

PROJECT Training Report

On

HEALTH, SAFETY AND ENVIRONMENT

AT

ALCAN PACKAGING LTD.

Submitted By:

DEEPAK PANDEY

B.SC. (PLANT OPERATION & MAINTENANCE)

UNIVERSITY OF PETROLEUM & ENERGY STUDIES,

DEHRADUN.

Project Guided by:

Mr. V.K TYAGI

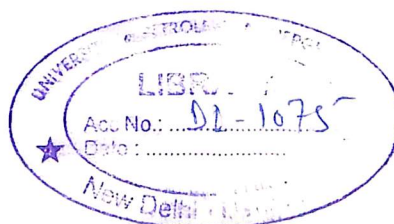
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ALCAN PACKAGING

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TRAINING CERTIFICATE

This is to certify that Mr. *Deepak Pandey* S/O Mr. *M. L. Pandey* from UNIVERSITY OF PETROLEUM & ENERGY STUDIES pursuing B Sc. (Plant maintenance & operation) has undergone rigorous training from *15 Aug 07* to *15 Jan 08* on Health Safety & Environment (Fall protection & working-at- heights) project in our organization at SIDCUL haridwar under the supervision of Dr. V.K.Tyagi.

He was regular, sincere and hardworking throughout his training. His overall performance was *good*. We wish him every success for his future.

Dated-15-01-2008

For Alcan India Pvt.Ltd.



Chandra Shekhar
Manager (HR & A)

ACKNOWLEDGEMENT

I wish to express my deep sense of gratitude to Mr. C.S. Pandey who allowed me to explore my knowledge in different sections according to schedule.

I acknowledge to Dr. A.K. Tyagi who has taken immense pain scheduling and maintaining our record of training and allot us to enhance our skills under 'Health Safety and Environment' project.

Preface

Industrial Training during studies helps the students to expose themselves to the industrial environment, which cannot be simulated in the classroom. It helps students to make them aware of the rapid developments being made in the industry, as the needs of the industry are changing due to rapid change in technology, management practices, competitive quality & productivity etc U.P.E.S. has really made a sincere attempt by detailing their students for industrial training.

On Project training has helped me to appreciate the theoretical knowledge gained by me in the class room. It has taught me the importance of teamwork, punctuality & the sense of responsibility. It has helped me to understand the psychology of the workers, their habits, attitude & their approach to the problems.

Apart from that it has given me good exposure to the current technological developments relevant to my subject of studies.

I avail this opportunity to thank **UNIVERSITY OF PETROLEUM & ENERGY STUDIES** for detailing me for this industrial training, the coordinator for his guidance & the **ALCAN PACKAGING Ltd.** for imparting me the practical knowledge in the industrial field.

DEEPAK PANDEY

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About Alcan packaging:

Ten Points about Alcan-

1 - World leader in specialty packaging

Alcan is a world leader in specialty packaging serving the food and beverage, pharmaceutical and medical, beauty and tobacco markets. Alcan Packaging strives to deliver the highest quality packaging products and services to its customers.

2 - Alcan Packaging worldwide presence

With 31,000 people and 129 sites in 31 countries, Alcan Packaging is present in the 5 continents. Our commitment to our customers around the world takes us into emerging markets where we can make a difference, such as China, Southeast Asia, Brazil, Mexico, Russia and Eastern Europe.

3 - Customer focused

"We have the size, scope and talent to grow. And, our team has the engagement, expertise and energy to fully satisfy customers by continuing to provide them with excellent service and innovative packaging solutions. Our goal is to deliver all that our customers want and need and to exceed what they expect". Ilene Gordon, President & CEO, Alcan Packaging

4 - Market Data

Alcan Packaging is a core business group of Alcan representing 25% of the revenues and generating a turnover of 6 billion US dollars. The food and beverage packaging market currently represents approximately 63% of total sales, followed by pharmaceutical and medical at 16%, beauty and personal care at 13% and tobacco at 8%.

5 - Multifaceted range of products

Alcan Packaging offers a broad technical range of packaging solutions using plastics, aluminum, engineered films, paper, paperboard and glass. We are constantly simplifying and optimizing our processes and operations to provide better products with superior functionality at competitive prices. Alcan Packaging offers a broad technical range of packaging solutions using plastics, aluminum, engineered films, paper, paperboard, and glass. We are constantly simplifying and optimizing our processes and operations to provide better products with superior functionality at competitive prices.

Food: < Capsules & Closures

< Container Strip and Containers

< Labels (e.g. roll-fed, shrink sleeves)

< Plain and converted barrier foils and films, single and multi-layer

< Pouches

< Technical and industrial foil and films, single and multi-layer

Beauty: < Collapsible Tubes

< Make-Up & Accessories

< Fragrance packaging

< Skincare & Toiletries

< Promotional Items

Pharma: < Contract Packaging

< Folding Cartons Services

< Glass Tubing

< Medical Flexible Packaging

< Pharmaceutical Flexible Packaging

< Plastics

< Science Products

Tobacco: < Folding cartons

< Flexible Packaging

6 - Integrated Management System

Value-Based Management, EHS FIRST, Continuous Improvement and People Advantage are the priorities of the Alcan Integrated Management System (AIMS). AIMS makes this journey possible and our objectives attainable, it positions us for long-term profitability and ensures that each of our operations focuses on the right priorities.

7 - On going innovation

Extensive R&D allows us to interpret and consistently translate trends into innovative packaging solutions that meet and exceed our customers' ever-evolving needs. This ability has made us a recognized leader in barrier technologies, surface treatment and printing techniques, offering a unique approach that incorporates plastics, engineered films, aluminum, paper, paperboard and other materials.

8 - Built by talented employees

Alcan's focus on leadership and value is centered on its skilled and talented employees around the globe. Alcan places a high value on skills, knowledge, teamwork and leadership, while ensuring a challenging, safe and rewarding work experience. At Alcan, our success has always been - and will always be - a reflection of our employees' achievements.

9 - Community involvement

Alcan Packaging is an active member of hundreds of communities in developed and developing regions of the world. Alcan aspires to enhance quality of life by creating employment and by improving health, safety and environmental conditions. In every instance, our goal is to generate economic,

environmental and social benefits that flow out to our many partners and communities around the world.

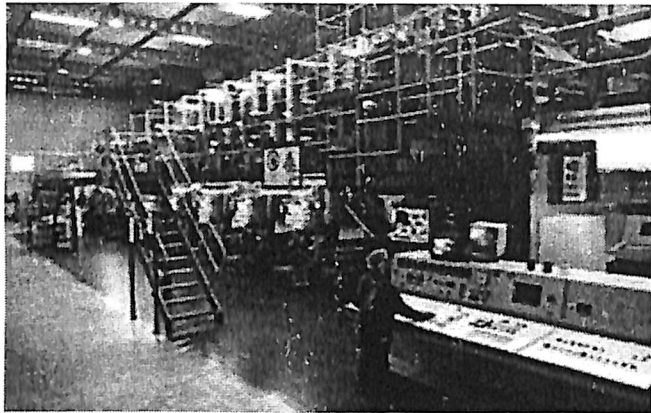
10 - Sustainability

Alcan Packaging focuses on generating profitable and sustainable growth. We strive to develop the highest quality packaging solutions, while also supporting sustainable product development and reducing environmental impacts during the manufacturing process and after product use.

Alcan Commitments:

- **EHS**
- **Continuous Improvement**
- **Sustainability**

Environment Health and Safety in Alcan:



Our vision is to be a recognized leader of Environment, Health and Safety excellence, in everything we do and everywhere we operate. To support our EHS FIRST policy, we:

- Foster open and transparent communication to build long-term stakeholder relationships and generate sustainable EHS improvements and value**
- Comply with and, where possible, exceed applicable laws and our own EHS FIRST standards**
- Develop and implement innovative technologies, industry best practices and effective management systems**
- Require our managers to take ownership of EHS FIRST and visibly demonstrate their EHS FIRST commitment**
- Select our partners on the basis of their commitment to meet our EHS FIRST requirements**
- Regularly audit our sites and publicly report our EHS FIRST performance**
- Hold each other accountable to live and work by the policy through application of Alcan's Worldwide**
- Code of Employee and Business Conduct**
- Encourage, recognize and reward positive contributions to Alcan's EHS performance**

Alcan Packaging results confirm the success of their efforts:

- RCR / LTII improved by 70% from 2006 / 2003 and RCR reached 0.97 in 2006

- 24 sites have reached more than 1 000 000 hours worked without any Lost Time in 2006

- 11 sites spent more than 5 years without any Lost Time

- EHS Management system: all sites owned by Alcan Packaging for more than 2 years are certified ISO 14001 and OHSAS 18001 in 2006

- EHS FIRST is a proactive mindset supported by everyone in day life not just at home but also at home and in our communities.

