP** measures taken and the effects
- **ENSURE** that no new problems have been introduced

Safety and Health at Work Act

Section 6 (2): No occupier shall carry out any **work** or **put into use any equipment, material, article or substance** in a workplace unless a **suitable and sufficient assessment of risks** likely to arise in the circumstances and of the **steps** to be taken to **eliminate** and **minimise** such risks to **safety** or **health** has been undertaken.

SHaW

Section 6(3)

Assessment shall be reviewed where there has been a **material change** in the **work** or the **circumstances** under which the work is carried on.

Assessment of Risks

Assessments of risks must be :

- Suitable
- Sufficient

Controls measures

Risks to health has to be:

- Eliminated

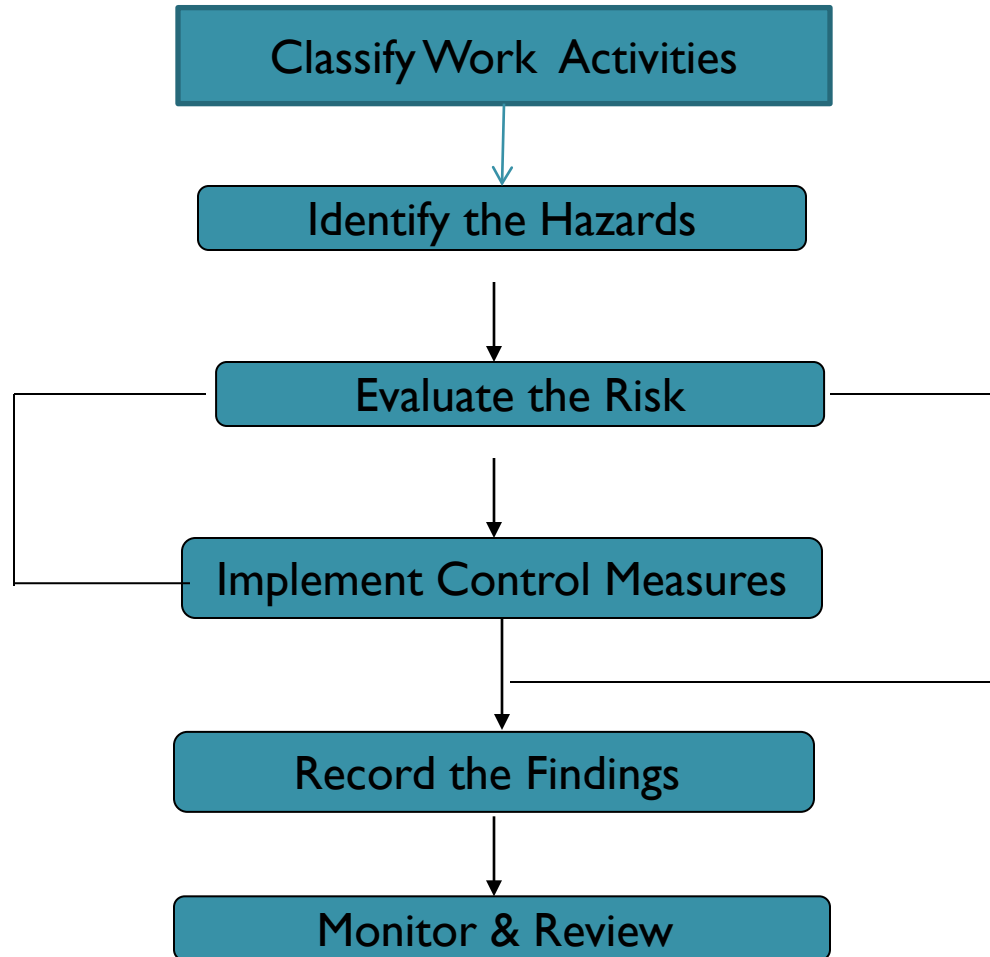
- Minimized

Hazard and Risk

These are common definitions that describe how the terms are generally applied:

