MODULE SEVEN

Personal Protective Equipment (PPE)

Learning Objective:

Upon completion of this unit the participants will be able to identify the need for Personal Protective Equipment (PPE) on Wisconsin Dairy Farms.

Learner Outcomes:

You will be able to:

1. Identify the requirements for PPE.
2. Develop a hazard assessment program as it pertains to PPE.
3. Evaluate a variety of PPE devices and determine the types of equipment necessary for your farm.
4. Understand the training requirements for your workers on proper usage of PPE.

Notes

Introduction:

Hazards exist in every work place and in many different forms:

- sharp edges
- falling objects
- flying sparks
- chemicals
- noise
- other potentially dangerous situations

OSHA requires employers to protect their employees from workplace hazards that can cause injury or illness.

Hazard Assessment:

Developing a comprehensive safety and health program:

- Identify physical and health hazards in the workplace.
- Conduct a walk-through survey of the facility to assess the potential hazards.
- Organize and analyze the data so that it may be efficiently used in determining the proper types of PPE required at the worksite.

The workplace should be periodically reassessed when:

- Conditions change
- Equipment or operating procedures change
- Injury and illness records are reviewed to identify any trends influencing suitability of existing PPE
- Monitoring PPE for condition and age

Required documentation of the hazard assessment includes the following information:

- Identification of the workplace evaluated
- Name of the person conducting the assessment
- Date of the assessment
- Identification of the document certifying completion of the hazard assessment

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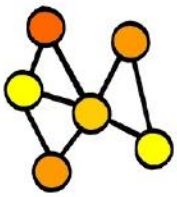
Physical hazards:



- Moving objects
- Fluctuating temperatures
- High intensity lighting
- Rolling or pinching objects
- Electrical connections and sharp edges

Heath hazards:

- Dusts
- Chemicals
- Radiation
- Heat
- Noise
- Ergonomics

Other issues:

- Sources of electricity
- Sources of motion such as machines or processes where movement may exist that could result in an impact between personnel and equipment
- Types of chemicals
- Sources of harmful dusts
- Sources of light radiation from welding, brazing or cutting
- The potential for falling or dropping objects
- Sharp objects that could poke, cut, stab or puncture
- Biologic hazards - blood, other potentially infected material, or zoonotic issues

Ways to Reduce or Eliminate Hazards	
Engineering Controls	Preferred method Eliminate or reduce the exposure by redesigning the procedure or task, new piece of equipment can eliminate hazard
Administrative Controls	Eliminate or reduce the exposure by changing work place policy Job rotations, varied hours
PPE	Least preferred method

Requirements for PPE:

Must have a cooperative effort between both employer and employee in establishing and maintaining a safe and healthful work environment.

Employer's responsibility:

- Performing a "hazard assessment" of the workplace to identify and control physical and health hazards
- Identifying and providing appropriate PPE for employees
- Training employees in the use and care of the PPE
- Maintaining PPE, including replacing worn or damaged PPE
- Periodically reviewing, updating and evaluating the effectiveness of the PPE program

Employees' responsibility:

- Properly wear PPE
- Attend training sessions on PPE
- Care for, clean and maintain PPE
- Inform a supervisor of the need to repair or replace PPE

PPE selection:

- Should be of safe design and construction
- Should be maintained in a clean and reliable fashion
- Fit and comfort should be taken into consideration when selecting
- Make sure PPE types are compatible if worn together
- Must meet standards developed by American National Standards Institute (ANSI)

It is a good idea to select PPE that will provide a level of protection ***greater than the minimum required*** to protect employees from hazards.

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Training employees in the proper use of PPE:

Employers are required to train each employee who must use PPE on the following information

- When PPE is necessary What
- PPE is necessary
- How to properly put on, take off, adjust and wear the PPE
- The limitations of the PPE
- Proper care, maintenance, useful life and disposal of PPE

Evaluation and documentation:

- The employee must demonstrate an understanding of the PPE training and the ability to properly wear and use the PPE before they are allowed to perform work requiring the use of the PPE.
- Employers must document the training of each employee that is required to wear PPE with the following information
    - o Name of employee
    - o Date trained
    - o Subject of the training
    - o Name and qualifications of the trainer

Types of PPE:

- Eye and face
- Head
- Foot and leg
- Hand and arm
- Ears
- Lungs

Eye and Face Protection

Necessary if exposed to :

- Flying particles
- Liquid chemicals
- Acids or caustic liquids
- Chemical gases or vapors
- Potentially infected material
- Potentially harmful light radiation

Prescription lenses

Regular prescription corrective lenses do not provide adequate protection against workplace hazards.

