#### ACETYLENE GAS SAFETY SEMINAR 2010 MALAYSIA



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### SAFE HANDLING AND TRANSPORTATION OF ACETYLENE CYLINDERS

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Knowing The Hazards - Cylinders should only be handled and transported by appropriately equipped and trained personnel.

- Acetylene is a colourless, highly flammable gas with a "garlic- like" odour. It burns in air with a very hot, bright smoky flame.
- Acetylene /oxygen torches burn at approximately 3500 C.
- When not dissolved in a solvent (free acetylene) can begin to dissociate or decompose at pressures above 103 kPa (15 psig). Considerable heat is generated when this occurs which can result in very violent explosions.
- Cylinders are typically fitted with fusible safety plugs designed to melt at 100 C, the boiling temperature of water.





### Acetylene

- It's highly flammable
- It can be very unstable
- We often mix it with oxygen to enhance its performance
- Yet.....
- It is one of the most commonly handled and transported cylinders gases
- It does not always get the respect

that it deserves





### Typical Welded Steel Acetylene Cylinder Design

- Low Pressure 250 PSIG @ 70° F
- Thin Walls, Welded And Easily Damaged
- Porous monolithic filler material
- Equipped with "fusible plugs" (100 C)
- Can be damaged if abused possibly resulting
  - in a cylinder detonation

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Needs to be weighed to confirm the contents



#### **Acetylene Cylinder**



# It Can Go Wrong Very Quickly

- Use the appropriate regulators, flashback arrestors, check valves and torches.
- Do not attempt to make repairs yourself. Contact the experts.
- Do not drop or damage the cylinder.
- No hot work, grinding and cutting etc. next to the cylinder.
- Never attempt to transfer gas from one cylinder to another.











- Inspect equipment for wear and leaks at all connections
- Replace damaged or suspect hoses
- Always wear protective clothing
- Use proper eye protection
- Never mix equipment brands as they may not be compatible
- Use the proper regulator for each specific gas







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- Keep acetylene cylinders away from external sources of heat. The cylinders are not designed for temperatures in excess of 52 C. The fusible plug melts at 100 C.
- Never transport cylinders inside cars or car trunks. The results can be devastating.
- Keep power and welding cables well away from cylinders.
- Do not attempt to repair valves or regulators. Leave it to the experts.







- Keep valves closed when cylinders are not in service or when the cylinders are empty.
- Cylinders should be externally and internally inspected by qualified individuals within specified frequencies.
- Never allow a lit torch near the cylinders or cylinder fuse plug. Boiling water should never be used on the cylinder as this is sufficiently hot to melt the fuse plug.
- Cylinders that are well secured in the vertical position will fail safe in most fire cases. Loose unsecured cylinders significantly increase the danger in a fire case.











- Cylinders should be shipped in the vertical position with the valve side up. (Note: When this is not possible the cylinders should be placed in the upright position for a minimum of 30 minutes before acetylene can be consumed to prevent the discharge of solvent).
- Cylinders should not be dropped when loading/unloading from trucks or docks. This can destroy the integrity of the cylinder and allow free acetylene to accumulate.



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- When in use, cylinders should be fitted with the appropriate and well maintained regulators, flashback arrestors, non-return valves and torch set.
- When cylinders are being moved or transported the ancillary equipment should be removed and the valve protection cap installed.
- Cylinders being moved in a cart or transported by truck they need to be well secured to prevent toppling and possible damage.





#### A safe oxyacetylene cylinder and accessories setup



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- Never leave a lit torch unattended.
- Keep the cylinders out of the dampness and wet ground to prevent corrosion of the cylinder wall.
- Never use cylinders as a roller or for any other purpose they were not designed for.
- Always leave the valve key with the cylinder so that the gas can be shut-off quickly in an emergency.
- Never apply a torch to the cylinder in an effort to raise the pressure.







#### **Work Areas**

- Always ensure that the work area is clear of combustible materials
- The area should be well ventilated
- Fire extinguishers should be readily available
- Keep cylinders a safe distance from all hot work





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- Do not supply acetylene by a system of shop piping without first consulting with an expert.
- The practice of "nipping" or "kinking" hoses in order to stop the gas supply while changing torches is unacceptable.
- Never attempt to transfer acetylene from one cylinder to another.
- Store full and empty cylinders in a separate place than the cylinders being consumed.







- Always inspect regulators, hoses and torches for leaks. Leaks in confined spaces can cause acetylene to collect in concentrations above the lower flammability limit of 2.5%. Very little energy is requires for ignition.
- Do not use acetylene above 103.4 kPa (15 psig), the pressure where decomposition can begin to avoid possible detonation.
- Remove leaking cylinders to an open area and never attempt to repair a fuse plug leak. Notify your supplier immediately.





### **Cylinder Storage Precautions**



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- Never store cylinders in confined poorly ventilated areas- outdoor storage is typically the best.
- Store cylinders away from heat and ignition sources, flammable or corrosivie materials
- Separate flammanble gas cylinders from oxygen and other oxidizing gases during storage.
- Store cylinders in a dry area to prevent corrosion of the steel cylinder walls.
- Keep cylinders vertical and secured.



### Transporting

- Adequate precautions should be taken to prevent valve damage while cylinders are being handled
- When cylinders are hoisted, they shall be secured on a cradle, or pallet. No magnets or choker slings!
- Cylinders should be moved on carts. They shall not be dropped, struck, or permitted to strike each other violently.
- Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually
  being hoisted or carried.









### **Safe Transportation**



#### ALWAYS:

- Close cylinder valve when not in use
- Close cylinder valve before venting regulators and hoses
- Detach regulator, hoses and torch from cylinder before transport

#### **DO NOT:**

- Transport in enclosed vehicle, including those with tarpaulin covers
- Transport with other highly combustible materials such as wood chips
- Drop them off vehicle avoid any violent impact on cylinder







#### **Cylinder Transportation**



#### **An Explosion !**

Acetylene ignited in this incident due to static caused by the opening of a door while an leaking acetylene cylinder was kept inside with no ventilation.





#### **Transport Regulations**





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- Ensure that you placard your vehicles to the standards required for Dangerous Goods transportation.
- Drivers must be familiar with the hazards of the product they transport.
- The vehicle must be registered for the transportation of Dangerous Goods.
- Do not overload the vehicle.
- Secure the cylinders in the vertical position and continually check that the load is secure.



# Transportation of pallets – dedicated system

# Dedicated pallets and trucks with locking forks













#### **Pallets on flatbed lorry**

Providing adequate load restraint

Every load must be restrained to prevent unacceptable movement during all expected conditions of operation.

 The load restraint system must be capable of withstanding the forces that will be applied as shown in the attached drawing



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### Thank you for your attention and please.... give acetylene the respect that it deserves.