- **Hazard:** **intrinsic/inherent** property of a substance or a situation having the potential to cause adverse effects when an organism, system or (sub)population is exposed to that substance or situation.
- **Risk:** **likelihood** of an hazardous event and the consequence/severity of the effect

Risk Assessment Process



**Classify the work activities at your
workplace**

Hazards

- Mechanical and physical
- Electrical
- Chemical
- Biological
- Radiation
- Fire and explosion
- Thermal
- Psychological

Step 1: Look for the Hazards

Walk around your workplace and look carefully at what could reasonably be expected to cause harm. Concentrate on significant hazards which could result in serious harm or affect several people.

Manufacturers' instructions or data sheets can also help you spot hazards and put risks in their true perspective. So can accident and ill-health records, as well as information on near-misses.



What are Some Common Hazards in Your Workplace?

Step 2: Decide Who Might be Harmed and How

Don't forget

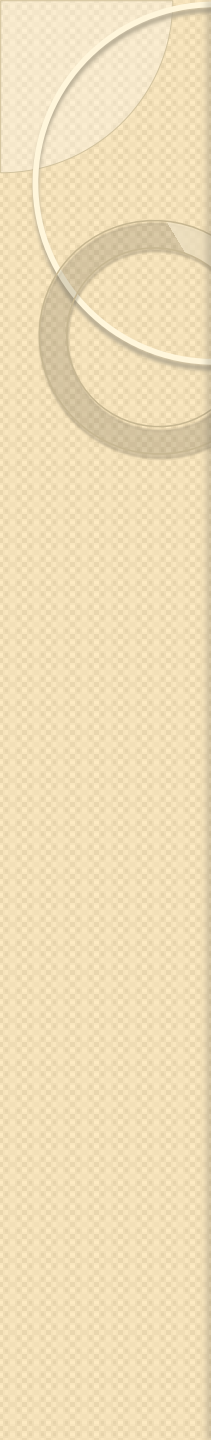
young workers, trainees, new and expectant mothers - persons who may be at particular risk;

visitors, contractors, maintenance workers - who may not be in the workplace all the time;

members of the public, or people you share your workplace with, if there is a chance they could be hurt by your activities.



Who might be affected by these hazards?



Step 3: Evaluate the Risks and Decide Whether Existing Precautions are Adequate

Consider how likely it is that each hazard could cause harm. This will determine whether or not you need to do more to reduce the risk. Even after all precautions have been taken, some risk usually remains. What you have to decide for each significant hazard is whether this remaining risk is high, medium or low.

What is being currently being done to control those hazards?

Is it enough?

What further action is necessary?

Company name: A. N. Other

Date of risk assessment: 30/3/2011

What are the hazards?	Who might be harmed and how?	What are you already doing?	Do you need to do anything else to manage this risk?	Action by whom?	Action by when?	Done
Slips and trips	Staff and customers may be injured if they trip over objects or slip on spillages.	General good housekeeping is carried out.	Ensure shop is tidy and free from trip hazards.	Supervisor	29/08/11	
		Changes in flooring level, such as steps, slopes and ramps are in good condition.	Ensure measures are in place to stop rain water being walked into the shop.	Manager		10/05/11

It is important you discuss your assessment and proposed actions with staff or their representatives.

You should review your risk assessment if you think it might no longer be valid (e.g. following an accident in the workplace or if there are any significant changes to hazards in your shop, such as new work equipment or work activities).

Company name:

Date of risk assessment:

**Step 1
What are the hazards?**

Spot hazards by:

- walking around your workplace;
- asking your employees what they think;
- visiting the *Your industry* areas of the HSE website or calling HSE Infoline;
- calling the Workplace Health Connect Adviceline or visiting their website;
- checking manufacturers' instructions;
- contacting your trade association.

Don't forget long-term health hazards.

**Step 2
Who might be harmed and how?**

Identify groups of people. Remember:

- some workers have particular needs;
- people who may not be in the workplace all the time;
- members of the public;
- if you share your workplace think about how your work affects others present.