- PPE may incorporate the prescription into the design
- Employees may wear additional eye protection over prescription lenses
- Protective eyewear should not disturb the proper positioning of the prescription lenses or interfere with the employee's vision
- Individuals with contact lenses must wear eye or face PPE when working in hazardous conditions

Areas on a dairy farm to wear eye protection:

- Handling chemicals in the milk house or shop
- Making repairs to structures or machinery
- Areas where there is a high level of dust
- Possibility or likelihood of flying particles

Examples of potential eye or face injuries include:

- Dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering; use of power tools; or strong wind forces
- Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions
- Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes
- Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles)

Types of eye protection

Selecting the most suitable eye and face protection for employees should take into consideration the following elements:

- Ability to protect against specific workplace hazards
- Should fit properly and be comfortable to wear
- Should provide unrestricted vision and movement
- Should be durable and cleanable
- Should allow unrestricted functioning of any other required PPE

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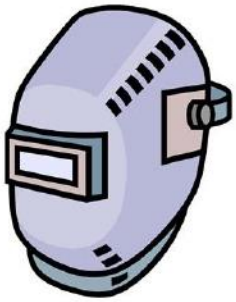
Safety Eyeglasses	• Metal or plastic safety frames • Impact resistant lenses • Side shields available on some models, must be ANSI approved
Goggles	• Tight fitting • Completely covers eyes, eye sockets and surrounding face area • Provides protection from impact, dust and splashes • May fit over corrective lenses
Welding Shields 	• Constructed of vulcanized fiber or fiberglass • Filtered lens protects eyes from burns caused by infrared or intense radiant light • Physical barrier protects from flying sparks, metal spatter and slag chips produced during welding, brazing, soldering and cutting • Shade number must protect against the specific hazards of the work being performed in order to protect against harmful light radiation
Face Shields	• Transparent sheets of ANSI approved plastic extend from the eyebrows to below the chin and across the width of the head • May be polarized for glare protection • Protect against dusts, splashes and sprays of hazardous liquids but do NOT protect against impact hazards • May be used with goggles or safety spectacles for additional protection against impact hazards

Head Protection

Employers must ensure that their employees wear head protection if any of the following apply:

- Objects might fall from above and strike them on the head
- They might bump their heads against fixed objects, such as exposed pipes or beams
- There is a possibility of accidental head contact with electrical hazards

Protective helmets or hard hats should do the following:

- Resist penetration by objects
- Absorb the shock of a blow
- Be water-resistant and slow burning
- Have clear instructions explaining proper adjustment and replacement of the suspension and headband
- Hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 1 to 1 1/4 inches away from the head
- Provides shock absorption during an impact and ventilation during normal wear

Industrial Classes of Hard Hats	
Class A	Provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts).
Class B	Provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration hazards by flying/ falling objects.
Class C	Provide lightweight comfort and impact protection but offer no protection from electrical hazards.

***Bump Hat**:* designed for use in areas with low head clearance. They are recommended for areas where protection is needed from head bumps and lacerations. They are not designed to protect against falling or flying objects.

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Size and care considerations

- Must fit appropriately for the head size of each individual
- Comes in a variety of sizes with adjustable headbands to ensure a proper fit
- Proper fit allows for sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact
- The hat should not bind, slip, fall off or irritate the skin
- Some allow for the use of various accessories to help employees deal with changing environmental conditions such as:
    - o Slots for earmuffs
    - o Safety glasses
    - o Face shields
    - o Mounted lights

- Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face
- Protective headgear accessories must not compromise the safety elements of the equipment

Periodic cleaning and inspection will extend the useful life of protective headgear

- A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential
- Paints, paint thinners and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance
- Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats
- Never drill holes, paint or apply labels to protective headgear as this may reduce the integrity of the protection
- Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

Stickers are not typically allowed on hats as they prohibit a thorough inspection for cracks and defects.

Hard hats with any of the following defects should be removed from service and replaced:

- Perforation, cracking, or deformity of the brim or shell
- Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation
- Always replace a hard hat if it sustains an impact, even if damage is not noticeable
- Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat.

Foot and Leg Protection

Workers at risk of possible foot or leg injuries from falling, rolling objects, crushing or penetrating materials should wear protective footwear.

Examples of situations in which an employee should wear foot and/or leg protection include:

- When heavy objects such as barrels or tools might roll onto or fall on the employee's feet
- Working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes
- Working on or around hot, wet or slippery surfaces
- Working when electrical hazards are present

Foot and leg protection choices include the following:

Leggings:

Protect the lower legs and feet from heat hazards like welding sparks. Safety snaps allow leggings to be removed quickly.

