CATALYST VESSEL

TEMPERATURE AND LEVEL MEASUREMENT

APPLICATION

A client processing ammonia, nitric acid and ammonium nitrate during the production of fertiliser needed to implement an improved method of monitoring the contents of a catalyst vessel during a planned plant upgrade. The requirement demanded that both the catalyst temperature and level within the vessel should be provided by the system offered.

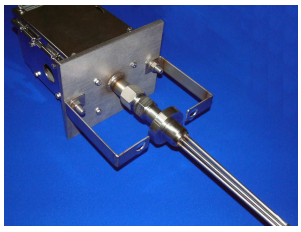
PROBLEM

The only access to the vessel was via an existing flange mounted dip pipe on top of the vessel, with the dip pipe having an internal diameter of 38.1mm and a length of 6 metres. The location of the vessel was in a hazardous area classification Zone 1. Due to the relatively small access available, there were limitations on the methods that might be available to meet the clients full requirements.

SOLUTION

It was decided that the exothermic reaction of the catalyst could be used to both measure the product temperature and to indicate its current level. In order to achieve this, small diameter thermocouples would provide the response time required, but they would have to be robust enough to allow their hot junctions to be forced against the internal wall of the dip pipe.



A total of six 3.0mm diameter type ‘K’ thermocouples were held within 6.0mm diameter support tubes with each tube and thermocouple terminating at predetermined lengths. The support tubes were angled at their exit to enable the thermocouples to be pushed out the tube exit and against the inner wall of the dip pipe, prior to being held firmly by a sealing gland beneath the terminations enclosure.

BENEFIT

Installation and positioning of the thermocouple ‘cluster’ assembly was made simple by the use of a site crane and a central 6.0mm diameter central rod in the assembly acting as a locating point for the bottom of the dip pipe. Following commissioning and plant start up, the client was able to gain continuous credible data which had not previously been available to him. A further vessel is now being considered for retrofitting in a similar manner.

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