Say how the hazard could cause harm.

**Step 3
What are you already doing?**

List what is already in place to reduce the likelihood of harm or make any harm less serious.

What further action is necessary?

You need to make sure that you have reduced risks 'so far as is reasonably practicable'. An easy way of doing this is to compare what you are already doing with good practice. If there is a difference, list what needs to be done.

**Step 4
How will you put the assessment into action?**

Remember to prioritise. Deal with those hazards that are high-risk and have serious consequences first.

Action by whom	Action by when	Done
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Measuring the Risk

- Qualitative
- Quantitative and
- Semi-Quantitative methods

Measuring risk

In quasi-mathematical terms risk is expressed as: -

Risk = (likelihood of the hazardous event occurring) \times (severity of the loss)

Severity of Harm

Harm categories	Slight Harm	Moderate Harm	Severe harm	Extreme harm
Health	Nuisance and irritation (e.g. headaches); temporary ill health leading to discomfort (e.g. diarrhoea).	Partial hearing loss; dermatitis; asthma; work-related upper limb disorders; ill health leading to permanent minor disability.	severe life shortening diseases; permanent substantial disability.	Acute Fatal diseases
Safety	Superficial injuries; minor cuts and bruises; eye irritation from dust.	Lacerations; burns; concussion; serious sprains; minor fractures	amputations; multiple injuries; major fractures.	Fatal injuries

Likelihood of Harm

Categories of likelihood	Very Likely	Likely	Unlikely	Very Unlikely
Typical occurrence	typical occurrence typically experienced at least once every six months by an individual	typically experienced once every five years by an individual	typically experienced once during the working lifetime of an individual	Less than 1% chance of being experienced by an individual during their working lifetime

Risk Calculation Matrix

Likelihood of harm	Severity of harm			
	Slight harm	Moderate harm	Extreme harm	Extreme Harm
Very unlikely	Very low risk	Very low risk	High risk	High risk
Unlikely	Very low risk	Medium risk	High risk	Very high risk
Likely	Low risk	High risk	Very high risk	Very high risk
Very likely	Low risk	Very high risk	Very high risk	Very high risk

