Introduction to the Explosion Prevention World

SALLAB
EXPLOSION PREVENTION

Presented by: Gerhard Pillay

Contents

- The need for Explosion Prevention
- Legal Requirements and Standards(Codes)
- Understanding Area classification
- Inspections in Hazardous Locations
- Correct use of PPE & Devices
- Questions ?

SALLAB
EXPLOSION PREVENTION

The need for Explosion Prevention

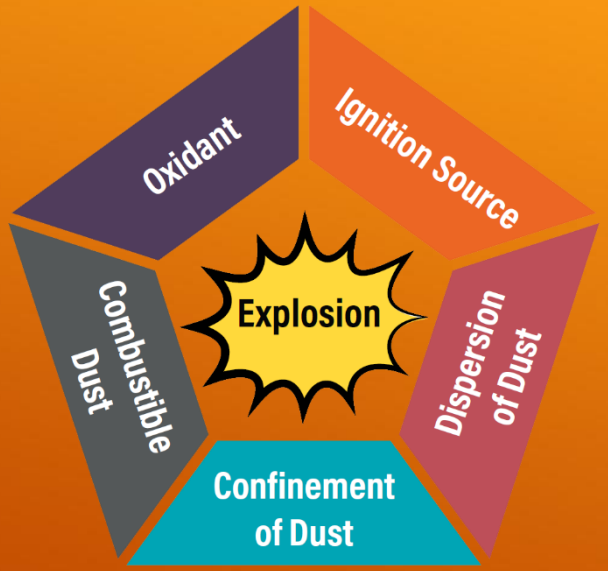
- Industries
  - Mining
  - Chemical and petrochemical
  - Food and beverage
  - Pharmaceutics
  - Paints and inks

In these industries, precautions have to be taken to prevent fires and explosions, as the results of such fires and explosions can be disastrous. (Various references in South Africa)

SALLAB
EXPLOSION PREVENTION

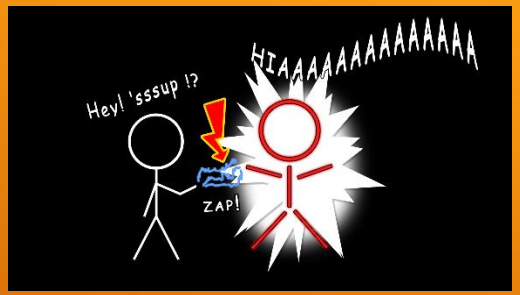
Prevention

- Prevention of a fire or explosion



Typical Ignition Sources

Sparks



Static

Flames

Lightning

SALLAB
EXPLOSION PREVENTION

Legal Requirements

- Occupation Health and Safety Act (Act 85 of 1993)
  - Employers duty
    - **Section 8**
  - Electrical Machinery Regulations (2011)
    - **Section 9**

SALLAB
EXPLOSION PREVENTION

Employers Duty

Section 8

- 8 (1) Each employer shall provide and maintain a workplace that is safe and without risk to the health of their employees.

- 8 (2) Each employer shall comply with the provisions of the Act.

SALLAB
EXPLOSION PREVENTION

Electrical Machinery in Hazardous Locations

- 9 (1) **Every employer or user shall identify all hazardous locations and classify them** in accordance with the relevant health and safety standard incorporated into these Regulations under section 44 of the Act.
- 9 (2) **No person may use electrical machinery in locations where there is danger of fire or explosion owing to the presence, occurrence or development of explosive or flammable articles, or where explosive articles are manufactured, handled or stored**, unless such electrical machinery, with regard to its construction relating to the classification of the hazardous locations in which it is to be used, meets the requirements of the safety standard incorporated for this purpose in these Regulations under section 44 of the Act.

SALLAB
EXPLOSION PREVENTION

Electrical Machinery in Hazardous Locations

- 9 (3) **Every employer or user referred to in subregulation (1) shall be in possession of a certificate in a form acceptable to the chief inspector**, which has been issued by an approved inspection authority and in which it is certified that the electrical machinery referred to in sub regulation (2) has been manufactured and tested for the groups of dangerous articles in accordance with the relevant health and safety standard incorporated into these Regulations under section 44 of the Act: Provided that in lieu of such certificate an inspector may approve permanent labelling on such machinery, which label shall contain all the relevant information.