Metatarsal Guards:

Protect the instep area from impact and compression. Made of aluminum, steel, fiber or plastic, these guards may be strapped to the outside of shoes.

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Toe Guards:

Fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum or plastic.

Boots:

To be worn in areas where the floors may be wet or slippery, provide protection for the toes if the employee is stepped on.

Care of protective footwear

- Safety footwear should be inspected prior to each use.
- Checked for wear and tear at reasonable intervals, looking for cracks or holes, separation of materials, broken buckles or laces.
- The soles of shoes should be checked for pieces of metal or other embedded items that could present electrical or tripping hazards.

Hand and Arm Protection

Potential hazards include skin absorption of harmful substances

- chemical or thermal burns
- electrical dangers
- bruises
- abrasions
- cuts
- punctures
- fractures
- amputations

Protective equipment includes gloves, finger guards and arm coverings or elbow-length gloves.

Types of protective gloves

- There are many types of gloves available that protect against a wide variety of hazards.
- The nature of the hazard and the operation involved will affect the selection of gloves.

- It is essential to use gloves specifically designed for the hazards and tasks in the work place.
- For chemical handling refer to the MSDSs under PPE.

The following are examples of some factors that may influence the selection of protective gloves for a workplace:

- Type of chemicals handled
- Nature of contact (total immersion, splash, etc.)
- Duration of contact
- Area requiring protection (hand only, forearm, arm)
- Grip requirements (dry, wet, oily)
- Thermal protection
- Size and comfort
- Abrasion/resistance requirements

Gloves made from a wide variety of materials are designed for many types of workplace hazards. In general, gloves fall into three groups:

- Gloves made of leather, canvas or metal mesh;
- Fabric and coated fabric gloves;
- Chemical and liquid-resistant gloves;

Leather, canvas or metal mesh gloves

Sturdy gloves made from metal mesh, leather or canvas provide protection against cuts and burns. Leather or canvas gloves also protect against sustained heat.

- Leather gloves protect against sparks, moderate heat, blows, chips and rough objects.
- Aramid fiber gloves protect against heat and cold, are cut and abrasive resistant, and wear well.
- Synthetic gloves of various materials offer protection against heat and cold, are cut and abrasive resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.

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Fabric and coated fabric gloves

Fabric and coated fabric gloves are made of cotton or other fabric to provide varying degrees of protection.

Fabric gloves protect against dirt, slivers, chafing and abrasions. They do not provide sufficient protection for use with rough, sharp or heavy materials. Adding a plastic coating will strengthen some fabric gloves.

Coated fabric gloves are normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities.

Chemical and liquid resistant gloves

Chemical-resistant gloves are made with different kinds of rubber. As a general rule, the thicker the glove material, the greater the chemical resistance. Check MSDS sheets to determine type of gloves to have available.

Care of protective gloves

- Inspect before each use to ensure that they are not torn, punctured or made ineffective in any way.
- Fill the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks.
- Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure.

Hearing Protection

Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including:

- The loudness of the noise as measured in decibels (dB).
- The duration of each employee's exposure to the noise
- Whether employees move between work areas with different noise levels
- Whether noise is generated from one or multiple sources

Generally, the louder the noise, the shorter the exposure time before hearing protection is required.

Acceptable Levels and Durations of Noise Exposure		
Duration per day (hours)	Sound level (dB)	Examples of noise source
86	90	Tractor, combine, ATV
4	92	Tractor, combine
3	95	Tractor, grain grinding, combine, air compressor
2	97	Tractor, combine or shop vacuum
1 1/2	100	Tractor, pigs squealing, table saw
1	102	Tractor, combine, or riding lawn mower
1/2	105	Tractor, combine, chickens, irrigation pump
1/4	110	Tractor or leaf blower
	115	Chainsaw

Hearing protectors reduce the ambient noise that gets through to the ears.

Hearing protectors worn by employees must reduce an employee's noise exposure to within the acceptable limits.

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Manufacturers of hearing protection devices must display the device's noise reduction rating (NRR) on the product packaging.

If exposed to occupational noise at or above 85 dB averaged over an eight-hour period, the employer is required to have a hearing conservation program that includes regular testing of employees' hearing by qualified professionals.

