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KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia	PROCESS DESIGN OF EMERGENCY MEASURES (PROJECT STANDARDS AND SPECIFICATIONS)	

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SCOPE

This Project Standards and Specifications is intended to cover minimum requirements and guidelines for process engineers to specify proper type of emergency measures for probable emergency situations.

REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

1. **NFPA (National Fire Protection Association)**

NFPA 30 "Flammable and Combustible Liquid code" 1996 Ed

2. **API(American Petroleum Institute)**

API RP 521 "Guide for Pressure-Relieving and Depressuring Systems" 4 th Ed. March 1997

3. **ASTM(American Society for Testing and Materials)**

ASTM D 323 "Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)".

4. **ISA(The International Society Of Automation)**

ISA 91.00.01 "Identification of Emergency Shutdown Systems and Controls That are Critical to Maintaining Safety in Process Industries".

DEFINITIONS AND TERMINOLOGY

Unit or Units - One or all process, offsite and/or utility Units and facilities as applicable to form a complete operable refinery/ and or plant.

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SYMBOLS AND ABBREVIATIONS

<u>SYMBOL/ABBREVIATION</u>	<u>DESCRIPTION</u>
APH	Air Preheater
CCR	Central Control Room
DN	Diameter Nominal, in (mm)
FDF	Forced Draft Fan
FO	Failure Open
FSLL	Flow Switch Low Low
HH	High High
HS	Hand Switch
IDF	Induced Draft Fan
LC	Locked Closed
LL	Low Low
LO	Locked Open
PB	Push Button
PDSLL	Pressure Differential Switch Low Low
P&IDs	Piping and Instrument Diagrams
PV	Pressure Valve
S/D	Shut Down
TSHH	Temperature Switch High High
TSO	Tight Shut Off

UNITS

This Standard is based on International System of Units (SI) except where otherwise specified.

DESIGN CRITERIA

Isolation

The following paragraphs describe the installation standards and design practice for valves used for equipment isolation in emergency cases, including vessels, furnaces and compressors. Installation points of the isolation valves shall be clearly indicated on P&ID, highlighting the distance from the equipment to be protected.

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1. Vessels

- a. If the liquid volume in the vessel exceeds 10 m³ (calculated at normal liquid level with the addition of a tray and reboiler inventory in case of towers, and neglecting line inventory) and one or more of the following conditions exist, emergency isolation valves shall be provided on vessel outlet line below normal operating liquid level.
 - i) Flammable liquid shall conform to NFPA No. 30 as follows:

Any liquid that has a closed-cup flash point below 38° C and a Reid vapor pressure not exceeding 275.8 KPa(abs) at 37.8° C, as determined by ASTM D 323, Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method), are classified as class I. Class I liquids are further classified as follows:

 - Class IA liquids – those liquids that have flash points below 23° C and boiling points below 38° C.
 - Class IB liquids – those liquids that have flash points below 23° C and boiling points at or above 38° C
 - Class IC liquids – those liquids that have flash points at or above 23° C but below 38° C.
 - ii) Liquids that are heated above their flash point.
 - iii) Temperature is 260°C or higher.
 - iv) Pressure is 1960 kPa(ga) or greater.
- b. The valve shall be located no farther than 9 meters measured horizontally from the side of the vessel. The total pipe length from the nozzle to the valve shall not exceed 15 meters.
- c. Valves shall be operable from grade or platform as follows:
 - i) Access to a manually operated valve shall be considered acceptable if the valve can be operated from a platform no more than 6 meters above grade and access to the platform is by stairway. Access to the platform by ladder is not permitted
 - ii) Valves having sizes DN 200 (8 inches) and smaller may be manually operated and may be fitted with extension spindles, angle drives and so forth, to fulfill the criteria of operability from grade.
 - iii) Valves having sizes DN 250 (10 inches) and larger shall be electrically or pneumatically operated and controls shall be located in a place at grade safe from the danger of fire.

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- d. If liquid on a side-draw flows into the bottom of a second vessel, such as a stripper and the total liquid in the draw-off pan plus that in the bottom of the second vessel exceeds 10 m³ and one or more of the four conditions noted in item 6.1.1.1 above exist, then an emergency isolation valve shall be installed on the bottom outlet line of the second vessel.
- e. Where a vessel outlet, within the scope of item 6.1.1.1 above is divided in a manifold system of branches (each with a valve), an emergency isolation block valve is not required if no more than two valves, meeting the requirements of item 6.1.1.3 above, are normally open, an emergency isolation block valve is required upstream of the manifold, if three or more valves are normally open.

2. Furnaces

- a. Fuel lines to process furnaces and steam boilers shall be provided with remotely operated emergency valves. These solenoid operated bubble tight shut off (TSO) valves shall be installed in each main furnace fuel line adjacent to the control valve. Operation shall be remote manual or automatic on closing and manual only opening. Loss of fuel or atomizing steam pressure shall also automatically close these valves.
- b. In addition to the above, a manually operated block valve shall be provided in each fuel line. This includes the pilot gas supply line if it is a separate line. These valves shall be located at least 15 meters horizontally from the furnace or boiler being protected. In some instance, a plant battery limit valve may be used to meet the above requirement.
- c. Atomizing steam lines to furnaces shall not be cut off automatically but shall be stopped by closing the pressure control valve on this line.
- d. Emergency valve on the snuffing steam line shall be located at least 15 meters horizontally from the furnace and operable from grade.
- e. Burner isolation valves from the main fuels and steam shall not be located under the heater and shall be arranged to be within arms length of the peep-holes enabling burner flames to be seen.
- f. The regulated pilot gas, where possible should be from an independent sweet gas supply or from a separate off-take on the fuel gas main (upstream of main fuel gas control valve) with its own spaded block valve. If continuous pilots are specified, additionally a solenoid operated shut-off valve shall be installed in the pilot gas line operated by emergency shut-down switch only. Low pressure alarm on pilot gas line shall also be fitted.