- Inspection Authority (IA) Certificate issued by an Accredited Test Laboratory (ATL)
- Only ATL's can issue IA certificates for explosion protected apparartus (EPA)

SALLAB
EXPLOSION PREVENTION

Electrical Machinery in Hazardous Locations

- 9 (8) **The employer or user shall cause all electrical machinery in a hazardous location to be visually inspected and tested at intervals not exceeding two years**, or any other interval approved by the chief inspector after a risk assessment has been conducted by a person who is competent to express an opinion on the safety thereof: Provided that installed intrinsically safe equipment may in lieu of a test be verified in terms of the approved design.
- 9 (9) **The person carrying out the examination referred to in sub regulation (8) shall enter, sign and date the results of each examination in a record book which shall be kept by the employer or user for this purpose.**

SALLAB
EXPLOSION PREVENTION

Standards(Codes)

- SABS or SANS?
  - South African National Standards (SANS) which is a division of South African Bureau of Standards (SABS)
- **SANS 10108** - The classification of hazardous locations and the selection of equipment for use in such locations.
  - **SANS 60079-10-1** - Explosive atmospheres Part 10-1: Classification of areas - Explosive gas atmospheres.
  - **SANS 60079-10-2** - Explosive atmospheres Part 10-2: Classification of areas - Combustible dust atmospheres.
  - and many more

SALLAB
EXPLOSION PREVENTION

Understanding Area Classification

- Determine the locations where explosive atmospheres may occur:
  - Evaluate process
  - Materials handled
  - Ventilation
- Work in line with Standards and with a team
- Various Zones 0,1,2,20,21,22?

SALLAB
EXPLOSION PREVENTION

Zones for gases and vapours

- **Zone 0** - Zone 0 locations are those in which an explosive gas, vapour or mist atmosphere is present continuously or for long periods.
- **Zone 1** - Zone 1 locations are those in which an explosive gas, vapour or mist atmosphere is likely to occur in normal operation.
- **Zone 2** - Zone 2 locations are those in which an explosive gas, vapour or mist atmosphere is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only.

SALLAB
EXPLOSION PREVENTION

Zones for Dusts

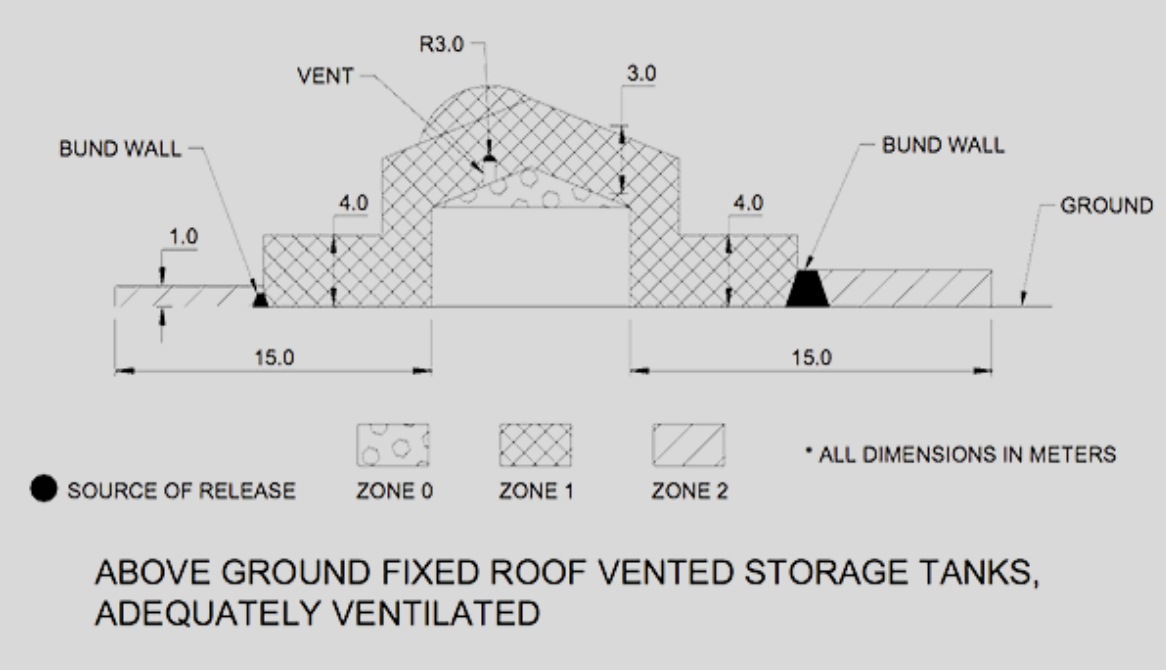
- **Zone 20** - Zone 20 locations are those in which combustible dust, as a cloud, is present continuously or frequently, during normal operation, in sufficient quantity to be capable of producing an explosive concentration of combustible dust mixed with air, and/or where layers of dust of uncontrollable and excessive thickness can be formed.

- **Zone 21** - Zone 21 locations are those not classified as Zone 20 in which combustible dust, as a cloud, is likely to occur during normal operation, in sufficient quantity to be capable of producing an explosive concentration of combustible dust mixed with air.

- **Zone 22** - Zone 22 locations are those not classified as Zone 21 in which combustible dust clouds may occur infrequently, and persist for only a short period, or in which accumulations or layers of combustible dust may be present under abnormal conditions and give rise to combustible mixtures of dust in air. Where, following an abnormal condition, the removal of dust accumulations or layers cannot be assured the area is to be classified as Zone 21.