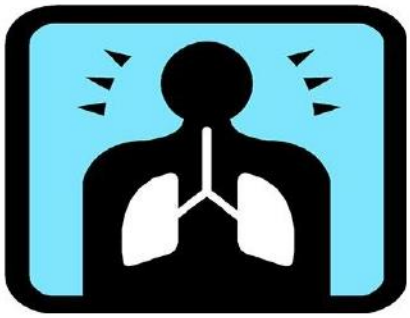
OSHA offers consultation services to test the noise level at a site. Consultants will help select the appropriate PPE for the noise level.

Some types of hearing protection include:

- *Single-use earplugs*: made of waxed cotton, foam, silicone rubber or fiberglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs.
- *Pre-formed or molded earplugs*: must be individually fitted by a professional and can be disposable or reusable. Reusable plugs should be cleaned after each use.
- *Earmuffs:* require a perfect seal around the ear. Glasses, facial hair, long hair or facial movements such as chewing may reduce the protective value of earmuffs.

Respirators:

There are many hazards in farming that can cause respiratory problems. Examples of these include pesticide vapors, dusty fields, hydrogen sulfide in manure pits, and nitrogen dioxide in silos. Farmer's Lung and Organic Dust Toxicity Syndrome (ODTS) are allergic reactions to dust from moldy hay or grain which can lead to permanent lung damage or death.



Types of respiratory hazards

1. Dusts, mists, molds, and fumes

- Dusts are usually the largest of the particles.
- Mold spores released when moldy hay or grain is disturbed and some can only be seen by use of a microscope.
- Mists are suspended liquid droplets found in areas where there is mixing, spraying or cleaning.
- Fumes are solid particles of evaporated metals from welding.

2. Gases and Vapors

- Gases are chemicals that are gaseous at room temperature. Examples include hydrogen sulfide (manure pit gas), nitrogen dioxide (silo gas), and carbon monoxide.
- Vapors evaporate from liquids like pesticides, paints.

3. Oxygen deficient atmospheres

- Manure storage, oxygen limited or sealed silos
- In structures when the oxygen level is below 21 %

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Protection for respiratory hazards	
Respiratory Hazard	Required Protection
Pesticide dusts, mists, vapors, and gasses	A NIOSH-approved chemical cartridge respirator or gas mask with added pro-filter. For extremely high gases concentrations, where the oxygen level may be low, wear a supplied- air respirator.
Dust from: mold, grain, manure, poultry, road/ field; untreated sawdust	A NIOSH-approved mechanical filter respirator or dust/mist mask approved for use with toxic dusts.
Ammonia	A NIOSH-approved chemical cartridge respirator or gas mask approved for use with ammonia.
Hydrogen sulfide (manure gas)	NIOSH-approved supplied-air respirator.
Nitrogen dioxide (silo gas)	NIOSH-approved supplied-air respirator.
Welding fumes	A NIOSH-approved mechanical filter respirator approved for use with fumes.
Spray paint mists	A NIOSH-approved mechanical filter respirator approved for use with spray paints or organic vapor cartridge with paint prefilter on chemical cartridge respirator.
Carbon monoxide (gas-powered vehicle/machinery exhaust)	A NIOSH-approved gas mask or supplied-air respirator.
Fumigants	Fumigants are highly penetrating; some can penetrate the rubber and plastic parts on respirators. Some are colorless and odorless and give no warning of exposure. Many respirators approved for pesticides are NOT approved for protection against fumigants. For the best protection, completely avoid fumigants and treated areas yourself and leave entry to licensed professionals.

Categories of respirators

- Air purifying
- Supplied air

Must be approved by the National Institute for Occupational Safety and Health (NIOSH) The cartridge and respirator must be made by the same manufacturer; brands are not interchangeable.

Air purifying

- Equipped with filters through which the wearer breathes
- Do not supply oxygen
- Good in areas such as barn lofts with moldy hay, fields during tilling or pesticide application, or construction sites where fiberglass or wood dusts are likely to be found.
- Wearer must pull air through the filter by breathing
- Types include mechanical filter, chemical cartridge and powered air-purifying.

Mechanical Filter Respirators

Not to be worn when situation may include an immediate danger to life or health (IDLH)

- Protects from particulate contaminants: dusts, mists, or metal fumes
- Both disposable and reusable masks are available
- Filters and disposable masks should be replaced when breathing becomes too labored, when the mask loses its shape and no longer seals well to face, or if substance can be smelled or tasted
- Approved models have two elastic straps that are placed across the crown and neck for a better seal. Look for a "TC" number to be sure it is approved.