Fall Protection & Working-at- Height



Training
Alcan Packaging

Objectives

To understand

- the risks when working at height
- what is a protected and unprotected elevated workspace
- What to consider before issuing a Working-at-Height Permit
- to select the right components for a Fall Arrest System
- the precautionary measures when working with an aerial lift, ladders, scaffolds or on the roof

Content

- Working-at-Height accidents in Alcan
- Elevated Workspaces
 - Protected and NO GOs
- Working-at-Height Permit
- Personal Fall Arrest Systems
- Safe Practices for working at height
 - Safe Work on aerial platforms and lifts
 - Safe use of ladders
 - Safe Scaffolds
 - Safe Roof Work
- Contractors

Working-at-Height Fatality Jiangyin , May 2007



Victim fell through the hole.



View from the top.

Description:

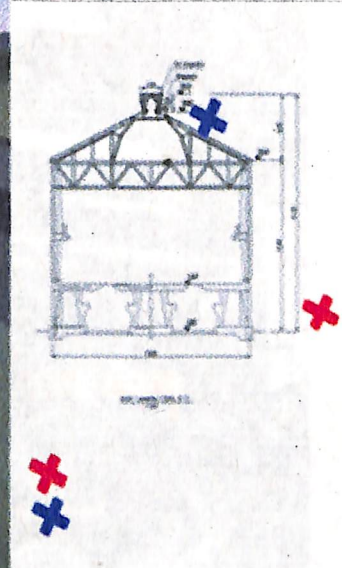
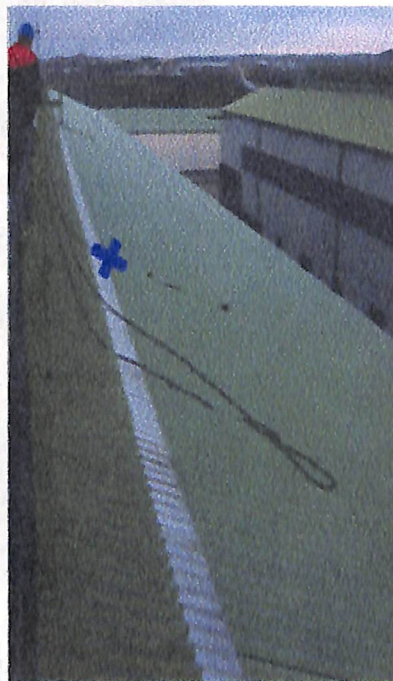
The subcontractor employee in charge of building a new roof on the top of an existing building was walking on the old roof. One of the steel sheets gave way and he fell to the concrete floor 6-7m below. He was wearing a safety harness but the lanyard was not connected to a lifeline or structure while he was walking.

Immediate Causes

- The victim stepped on an unsupported metal sheet of the old roof without having his harness secured to a lifeline or steel structure. The sheet gave way and he fell through the hole in the roof.
- The previously removed sheets of the old roof were not properly re-attached on beams and girders and were not able to sustain load.

- The safety harness' lanyard was not connected to a lifeline or to the structure.
- The previously proposed and agreed walking boards and platforms for constructors were not put in place by the contractor.

Working-at-Height Fatality ISAL, November 2005



Description:

- The victim was working at the top of the roof, when he fell down to the ground (over 15 meters). The victim died instantly when he hit the ground.

- The victim was found wearing all required safety gear for this kind of work including safety harness and line. Defect on the hook was observed. The latch did not close automatically as supposed to.

Working at Height Accident Santo Domingo Prodpac Mill, Aug 2004

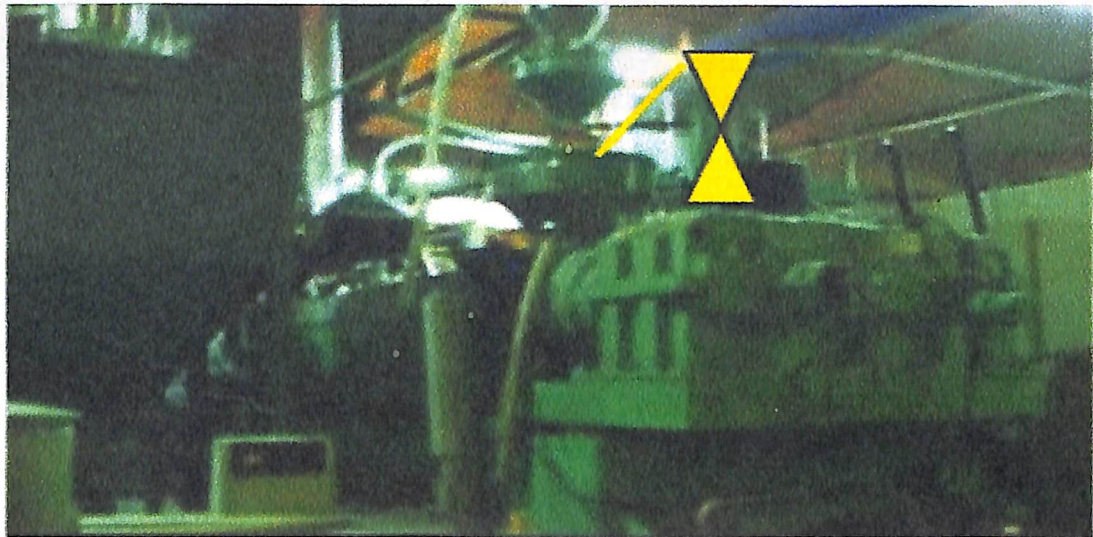


Description:

The injured walked on the top of the roof to get his lanyard. When he stepped on one of the translucent sheets, the material yielded and he fell down to the plant floor (about 5m). He broke his arm.

Working at Height Accident Alcan Packaging, June 2005

Work at height accident does not only happen when people work on roofs. In Packaging, we face two serious accidents, when people climbed onto equipment.

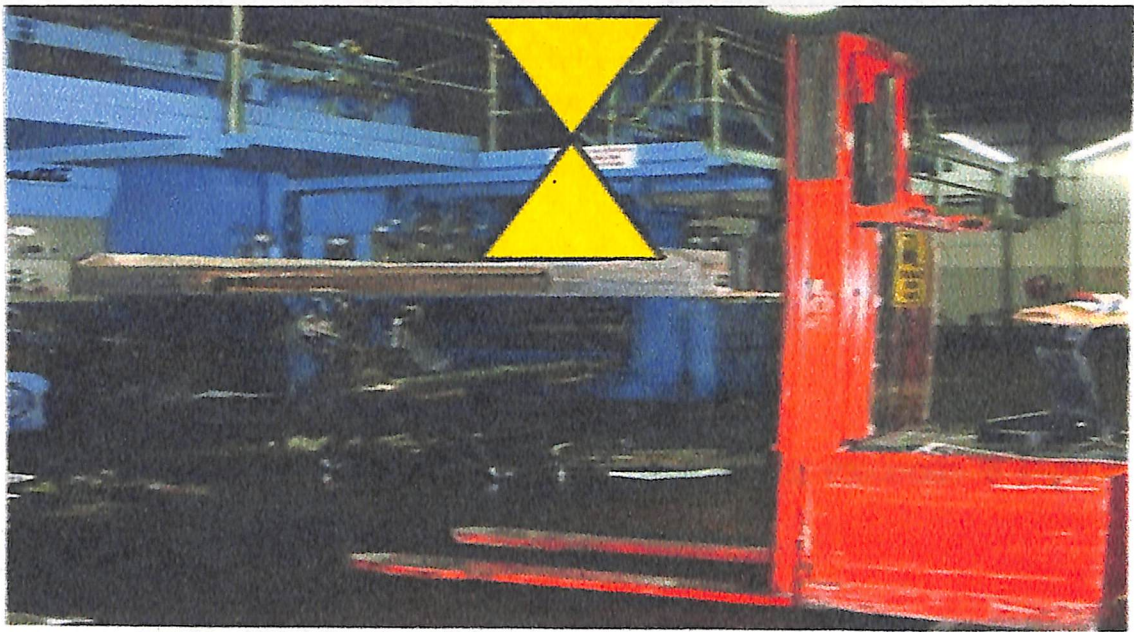


 Employee

Description:

The employee had climbed on top of the unit (2.5 m) to unblock a blocked hopper. When pulling out a ball of resin from the hopper with a metal rod, he lost balance and fell. He broke his leg.

