BVMS FIRE CONSULTANTS
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CIPLA MEDPRO MANUFACTURING
1474 SOUTH COAST ROAD, MOBENI

FIRE RISK ASSESSMENT REPORT
FLAMMABLE LIQUID HANDLING

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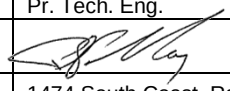
Signature				
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FIRE RISK ASSESSMENT REPORT

1. Introduction

BVMS Fire Consultants (Pty) Ltd have been appointed by Cipla Medpro Manufacturing to compile a Fire Risk Assessment Report for the handling and storage of flammable liquids for the proposed new process.

This report will address all the risks associated with the storage and handling of flammable liquids on the site. Appropriate mitigation measures will be provided to reduce or eliminate the risk.

The new process will include the use of Isopropyl Alcohol which is a flammable liquid. The other products used in the process will consist of toxic chemicals i.e. Methylene Chloride, Chlorine Dioxide, Sodium hypochlorite and Nitric acid.

This report will assess the fire risk during the following steps in the process:

- Receipt of product on the site from supplier;
- Storage;
- Transporting product from storage to holding areas;
- Sampling areas;
- Dispensing areas;
- Granulation suites;
- Coating
- Packaging

2. Compliance with Legislation

The following legislation is applicable to the storage and handling of flammable liquids. The process equipment that is used must also comply with legislation:

- Electrical equipment for zone 1 classification – SANS 10108.
- The storage of flammable liquids and gases in accordance with the EThekwini Municipality Flammable Liquid and Fire Prevention Bylaws.
- Occupational Health and Safety Act

3. Associated Risks

a) Delivery and Offloading

The entry of delivery vehicles to the site poses a risk to personnel and property as drivers are generally not familiar with company SOP and other protocol. The delivery route and size of vehicle allowed into the

site is crucial. These will be discussed in detail in the control measures.

b) Storage

Isopropyl alcohol and Methylene chloride must be stored separately as IPA is a flammable liquid and Methylene chloride is a health risk. The flammable liquid products are stored in 25L plastic drums in the flammable store. The chemicals products are stored in 25L plastic drums in the chemical store which is adjacent to the flammable liquid store. The chemicals are stored separately in their individual bunds. The store is provided with the correct mechanical and electrical equipment in accordance with SANS 10108. Any spillage or leakage of product in the store will be contained with no possibility of contamination of other products. All the equipment required to remove flammable vapours and prevent ignition in the flammable store have been provided.

However temporary storage in transit areas can lead to leaked product contaminating hygienically stable areas. Leakage can cause respiratory problems and can also result in a fire or explosion. All reasonable measures will be implemented to prevent leakage and any other incident

c) Handling, Sampling and Testing

The sampling room is adjacent to the flammable store. An opening is provided between the store and the sampling room to ensure a smooth operation during the sampling and testing. Drums transported from the flammable store into the sampling room can result in accidental spillage due to unsecured loads and space constraints. Drums leaking product during transportation can result in environmental accidents or fires. The possibility of leakage or accidental spillage during the testing or sampling of the product is also a possibility. Grounding and bonding equipment is available in the sampling room to discharge static currents.

d) Granulation Suites

The greatest risk posed by the product is during the manufacturing process. The transfer of product is conducted in an open loop where the product introduced into the mixing vessel. The following is a list of potential hazards present in the area.

- The presence of static electrical charges due to flow of product.
- The presence of flammable vapours due to the open decanting process.
- Electrical apparatus and equipment not approved for the flammable atmosphere.
- No anti-static footwear and floors.
- Bonding and static discharge incomplete or broken.
- No vapour detection system.
- Sieve used for powder refining generating static inside the suite.

- No antistatic bracelet for staff operating the sieve – static electrical charge flowing into staff clothing and body.
- Manual type fire dampers in ventilation system.
- Full and empty drums stored for a longer period than necessary.
- No fire extinguishers in the suite.
- Potential for dust explosion due to powders being used in the process.

e) Coating Room

A large part of the coating process is done in the closed loop which reduces the risk posed during the process. There is the possibility of a small amount of vapour being released into the room due to the container not being totally sealed. The following is a list of potential hazards present in the area.

- The presence of static electrical charges due to flow of product.
- Electrical apparatus and equipment not approved for the flammable atmosphere.
- No anti-static footwear and floors.
- Bonding and static discharge incomplete or broken.
- No vapour detection system.
- Manual type fire dampers in ventilation system.
- Full and empty drums must be stored for a minimum period of time.
- No fire extinguishers in the suite.

f) Packaging

Although the risk is greatly reduced due to the mixture solidifying, precautions will be taken to ensure all risks are eliminated.

4. Controlling Risks

a) Delivery and Offloading

The following procedures must be implemented during this process:

- The delivery vehicle size must be restricted to a 3 ton diesel. This will enable the vehicle to manoeuvre easily during the off-loading process.
- The vehicle must not be allowed on site if the flammable liquid transport permit is not produced. This requirement must be included in the checklist before entry is granted.
- The general condition of the vehicle must be checked to reduce the possibility of accidents on the site.
- All dangerous goods received must be marked and packed in accordance with SANS 10232 Part 1. Drums without labels must not be allowed on site.
- A route must be designated for delivery vehicles. If possible deliveries must be scheduled when there is minimum activity

on the site i.e. after hours or during working hours when there is a minimum number of staff along the route or near the off-loading area.