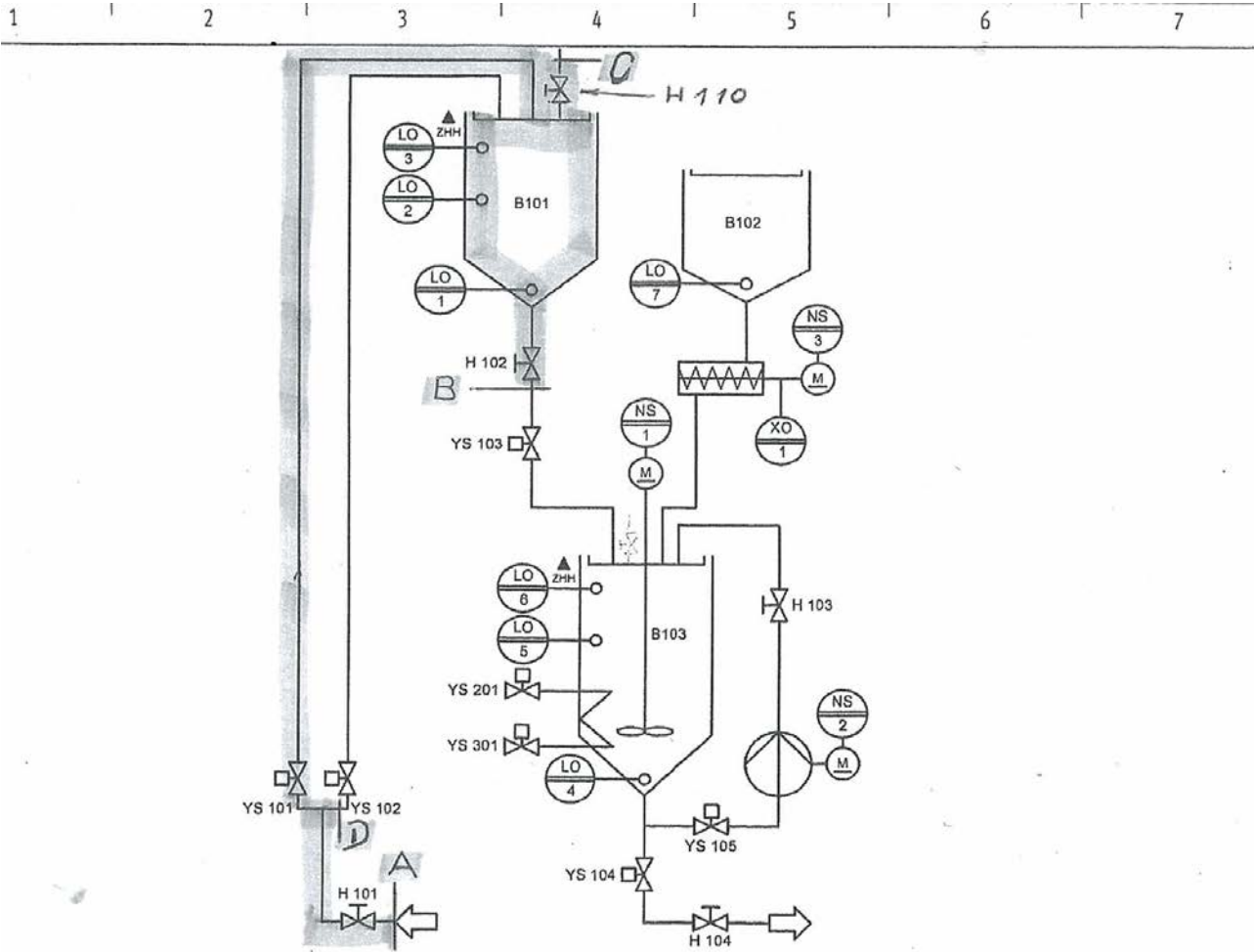
Risk Controls

Risk level	Guidance on necessary action and timescale
Very low	These risk are considered acceptable. No further action is necessary other than to ensure that the controls are maintained.
Low	No additional controls are required unless they can be implemented at very low cost (in terms of time, money and effort). Actions to further reduce these risks are assigned low priority. Arrangements should be made to ensure that the controls are maintained.
Medium	Consideration should be given as to whether the risks can be lowered, where applicable, to a tolerable level, and preferably to an acceptable level, but the costs of additional risk reduction measures should be taken into account. The risk reduction measures should be implemented within a defined time period. Arrangements should be made to ensure that the controls are maintained, particularly if the risk levels are associated with harmful consequences.
High	Substantial efforts should be made to reduce the risk. Risk reduction measures should be implemented urgently within a defined time period and it might be necessary to consider suspending or restricting the activity, or to apply interim risk control measures, until this has been completed. Considerable resources might have to be allocated to additional control measures. Arrangements should be made to ensure that the controls are maintained, particularly if the risk levels are associated with extremely harmful and very harmful consequences.
Very high	These risks are unacceptable. Substantial improvements in risk controls are necessary, so that the risk is reduced to a tolerable or acceptable level. The work activity should be halted until risk controls are implemented that reduces the risk so that it is no longer very high. If it is not possible to reduce risk the work should remain prohibited.