This is an example of working-at-height without protection which is not allowed.



Employee

Description:

The employee boarded the pallet himself. During lowering the pallet, the operator fell. The employee sustained injuries to his lower back and spine.

Never use a forklift as a lifting device for people. This practice is forbidden.

What is an Elevated Workspace?

Elevated Workspace

- An unprotected workspace that exceeds 6 feet / 2 m high*
- un-guarded edges
- unsecured ladders
- wall openings and holes
- floor openings and holes
- elevated work platforms
- loading docks
- roofs
- Fixed ladders that exceeds 10 feet / 3 m *
- Stairs that exceed 4 feet / 1.2 m *

* unless regulated lower by applicable legal standards

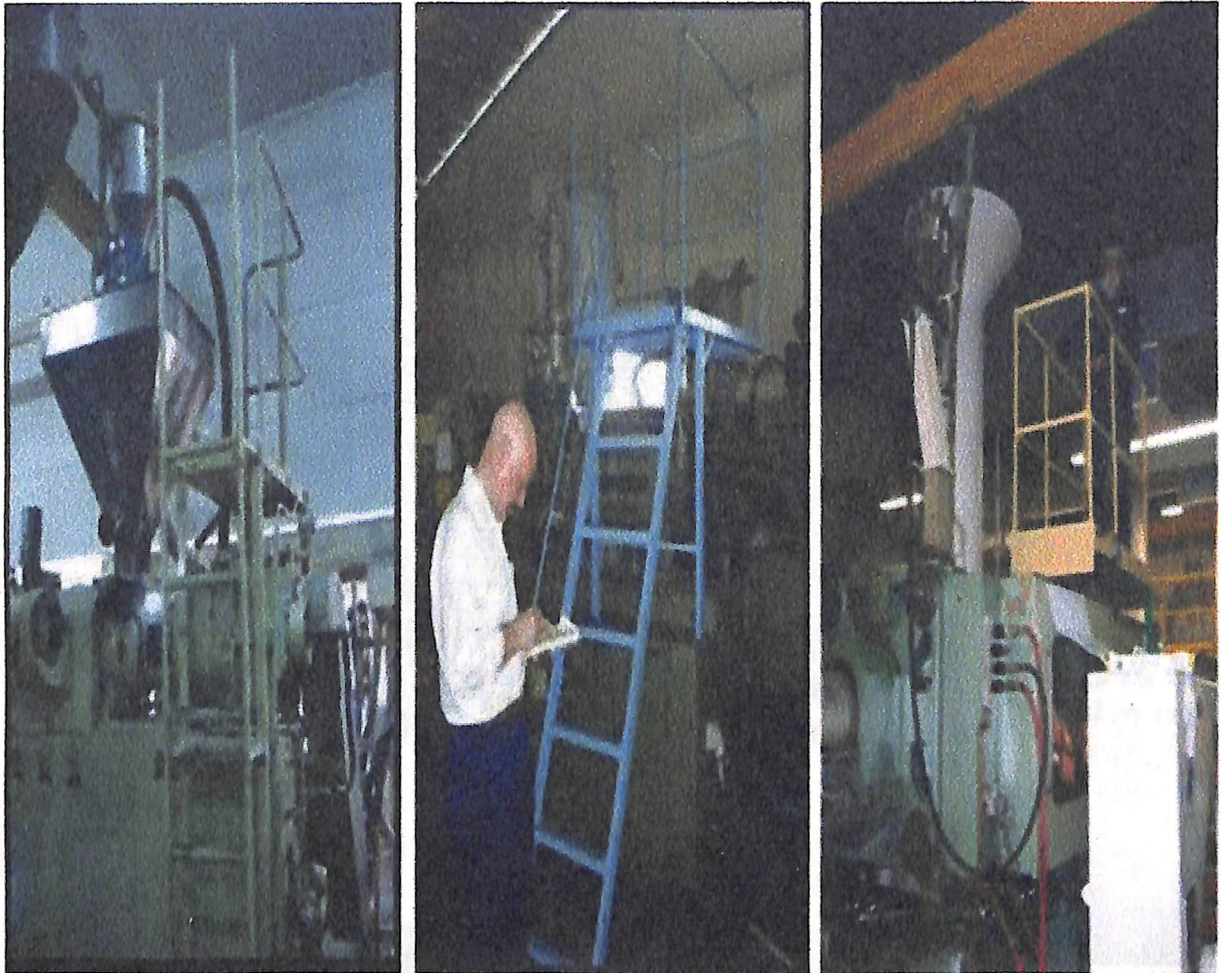


Protected Elevated Workspace

Example

- **Minimum requirements for stairs, platforms, or elevated work surfaces:**
- **The top rail should be at least 42 inches /1.0 m high.**
- **There shall be a mid-level rail so that there is no gap more than 21 inches /0.5 m.**
- **The platform must be protected by a toe board.**



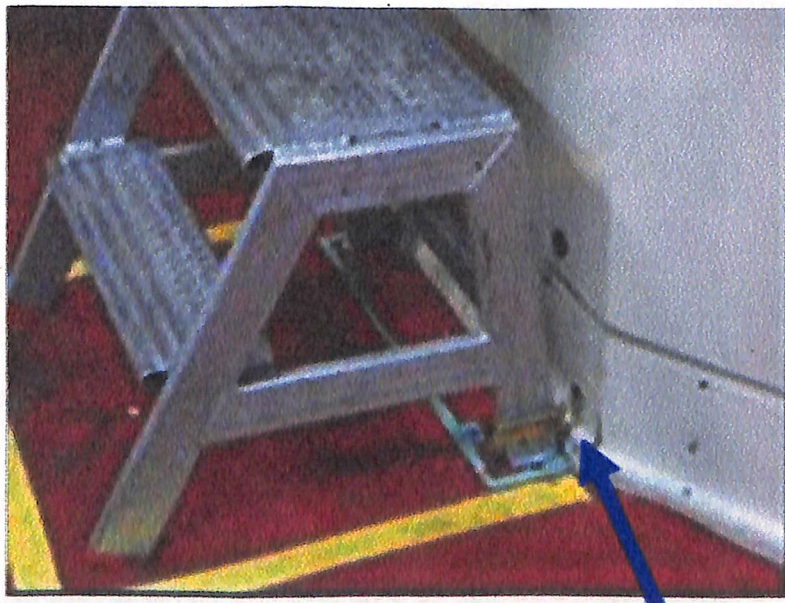


Protected elevated workspaces with platform and standard railings.

Protected Elevated Workspace Example



**Very light ladder
easy to move fr
one workstation
the next.**



Ladder is attached to the machine.

Protected Elevated Workspace Example

Aerial lift with appropriate railing

- Despite this protection, during work > 6 feet / 2 m, a Working-at-Height Permit must be issued.

- Be sure that
 - > the person wears a harness connected at the anchor point provided
 - > the person is trained & authorized
 - > checks have been performed before use.



Approved Elevated Workspace Example

Ladder with appropriate railing
For working heights < 10 feet / 3m



Unprotected Elevated Workspace NO GO Example

This is an unprotected elevated work-space and thus a work-at-height situation.