- The delivery vehicle must reverse into position with the front of the vehicle facing away from the off-loading area. This will ensure that the vehicle can exit immediately during an emergency.
- The off-loading area must be demarcated and no other vehicles must park in the area when deliveries are expected.
- All other vehicles and any other source of ignition must be removed from the area during off-loading.
- A 9kg Dry Chemical powder fire extinguisher must be provided on standby near the off-loading area.
- A spill kit must also be available nearby.
- 'No smoking signs' must be provided at the off-loading area.
- Staff off-loading the vehicle must use safety shoes, long sleeve coats, eye protection and chemical gloves.
- All other activities at the store must cease during off-loading.

b) Storage and Transporting

Flammable liquids and chemicals must be stored separately in their respective store rooms. Chemicals must be stored in their respective bunds. Different types of chemicals must not be stored in the same bund. The following procedures must be implemented in the storage facilities:

- The doors to the storage facilities must be locked when not in use.
- Samples must be moved from the flammable store into the sampling room through the opening provided.
- The flammable liquid store and the sampling room doors must be closed when decanting or sampling is being undertaken.
- No unauthorised persons must be allowed into the store.
- Staff must work in pairs when sampling to ensure that assistance is provided during emergencies.
- Full PPE including respirators must be used when decanting IPA and chemicals.
- Portable electrical equipment that is not certified for use in intrinsically safe zone 1 environments must not be allowed into the stores. Examples are scales, radios or clocks.
- Containers must be stored one high with an aisle in between.
- Containers must be stored directly on the floor. The use of wooden or plastic pallets is not allowed due to the increase in the fire loading inside the store. Pallets will conceal any leakages in the store.
- Earth clamps must be used to discharge build-up of static charges during the transfer of flammable liquids.

- Lighters, matches and cell phones are not allowed into the store.
- Escape doors must be kept free of obstacles, on the inside and the outside of the store, at all times.
- A copy of the Material Safety Data Sheet (MSDS) must be available inside the store.
- A minimum quantity of containers must be transported from the store to the holding area.
- In order to prevent accidental leaks or spillages, 25 litre drums must be transported in a stainless steel tray with compartments to hold either 4 or 6 drums depending on requirement.
- All staff must be trained in the use of firefighting equipment.

c) Handling, Sampling and Testing

In order to do sampling and testing, the product has to be transferred from the 25 litre drums to smaller containers. This process increases the risk as flammable vapours are readily emitted during the transfer. Staff must be especially vigilant and careful during this process. The following precautions must be undertaken:

- Staff tasked with this function must be thoroughly versed with the properties of the product being handled.
- Staff must also be trained in the emergency response plan for spillages and accidents.
- Training in the use of fire extinguishers must be provided for all staff.
- Containers with flammable liquids must be sealed at all times.
- The minimum quantity of product required for testing must be taken at any one time.
- Containers used for samples and testing must be kept closed until required.
- Any minor spillage occurring during decanting must be cleaned up immediately. All operations must cease until the spillage is removed.
- Full PPE including respirators must be used during sampling and testing.
- All samples for discarding must be stored in a steel containment tray which must be locked in a steel cupboard. The cupboard must be located in a steel cage outside the building.
- Empty drums must be capped immediately after use. When drums are manually handled, care must be taken not to agitate the contents due to the possibility of static electrical charge being generated.

d) Granulation Suites

The following safety procedures must be adopted during the transfer of product from the container to the mixing vessel.

- All equipment connected to the granulation vessel must be bonded with an earth clamp. Any loose contact on the earth wiring must be repaired immediately.
- All other activity in the suite must be stopped until the decanting process is completed.
- The minimum number of person's required to be present for the process must be present during the decanting process.
- The decanting process must be completed in the shortest period as is reasonably practical.
- All earth connections must remain until the entire granulation process is completed.
- The powder sieve process must not be done while the decanting process is undertaken.
- No cellular phones or other portable electronic devices must be allowed in the suite.
- Empty containers must be capped immediately and drums must be removed from the room as soon as possible.
- Anti-static bracelets must be worn by staff during the decanting process and during the powder sieve process.
- The possibility of providing portable vapour detection system must be investigated.
- An emergency plan must be drawn up and all staff must be familiar with the plan.
- A portable CO2 or other clean agent fire extinguisher must be within easy reach.
- Some type of manual alarm must be provided in the suite.
- The powder sieve process must be isolated due to the potential for a dust explosion.
- All staff decanting product must wear a government approved respirator.

e) Coating Room

The following is a list of safety measures for the coating room.

- Bonding and earth cables to be checked and tested for continuity.
- The possibility of providing a portable vapour detection system must be investigated.
- Provide a portable CO2 fire extinguisher in the suite.
- Portable electronic and electrical equipment must not be used during the spraying process.

f) Packaging

There are no special requirements for packaging area as the product is already in the solid state and no vapour will be generated. However staff must be provided with basic firefighting training.

5. Reviewing Control Measures

All control measures that have been implemented must be reviewed so that any change in risk can be identified and appropriate steps can be taken to reduce or eliminate the risk. The emergency plan will enable staff to take the correct action necessary in an emergency. The introduction of new equipment into the process must be thoroughly vetted to ensure compliance with requirements.

6. Conclusion

The handling and transporting of Isopropyl Alcohol poses the greatest risk. The risk of an incident in the store is minimal but this risk is increased when loading or off-loading occurs. As the flammable store has a large quantity of flammable liquids, the safety precautions contained in this report must be strictly implemented.