“Advanced Risk Assessment Techniques”

- Task/Hierarchical Task Analysis (HTA)
- Job Safety Analysis (JSA)
- Hazard & Operability Studies (HAZOPS)
- Failure Mode & Effects Analysis (FMEA)
- Fault Tree Analysis (FTA)
- Event Tree Analysis (ETA)
- Root Cause Analysis (RCA)

Plant



Zust.	Datum/Edt.	Name/Name	Datum/Date	Name/Name
	Gez.: 00.11.2011	Keller		
	Gepr.: 24.01.2012	HEL		

Festo Didactic
VT-Modell Currenta
RI-Fließbild / Flow chart

ADIRO
Automatisierungstechnik GmbH
Limburgstr. 40
D-73734 Esslingen

Projektitel/Project: VT-Modell_PC.VT.0010
Auftraggeber/Order-No.: 211608
Zeichnungsart/Drawing-No.: RI-Fließbild_VT-Modell

HAZOP

Hazard Study Worksheet 3.1		Hazard Study - HAZOP - EXAMPLE for Case Study 3	
Project No.: IE 001	Project Title: Experimental Work in a Laboratory (develop a product "Lemon Fresh")		Sheet :1
Study team members:			Issue No.:01
HS Leader: Secretary:			Date: 04.11.2014
Debit Function: Transfer 1 litre Ethyl benzene (EB) from position A into Tank B101. Parameter see below:			
Product: Ethyl benzene		Flow rate: 0,5 litre/h	Quantity: 1litre
Pressure: p1 = 0,5 – 6,0 bar max.		Temperature: 20°C	Direction: Position A into B101
0,5 bar operating pressure		Tank B101= 1,25 litre	
Boundary Condition: System: A,B,C,D		Valve open: H101, H110, YS101; Valve closed: H102	
Site: D		Plant: BUW	Unit: U.09
Drawing No. P&I 211608		Drawing Title: Storage Tank B101 for Ethyl benzene - Lab. Arrangement	
Completed by: LMH			

Use this form to record the output from the study.

Item / Line / Stage Guidewords	Deviation	Causes	Effect or Hazard	Preventive or corrective measures (safeguards)	Action required	Action by	Action No.
Parameter: Ethyl benzene							
Pressure: p1=6bar	No pressure	H101,YS101 close	no flow of EB, no hazard	none	none	n/a	01
	More than 6 bar pressure	H110 closed	Increased pressure - seal damage, leakage - explosion - damage of B101	Flow gauge with switching off device for EB supply station	07.11.2014	Engineering	02
	Less than 6 bar pressure	Pipe blocked	Less EB - temperature increase	Flow gauge with switch off device for EB supply station	07.11.2014	Engineering	03
	More than or as well as	n/a	---	---	---	---	04
	Part of	n/a	---	---	---	---	05
	Reverse	n/a	---	---	---	---	06
	Sooner/Later	n/a	---	---	---	---	07
D3.5	Other Than	n/a	---	---	---	---	08

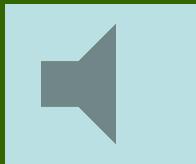
Why Risk Control

The basic principle of controlling risks in the workplace is to either remove the risk or to control its possible impact.

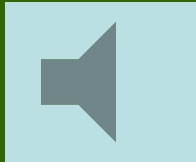
Any control measures that are introduced should be designed to:

- reduce the likelihood of an injury occurring
- reduce the likely severity of injury that could be suffered
- reduce the numbers of people that are likely to be exposed to the risk
- ensure that vulnerable persons are not affected

WORKERS



HAZARD



HAZARD

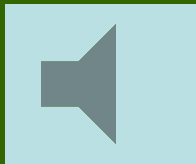
WORKERS



WORKERS



SYSTEM



HAZARD

WORKERS



Principles of Risk Control

- The number of persons protected by the risk control measure
- The extent that continuing effectiveness of the risk control measure relies on human behaviour
- The extent to which the risk control requires maintenance
- the cost of the risk control measure
- The extent that the risk control measure reduces the risk

Controlling the Risk

Hierarchy of Controls

- Elimination
- Substitution
- Engineering Controls
- Administrative Controls
- Personal Protective Equipment

Role of Consultation and Communication

- Legal duty
- Information on hazardous situations
- Useful feedback on the effectiveness of the controls
- Greater buy in to safety procedures and policy /less violation



Practical Exercise

Summary

Risk assessment :

- proactive

Risk assessment:

- Suitable and
- Sufficient



Closing Comments

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Website : www.labour.gov.bb