

Appendix 4.3

Interlock System

4.3 Description of Interlocks

4.3.1. Description of Interlock System

The interlock system is described below.

Interlocking is an automatic action on one or more components of the process or on the whole plant (automatic shutdown).

There are four levels of interlocking

- Level 3
- Level 2A
- Level 2B, and
- Level 1.

4.3.1.1 Level 3 interlocks

Level-3 will be used for interlocks required by legislation. Each interlock will be preceded by a low-level alarm generated by a separate transmitter and reported by means of the central control system in the control room. The status of all consequences of a level-3 interlock will be monitored on the central control system. Each level-3 interlock will also be programmed as a level-1 and a level-2A interlock.

4.3.1.2 Level 2A interlocks

A level-2A interlock will be used where a level-3 interlock is used to act as a double protection, and to protect against human error, environmental damage and damage of equipment.

4.3.1.3 Level 2B interlocks

A level-2B interlock will be used when an interlock is also required in manual mode and when a level-2A interlock is unnecessary.

4.3.1.4 Level-1 interlocks

A level-1 interlock will be used for the following circumstances:

- in cases where level-3 interlock is used (triple protection),
- cases where level-2A interlock is used (double protection),
- cases where level-2B interlock is used (double protection) and
- for protection of all non-static equipment against damage.

A level-1 interlock will act on a function group rather than a specific piece of equipment. It will be a software interlock programmed in the central control system.

An interlock which results from an abnormal operating condition will be preceded by a low-level alarm reported by means of the central automation system in the control room.

When more than one interlock-level is used for a piece of equipment or function group, the level-1 interlock will be activated before the level-2A and level-2B and the level-2A and level-2B will be activated before the level-3 interlock. Therefore, under normal operating conditions the level-2A, level-2B and level-3 interlocks will provide a backup to the level-1 interlock.

The interlock system is explained further below by way of example.

Example – Elevated levels of dust due to malfunctioning of the bag house filter

Dust emissions will be monitored from the interface computer system in the control room. The dust removal process will be surveyed using a number of instruments which return measurement values to the computer system in the control room. A number of instruments will indicate a malfunctioning of process parameters before the dust emission increases and activate a low-level alarm. This would be the first level of protection from elevated emission limits. Malfunctioning process parameters could include very low pH in wet scrubber, no lime supply in the evaporating spray reactor, and low oxygen level in the furnace.

A second level of protection would be an alarm and activation of the interlocking system due to higher than normal emission values. For example if 75% of the emission limit for dust is reached a low-level alarm (acoustic signal) will be given. This will allow for intervention to detect and remedy the cause of the raised emission value. At the emission limit (for example if the cause cannot be detected and the emission remediated) another acoustic alarm will be given and the automatic interlock system will become active. Activation of this system will terminate waste feeding in order to reduce the emission to a value below the emission limit. Under such circumstances the temperature of the plant will automatically be maintained at 850°C or 1100°C as appropriate by the support burners. Such an interlock system will be of the level 2A type as it must protect against environmental damage.