Two possible risk control solutions:

- 1. Elimination of the risk by providing a rail and to turn it into a protected platform**
- 2. To require that the person wears a harness**

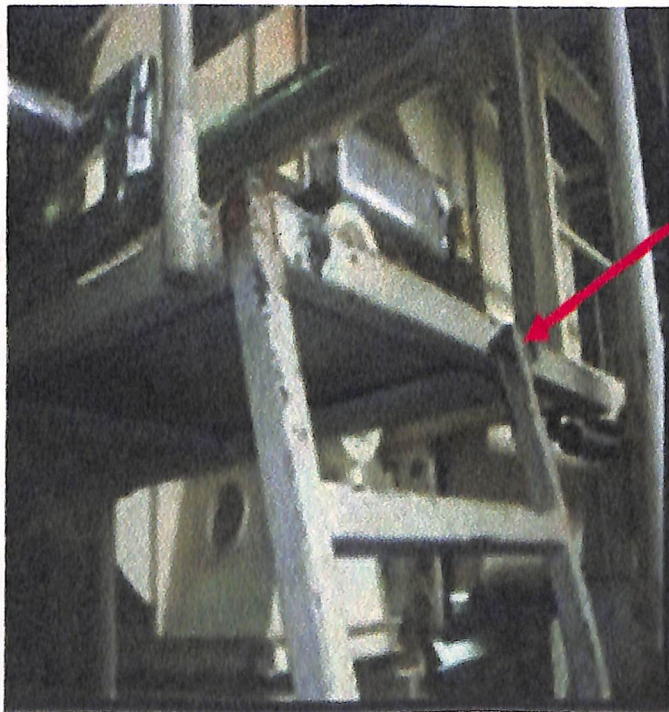




Poor Scaffolding

- **Poor platform:
not fixed
no railings and toeboard**
- **Unsafe access**
- **Person should wear a harness
connected to a stable anchor point**

If this can't be done:



Unsecured Ladder
Not fixed at the top

Elevated Workspace

Risk Control

The safest and preferred solution is to find

Engineering solutions to eliminate the fall hazard by changing it from an unprotected to a protected elevated workspace by installing **Fall Protection Systems** like e.g. handrails, walkways,

If this can't be done:

A Working-at-Height Permit needs to be issued defining

- > safe working procedures,
- > working-at-height tools, and
- > Personal Fall Arrest Systems

to ensure safe working.

Working-at-Height Permit

- Each site must identify and set up a list of **unprotected elevated areas.**
- If tasks require a person to access an unprotected elevated area,
a **Working-at-Height Permit** is needed.

Working-at-Height Permit

Make sure, that when someone has to work on an elevated workspace, it is safe to work on!

- **Step 1** Conduct a formal **Risk Assessment** covering the entire Work-at-height project by **visiting the location.**Based on the Risk Assessment:
- **Step 2** Challenge, if there are alternative ways of doing the job?
- **Step 3** Decide on the Fall Arrest Protection system
- **Step 4** Establish safe working procedures for each step/phase of the job and issue a signed Work-at-Height Permit
Every day:
- **Step 5** > Review the Risk Assessment & Work-at-Height permit in case of any changes
> Issue a Work-at-Height Permit per shift with names of authorized persons (strong recommendation).

Working-at-Height Permit

Step 1: Conduct a Risk Assessment

- **What working steps does the job involve?**
- **What are the risks of each working step?**
- **Is the elevated work space structurally safe?
Are walkways safe?
Do roof sheets need to be loosened /
opened?
What can happen, if the person loses
balance and need to make a step aside?**
- **Does the work require the person to move
around?**
- **Does the elevated workspace have sufficient
anchor points and lifelines?**
- **How many workers?**
- **If outside, consider the weather conditions**

Step 2: Challenge, if there are alternative ways

of doing the job.

**The objective must be to eliminate
as many jobs as possible requiring working
at height.**

- **Redesign the job task**
- **Use tool extensions and work from ground
level**
- **Use aerial lifts or platforms that provide built-
in fall protection**

If raised to heights > 6 feet / 2m, it will still require fall arrest systems and a Working-at-Height Permit, but are in general safer.

Step 3: Select the appropriate type of Fall Protection System

Consider the following factors:

- **The distance to lower level**

- **The type of activity and specific requirements of each activity**

- **How much vertical and horizontal movement employees will need:
Can employees move safely from one place to another without getting disconnected?**

- **The specific types of equipment and components needed**

- **Can all workers be connected to the fall arrest system at any location of their work**

- **Environmental conditions (wind, rain, extreme heat/cold)**

- **How employees will be recovered or be rescued from fallen positions**

Step 4: Establish Safe Working Procedures

Consider the following factors:

- PPE
- Work precautions
- Safety zones establishment
- Nobody may work at height alone
- Hand tools must be fixed to prevent from falling

Issuing a Working-at-Height permit is not enough.

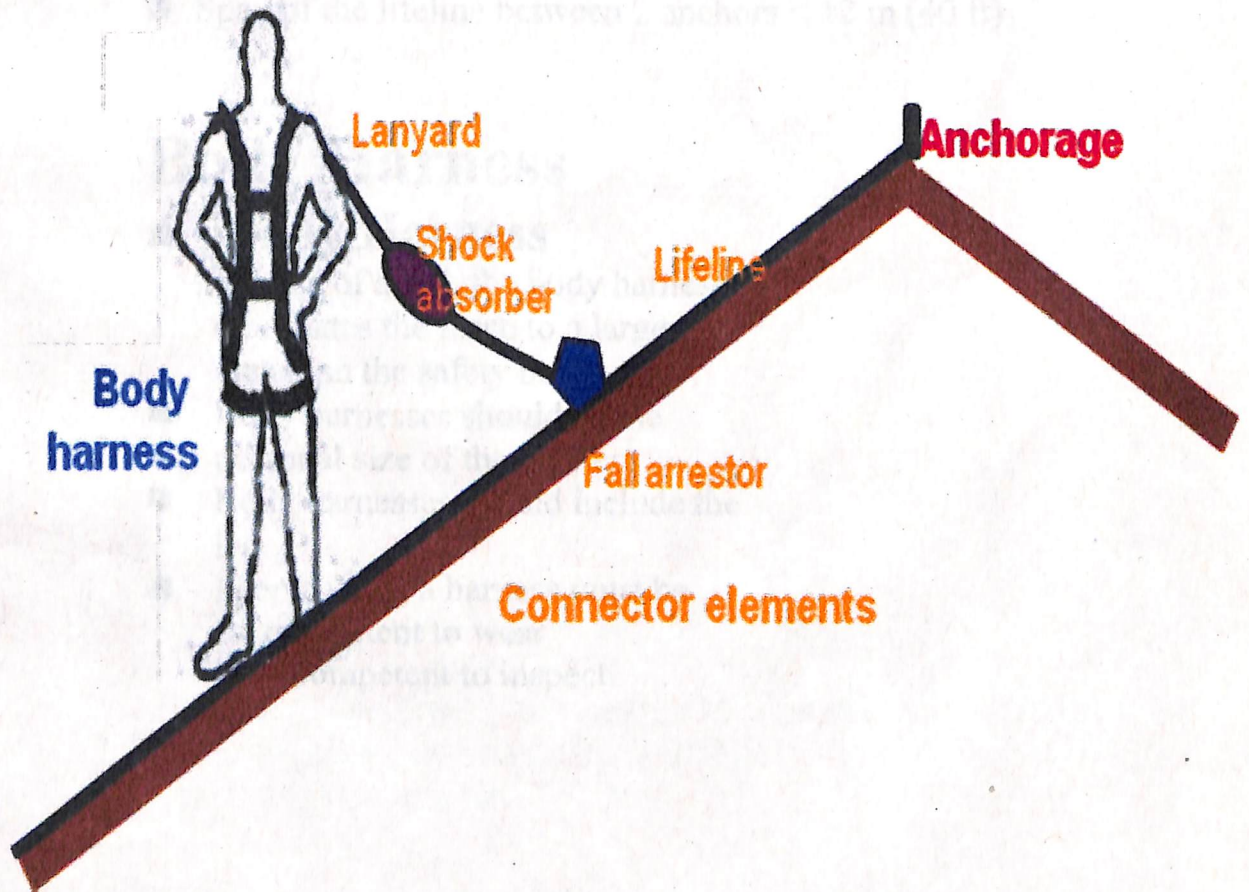
Next steps MUST be:

- Training and communication to affected employees
- Authorization of those, who are trained and competent to undertake the job
- Strong supervision by competent personal (Alcan or Contractor) to ensure mandatory controls & precautions are in place and persons adhere to the approved work procedures
- Inspections must be carried out by competent personal.