SALLAB
EXPLOSION PREVENTION

Drawings



ABOVE GROUND FIXED ROOF VENTED STORAGE TANKS, ADEQUATELY VENTILATED

Demarcation

- Distinctive features
  - Triangular shape
  - Black letters on a yellow background with black edging (the yellow part to take up at least 50 % of the area of the sign).

SALLAB
EXPLOSION PREVENTION

Inspections in Hazardous Locations

- SANS 60079-17 - Explosive atmospheres Part 17: Electrical installations inspection and maintenance
- Three types of inspections
    - Visual Inspection
    - Close up
    - Detailed Inspection
- Equipment Checks
    - Equipment is appropriate for the area
    - Equipment meets the legal requirements
    - Checklists available in SANS 60079-17

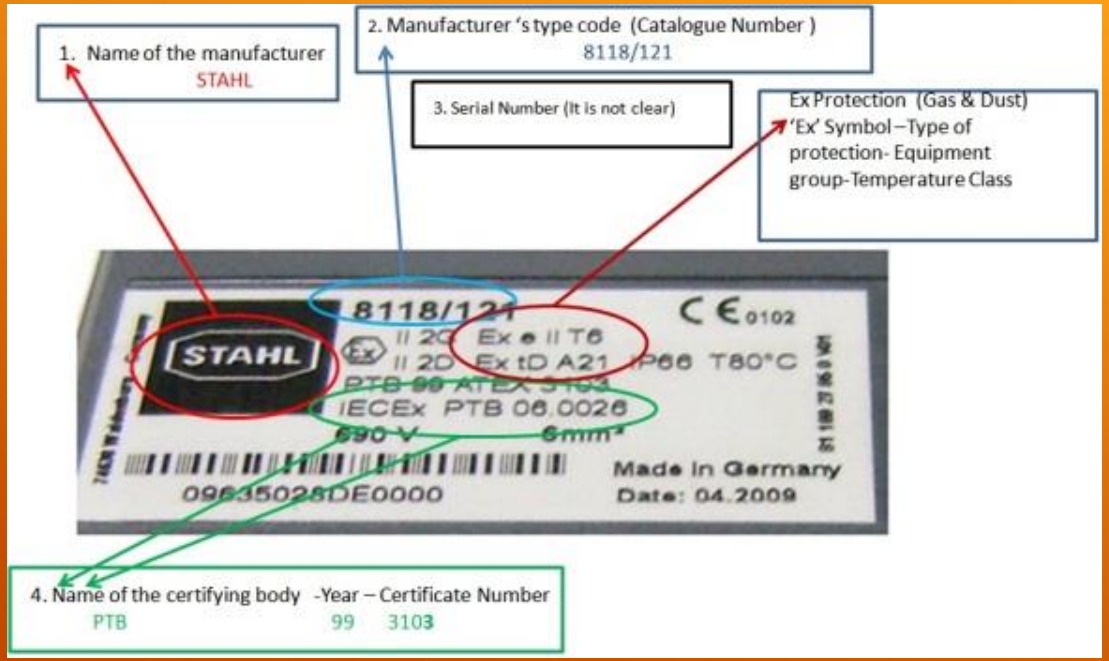
SALLAB
EXPLOSION PREVENTION

Inspections in Hazardous Locations

- Various types of Ex rated equipment
  - Gases, vapours and mists
    - Flameproof enclosures, Ex d SANS 60079-1
    - Increased safety, Ex e SANS 60079-7
    - Intrinsic safety, Ex i SANS 60079-11
    - Pressurized enclosures, Ex p SANS 60079-13
    - Encapsulation, Ex m SANS 60079-18
    - Powder filling, Ex q SANS 60079-5
    - Oil filling, Ex o SANS 60079-6
    - Type “n” including Ex nA, Ex nL, Ex nR, Ex nC SANS 60079-15
    - Special protection, Ex s SANS 60079-33
  - Dusts
    - protection by enclosure Ex tD (previously dust-ignition-proofing and dust-ignition-protection) SANS 60079-31
    - with additional features, also Ex pD, Ex mD, Ex iD

SALLAB EXPLOSION PREVENTION

Inspecting Labels



SALLAB
EXPLOSION PREVENTION

Correct PPE & Tools

SALLAB
EXPLOSION PREVENTION

Correct PPE & Devices

- Are smart devices allowed in Hazardous Areas?

- Ex Rated Devices:

SALLAB
EXPLOSION PREVENTION

SALLAB
EXPLOSION PREVENTION

Questions

Thank you

SALLAB
EXPLOSION PREVENTION

Gerhard Pillay
068 097 9889
gerhard@sallab.co.za
www.sallab.co.za