Chemical Cartridge Respirators

- Filters out low concentrations of toxic gases and vapors
- Activated charcoal absorbs contaminants from inhaled air

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- Can also be equipped with particulate filters, (should be worn if exposed to gases, vapors, dusts, or mists)
- Some cartridges specifically made for use with pesticides
- Cartridges should be replaced according to manufacturer's guidelines or when "breakthrough" occurs -- that is, when you begin to smell or taste the contaminant or when dizziness or irritation occurs. Some cartridges last for hours while others last for days.
- Chemical cartridge respirators should not be worn in areas considered immediately dangerous to life or health (IDLH).

Powered Air-Purifying Respirators (PAPRs)

- Air-purifying respirator with a motorized blower that forces air through the filtering device
- Breathing is easier for the wearer; this type of respirator may be recommended by a doctor for someone with a minor respiratory or cardiovascular ailment.
- They tend to be cooler, too, because there is a constant stream of air over the wearer's face and head.

Supplied-air respirators

- These are the only kind to be used in areas considered IDLH
- These respirators can be used in manure pits, sealed silos, or fumigated bins containing high-moisture grain
- They supply the wearer with fresh, clean air from an outside source.
- Types include air-line and self-contained breathing apparatus

Air-Line Respirators: provide clean air through a hose that is connected to a stationary air pump or tank. Ensure that air supply is not drawing in potentially hazardous gases.

Self-Contained Breathing Apparatus: or SCBA, has a portable air tank that is carried on the back like those worn by scuba divers and firefighters.

Testing and caring for respirators

Testing your respirator:

- Get a fit test. (A fit test is administered by a trained professional to make sure your respirator has a good seal).
- Should be done before wearing any new respirator and once a year in subsequent years.
- Every time you put on an air-purifying respirator, conduct a fit check.
- The respirator should slightly push out from your face.
- Cover the inhale ports, or filters, and inhale for 10 seconds.
- The respirator should suck back onto your face and maintain good suction for the entire 10 seconds.
- If you do not get a good seal, readjust straps or reposition the respirator and re-do the check.
- When wearing a respirator, if at any time the seal breaks and you begin to smell or taste a contaminant or if you experience dizziness, nausea, or irritation, get out of the contaminated area and into fresh air immediately.

Proper respirator use and maintenance:

- Glasses, gum or tobacco chewing, facial hair, or even stubble can prevent your respirator from sealing properly.
- Don't wear contacts with respirators; in any contaminate environment contaminants can stick to contacts and cause damage to your eyes.
- Clean your respirator often in warm, soapy water
- After it is thoroughly dry, store it in a sealed plastic bag
- If you leave the respirator out in the open with the cartridges and filter attached, cartridges can absorb vapors and filters can collect dust from the air and become saturated.
- Inspect for damage, dirt or missing valve covers
- Breaks or tears in the head straps, or loss of elasticity in the head straps.
- Store only in a clean area

NEVER attempt to repair a damaged respirator beyond replacing replaceable parts, such as filters and head straps.

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How to overcome employees' objections to using PPE:

- Involve employees in the safety plan.
- Be an example of "do as I do," rather than "do as I say."
- Educate employees on PPE.
- Listen to complaints about PPE try to find solutions - fit, weight, comfort, and appearance.
- Find equipment that is easy to clean, maintain, and replace.
- Remember that maintenance and cleaning is the employees' responsibility.

Personal items and apparel that can be a hazard during PPE use:

- Jewelry, rings
- Loose clothing
- Hood strings - hanging items
- Long hair - not tied back Ear
- buds for MP3 devices
- Contact lenses
- Transition lenses or sun glasses

Note: If an employee owns and uses their own equipment the employer is responsible to assure the quality and adequacy of the device.

Make sure that employees are using required PPE properly and are following the policies and procedures regarding PPE established at your work place. Have supervisors or lead workers regularly monitor, supervise, reinforce, and enforce the correct use and care of PPE by employees. Provide follow- up training if necessary to ensure that each employee has the adequate skill, knowledge, and ability to use his/her personal protective equipment.

Review:

1. What is a current hazard on your farm that is controlled with a type of PPE? _____

_____

_____

_____

2. Could this hazard be controlled administratively? _____

_____

_____

_____

3. Could this hazard be controlled by using an engineering control? _____

_____

_____

_____

4. Name a place/task on your farm where each of the following types of PPE should be implemented:

Eye/Face Protection: _____

_____

Head Protection: _____

_____

Foot/Leg Protection: _____

_____

Hand/Arm Protection: _____

_____

Hearing Protection: _____

_____

Lung Protection: _____

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