Personal Fall Arrest Systems

The three elements of a Personal Fall Arrest System:

- Anchorage
- Body Harness
- Connector elements >
 - > Carabineers, hooks
 - > Lanyard
 - > Shock absorber
 - > Fall arrestor
 - > Lifelines



Personal Fall Arrest Systems

Anchorage

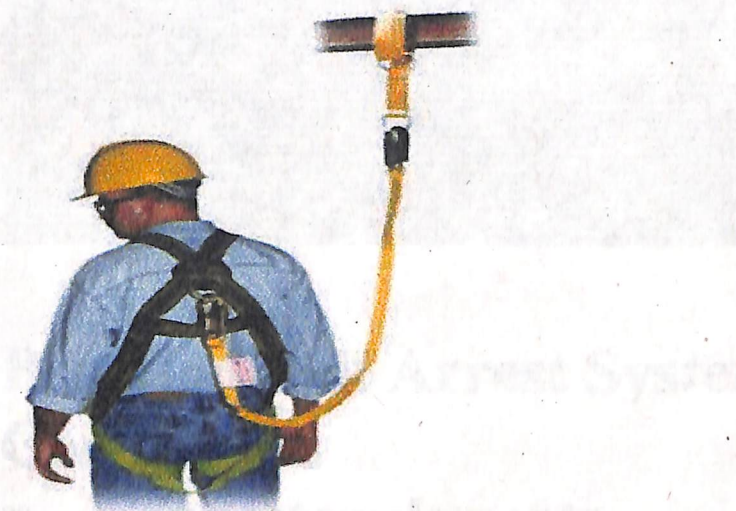
- An **Anchorage** is a secure point of attachment for lifelines or lanyards.
- The anchorage point must be chosen such that it is strong and independent without a risk to collapse.
- **NO GO:** Guardrails shall never be used as anchoring devices.
- **Important:** All anchorage points shall be inspected before each use.
- Anchors for vertical lifelines
- One anchor = one employee
- Anchors for horizontal lifelines
- Must be subject to extreme force in case of a fall
- Span of the lifeline between 2 anchors < 12 m (40 ft)

Body Harness

- **Body Harness**
In case of a fall, the body harness distributes the force to a larger area than the safety belt.
- Body harnesses should fit the personal size of the wearer.
- Body harnesses should include the leg.
- People using a harness must be
 - > competent to wear
 - > competent to inspect.



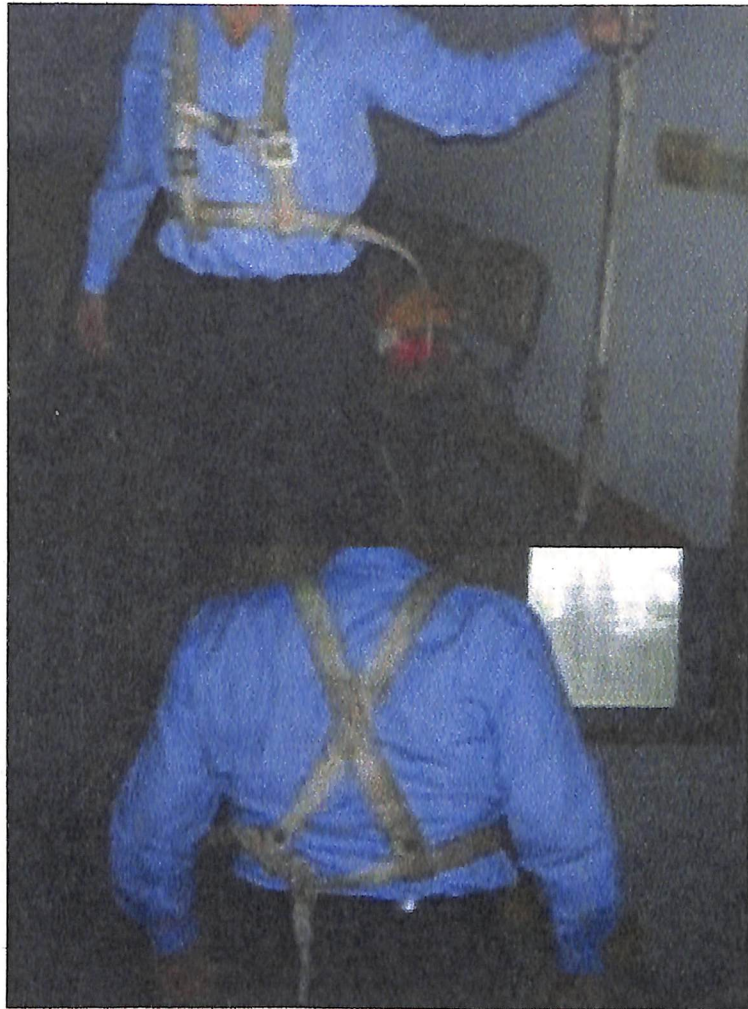
- The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level or above the head.



This type of harness is forbidden for use in Alcan

NO GO: This type of harness is forbidden for use in Alcan.

- Attachment point is at the belt.
- Harness does not include the leg.



Personal Fall Arrest Systems Connectors

■ **Connector elements**

Everything between the body harness and anchor:

- **Lanyard with**
 - Shock absorber to limit the force of a fall
 - Fall arrestor system
 - Connectors
- **Lifeline**
 - horizontal lifeline
 - vertical lifeline

Personal Fall Arrest Systems

Lanyards

Types of Lanyards and when to use which (1/4)

- The restraint lanyard works as a restraint; i.e. typically on a level surface to prevent the user from entering a zone which is unsafe.
- Restraint lanyard must never be used in situation where there is a risk of fall. If a fall is possible, fall arrest system must be used.



Restraint lanyard

Types of Lanyards and when to use which (2/4)

absorbing lanyard



- Energy absorbing fall arrest lanyard
- Shock absorber reduces the impact of a fall on the body
- Used when work is close to anchor point or when lanyard can travel along a horizontal lifeline
- Max length 1 m; recommended length 0.6 m
- **When used on a vertical life line, a rope grab must be used in addition**



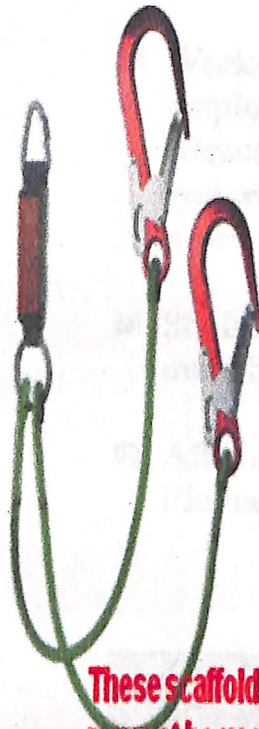
A rope grab is fitted between the lifeline and lanyard. It normally slides freely on the lifeline until there is a sudden downward motion. When this sudden motion occurs, the fall arrestor "grabs" the lifeline and holds firmly.

MEMO ON HUMAN BUILT

Types of Lanyards and when to use which (3/4)

■ Twin-lanyard

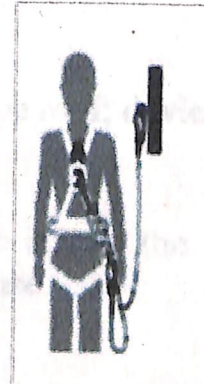
- Used for work on scaffolds
- Used when the person has to change scaffold bars for safe disconnection and re-connection. Allow one lanyard always to remain attached to one bar.
- When twin-lanyards are used, be sure to use them correctly



These scaffold hooks may not be used on scaffolds.

One lanyard always to remain attached to one scaffold bar.

When used only one; the spare one MUST be clipped back onto the energy absorber itself on the side away from the body



Types of Lanyards and when to use which (4/4)

- Retractable lanyards for use when a suitable anchorage is available direct above the worker in fall arrest situations.
- Works somewhat like a safety belt of a car: As the employee is moving up or down, the lifeline extends or retracts. At the moment a fall occurs, the lifeline locks and works to stop the individual from falling further down.
- Shall not be used as fall arrest on slope roof; device must be in vertical position
- After a fall, the manufacturer needs to inspect the lifeline and approve it for continued use.



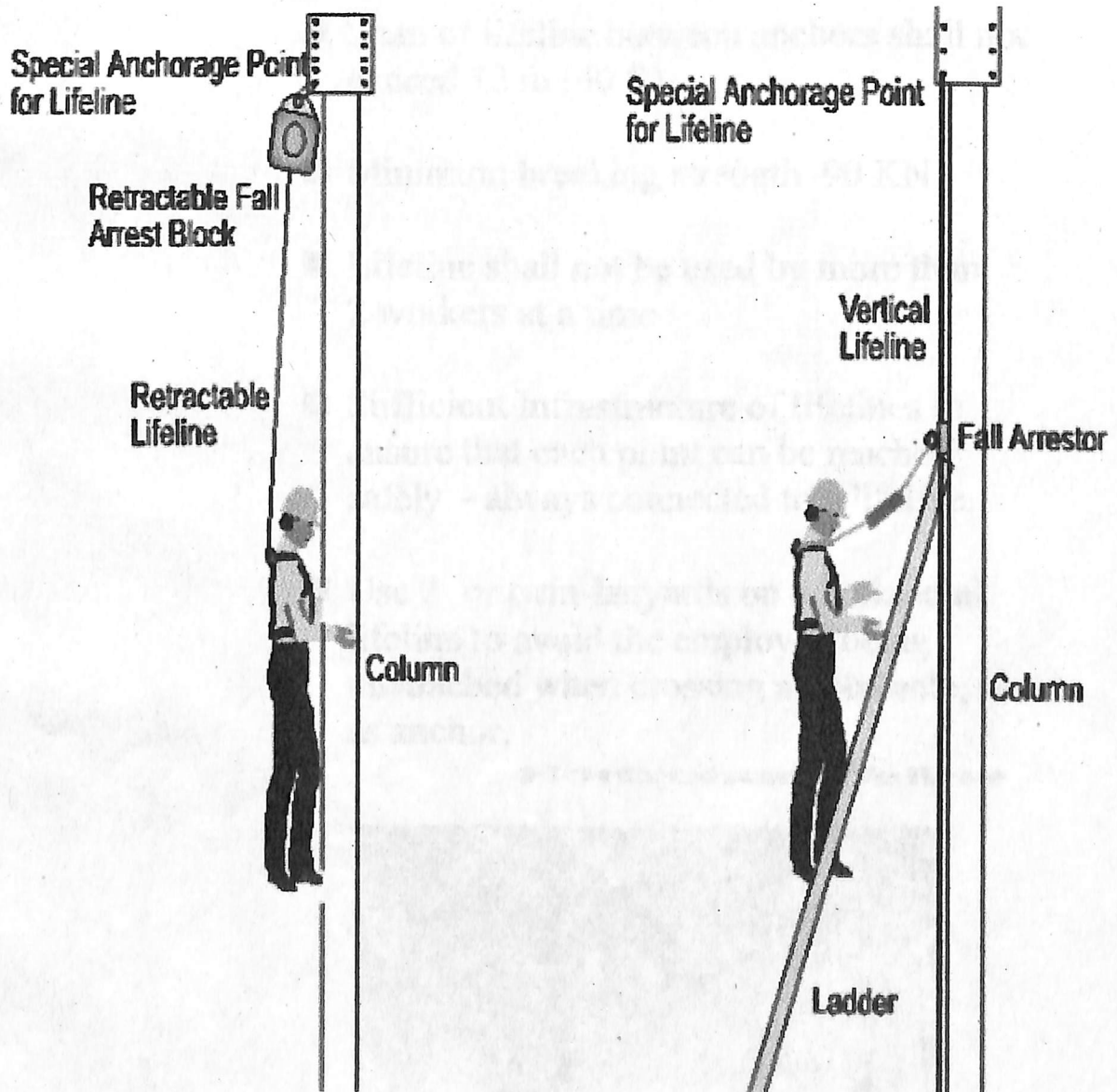
Retractable lanyard

Personal Fall Arrest Systems Working on a vertical front / column

Two alternatives when working on a column:

A. Retractable Lanyard

B. Vertical lifeline & Rope Grap



Personal Fall Arrest Systems Lifelines

A sufficient infrastructure of lifelines must be provided

■ **Horizontal Lifelines**

- Steel cable of minimum 12 mm (0.5 inch) diameter
- Span of lifeline between anchors shall not exceed 12 m (40 ft).
- Minimum breaking strength 90 KN
- Lifeline shall not be used by more than 2 workers at a time
- Sufficient Infrastructure of lifelines to ensure that each point can be reached safely – always connected to a lifeline.
- Use 2- or twin-lanyards on a horizontal lifeline to avoid the employee being unattached when crossing an obstacle, such as anchor.

Horizontal lifeline



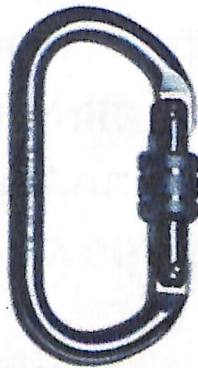
Personal Fall Arrest Systems

Connectors

Only self-locking carabineers or hooks may be used

■ Connectors

- must have gates that are both self-closing and self-locking
- must have a breaking strength of at least 22 KN
- must have the manufacturer's identity and load capacity marked on it (easy to read)
- Inspect before each use:
 - > make sure it is free of damage; deformities or excessive wear



Carabineer with self-lock



Screw links

Personal Fall Arrest Systems Training

Practical training needs to back up this introduction on Fall Arrest Systems to ensure the employee understands:

- How to properly wear/adjust a fall protection harness.
- What lanyards are available and which to use when and how
- How to properly use a twin energy-absorbed lanyard.
- How to properly attachment to anchorage points and lifelines.
- How to maintain and properly store fall protection equipment.

Other Precautions Spotter

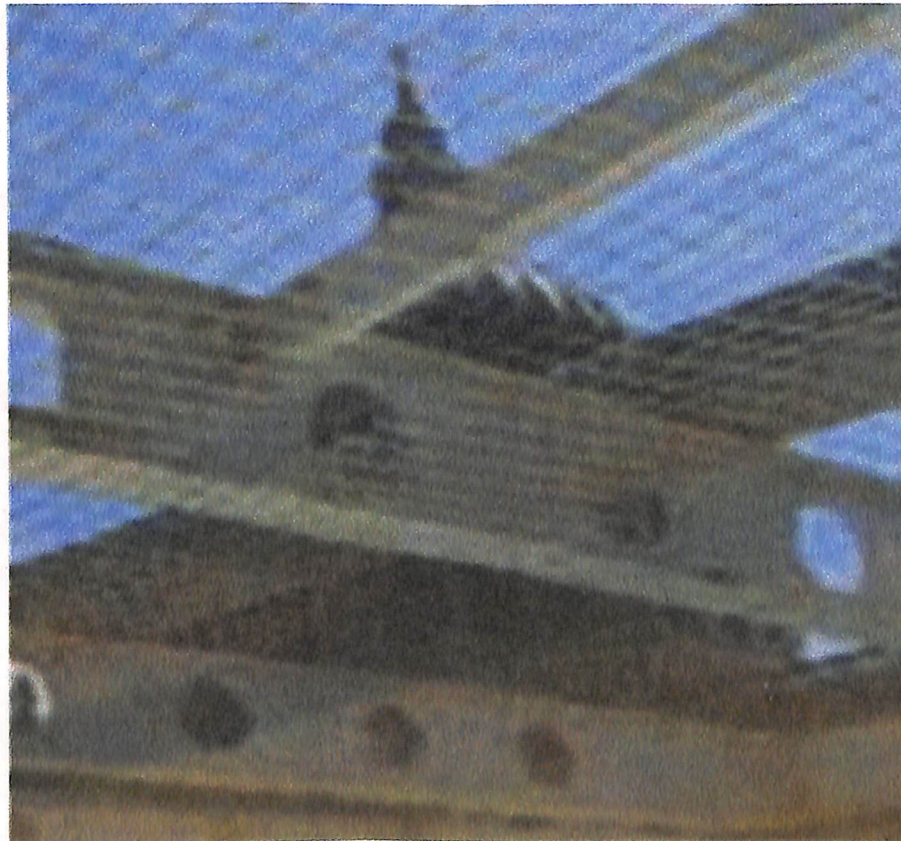
When a person uses a Fall Arrest System a **spotter** needs to be resent so that in case of a fall, the person can be immediately rescued.

Other Precautions

Safety Netting

Safety Netting is a recommended measure in addition to personal fall arrest systems.

- It stops the employee from “hanging in the air” until rescued.
- It protects not only roof workers, but others working underneath.
- A must when working on fragile roof structures.

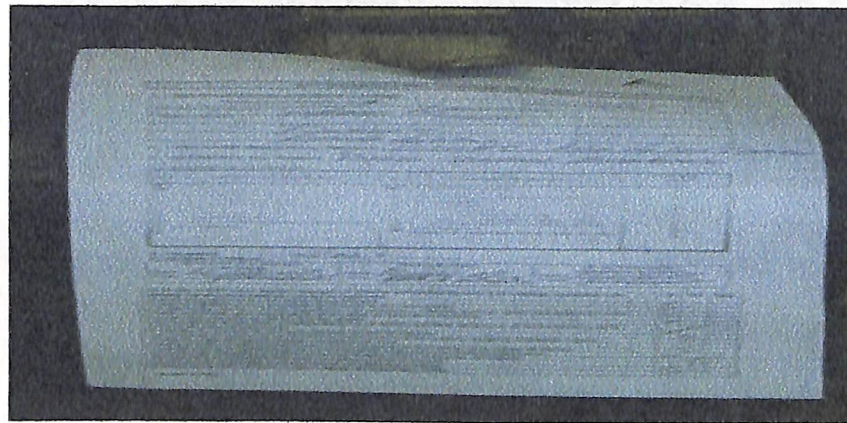


Safe Work on Aerial Platforms or Lifts

Precautions

1-A Working-at-Height Permit must be issued during aerial work at heights greater than 6 feet / 2 m.

2-Only trained and authorized employees may carry out the work.



3-Pre-use inspection using a checklist at least once a day

4-Areas underneath where overhead work is being done must be closed off to all employees other than those who are wearing hard hats and must be in that area.



5-Fix the Aerial Platform to avoid unexpected movement.



6-Employee must wear harness and lanyard when raised > 2 m (6 ft).

A lanyard may be attached to a railing only when there is no manufacturer supplied anchorage point and the manufacturer has approved the railing as an anchorage point.

7-Never start raising the platform > 2 m unless all persons on that platform are secured (harness & lanyard attached to anchor).

8-Worker shall stand on floor of basket.

9-Any employee working in an aerial lift shall make sure that the platform opening is securely closed.



10-A spotter works with the employee to keep an eye on safety.

11-Do not move lift trucks with workers in the basket

12-Never exceed load capacity.



Safe Use of Ladders

Working on portable ladders may only be allowed for very short jobs.

Ladder Safety TO Dos

- Use a fixed ladder when a job requires regular access to a platform
- Ladders shall be placed with a secure footing and measures taken to prevent slipping.
- Ladders used to gain access to an elevated platform shall extend min. 3 feet (1 m) above the point of support.
- The foot of a ladder shall be placed such that the horizontal distance to the supporting point is $\frac{1}{4}$ of the working length of the ladder (the length between the foot and the support).
- When climbing
 - Face the ladder
 - Use both hands
- Ensure a clean and clutter free base area

Ladder Safety DO NOTs

- When climbing
 - Don't move, shift, or extend ladder while in use
 - Don't lean out from the ladder in any direction.
 - Don't use the top of a regular step ladder as a step.



Don't use the top of a regular step ladder as a step.

- Only one person should be on a ladder at any time.
- Don't allow others to work under a ladder in use.

- Short ladders shall not be spliced together to make long ladders.
- Ladders shall never be used in the horizontal position as scaffolds or work platforms.
- Metal ladders shall never be used near electrical equipment.



Only one person should be on a ladder at any time.

Safe Scaffolds

Building construction exceeding a height of 3 m require a scaffold.

Basic requirements for scaffolds

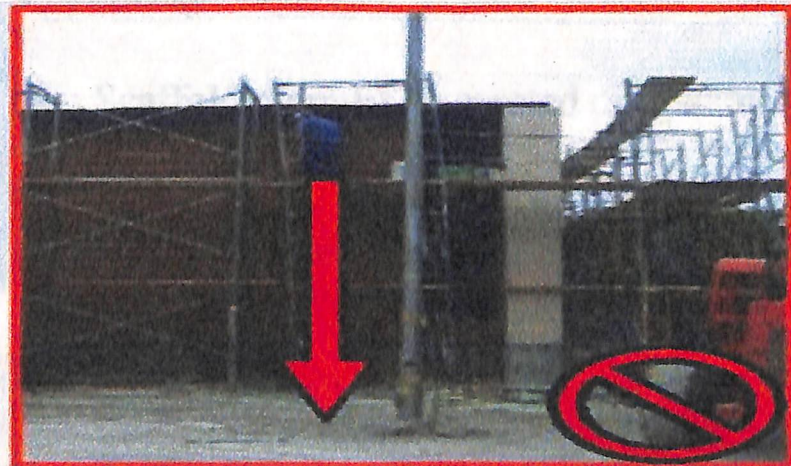
1. Safe Access

- Scaffolding walkways must be accessed safely.
- From any place, the max distance to an access is 25m.
- In case, the height difference exceeds 1 m stairs or ladders needs to be provided.



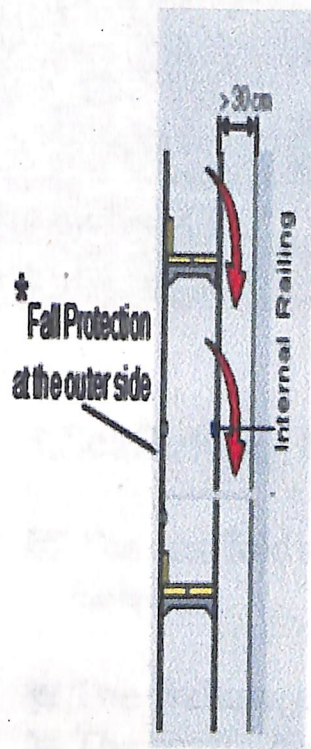
2. Guardrails at the outer side of the scaffold

- All walkways need to have a railing around the outer side.
- Never use scaffold that do not have proper guardrails installed.



3. Fall protection at the inner side of the scaffold

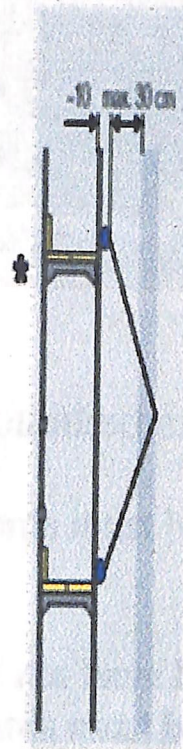
- In case, the distance between scaffold and building front exceeds 30 cm, fall protection measures need to be installed.



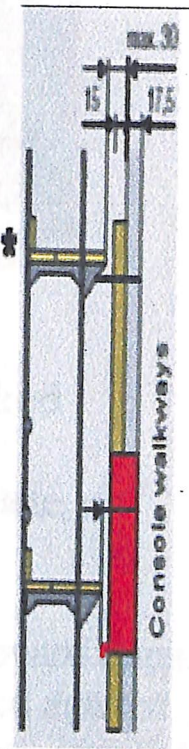
* Fall Protection at the outer side

Internal Railing

Picture 1: Internal railing



Picture 2: Extra beams

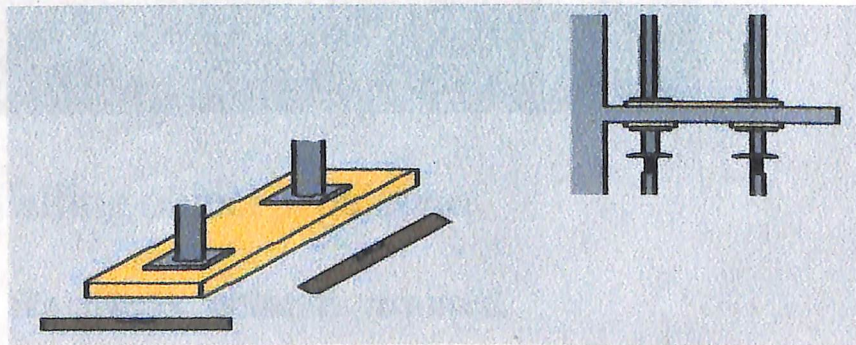


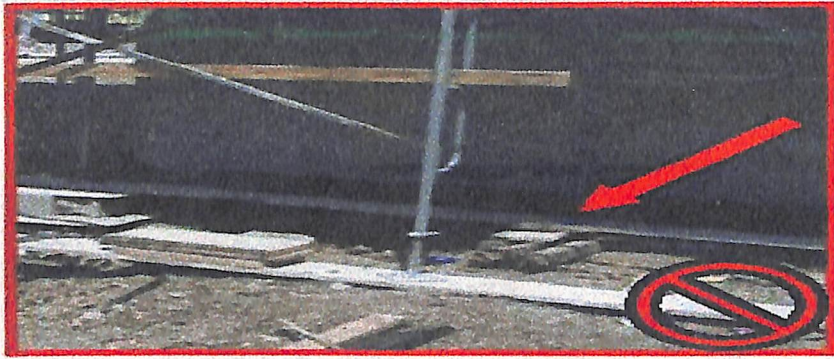
Picture 3: Console walkways

The solution depends on the type of job.

4. Stability

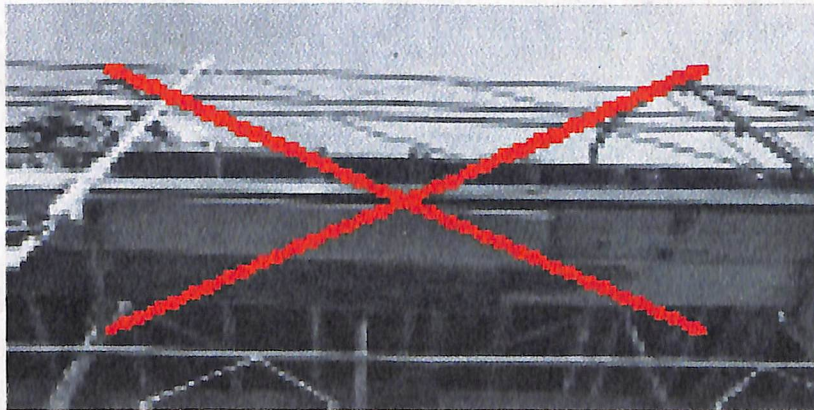
- Scaffolding must be erected on a stable foundation
- Unstable objects will not be used as working platforms





5. Scaffolding fully planked and decked

- The scaffolding boards must be complete, no holes.
- The walkways must not have hidden board traps.
- The scaffolding boards must be secured against movement, particularly at the edges.
- No more than 1" gap between adjacent planks.
- Walkways at least 60 cm (18") wide.



6. Falling object protection

- Hardhats, helmets required.
- Protect employees below from falling objects:

- toe boards
- canopies..



7. Mobile Scaffolding

- Mobile scaffolding must be fixed to the ground.
- Do not move a mobile scaffold with people on it.



Safe Roof Work

Working on a roof is dangerous

- Any fall from the roof inevitably involves at least serious injury.

Falls occur

- from the edges of roofs
 - through gaps or holes in roofs
 - through fragile roof material and roof lights
 - through slipping on the roof.
- High safety standards are essential however long or short the work is.
 - The nature of precautions needed may vary from one job to another, but not providing any safeguard is simply unacceptable.
 - In all cases, a Work-at-Height permit must be issued.

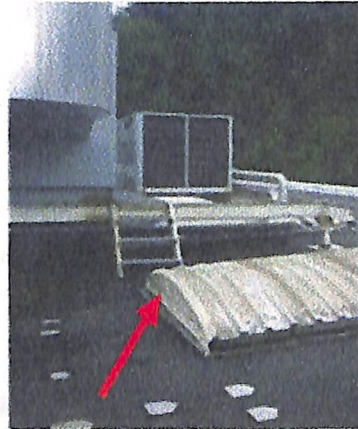
Key Question: Is the roof structurally safe?

- Consider
 - entire roof in good shape
 - all roof plates well fixed
 - fragile or (temporarily) loose roof sheets
 - weak openings (e.g. roof lights) in the roof
 - older buildings or buildings with wooden roof
 - demolition/construction work

Roof windows are considered as roof openings.



The inspection area is 0.6 m from a skylight consisting of Plexiglas.



The staircase ends close to a skylight.



Open skylight

Skylights would not sustain a person stepping or falling onto it.

Roof windows must be protected



Roof skylights should be protected by a skylight screen or standard railings on all exposed sides.

Determine the areas on flat roof, when the work is considered working-at-height

- **Area zoning**
 - **Work on flat roofs is considered work-at-height when the work is done within a corridor of approx. 1 m from the roof edges.**
 - **Inside that corridor, the work is safe. Fall protection is not needed here.**
 - **Note: Skylights are roof openings; keep 1 m distance**
- **Marking**
 - **Mark areas of the roof where a working at Height Permit is required. Ensure those areas have a suitable fall arrest system anchor if they cannot be made intrinsically safe by other means.**



■ **Fragile roofs**

- **Fragile material:** fiber cement roofs, roof lights

- **At NO time may anyone work on or pass over fragile material, unless**
 - walkways, platforms or coverings are provided in sufficient quantity
 - safety netting beneath the roof is installed
 - Fall Arrest System (Harness, lanyard with shock absorber & fall arrestor) must be worn.

ATTENTION: Anchorage points might be difficult to arrange on fragile roofs.

- **Working near fragile materials:**
Harness with a restraint lanyard is a **MUST**.
The person must not closer than 2 m to fragile materials.

Precautions for roof work

■ Weather conditions

- Do not work on roofs on icy, rainy or windy conditions.

Does weather conditions could change during work?		Yes	No							
If "YES", second weather assessment due at _____ (time)										
WEATHER CONSTRAINTS?										
Evaluate actual weather conditions area on chart to authorize or not work at height										
Wind Velocity (Km/H)	Ambient Temperature (°C)									
	+4	4	-1	-7	-12	-18	-23	-29	-34	-40
	Equivalent Temperature (°C) vs. Wind Factor									
0	4	-1	-7	-12	-18	-23	-29	-34	-40	
8	3	-3	-9	-14	-21	-26	-32	-38	-44	
16	-2	-9	-16	-23	-30	-35	-43	-50	-57	
24 - 35	-6	-13	-20	-28	-36	-43	-50	-58	-65	
+35										
Green	No constraint	Yellow	Emergency only	Red	No work at height					

Precautions when not working on the roof

- Access locked
 - Best control the access by locking it



Grid is locked
the ladder

Contractors

In the past, contractors have violated safety rules when working at height. Strong supervision is required.

- Contractors must follow Alcan requirements.
- Whenever you observe, a contractor works on an elevated workspace without the required safety measure applied, e.g.
 - Works on a level > 2m/6 feet without a fall protection system
 - Fall protection system not properly applied report it immediately to the Alcan project supervisor.

CONCLUSION

In conclusion , I will like to express my heartiest thanks to all the members of health safety & environment team for such a great support which they extend for me to feel at home in at a very new field of work . to be familiar with such huge machines & carry out my project is a great experience. Last but not least , I will definitely Like to express my deep sense of gratitude to my seniors who encouraged & guided me nicely.

References

SITES

- www.google.com
- www.alcan.co.in

And the help of

- Mr. C.S. Pandey
- Dr. A.K. Tyagi