

# SpiraLoad™ Technology

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Topsøe SpiraLoad™ Technology is a new, unique method for loading catalyst into steam reformers in ammonia, hydrogen and methanol plants. The method has been developed not only to meet the need for a uniform and fast loading of conventional reformer tubes, but also to solve the inherent problem of loading catalyst into the often confined space of reactors with heat exchange.

The SpiraLoad™ Technology ensures a high catalyst density, thus minimising the void and the risk of bridging of the catalyst. The loading technique can be applied to all common catalyst types and sizes and gives optimal loading densities with all tube diameters, including the most narrow tubes.

The method is highly automated, which reduces the possibility of human errors and the risk of reloading of reformer tubes. The labour-intensive steps such as socking of the catalyst or vibration of the reformer tubes by hammering are also avoided.

The SpiraLoad™ Technology is competitive with other modern loading techniques, also with respect to the rate of loading. Since only two operators are required to control one loading equipment, the required manpower is reduced as well.

With the SpiraLoad™ Technology a uniform pressure drop and thus a uniform flow across the reformer tubes is obtained. The result is a more uniform tube skin temperature and an extended tube life.



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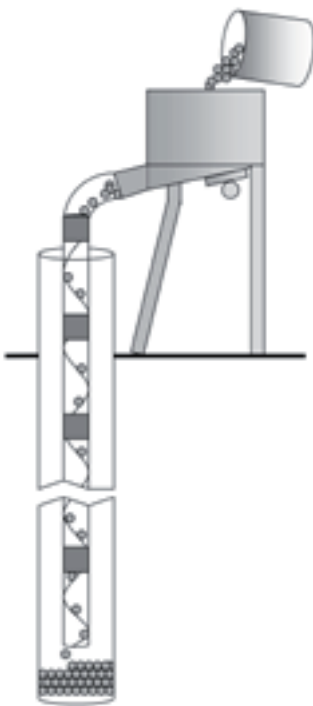
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## Method description

The SpiraLoad™ loading equipment consists of a number of equally sized tube sections with spiral shaped guide elements placed along the inner walls. The tube sections can be assembled and inserted in the reformer tubes to form one long loading tube.

When the catalyst is poured into the loading tube the velocity of the catalyst particles will be reduced, as the catalyst will travel downwards in a circular movement guided by the spiral. At the

bottom of the loading tube the catalyst particles will all have the same velocity and fall a short, well-defined distance. The result is a uniform and dense loading with no broken catalyst particles. In order to control the amount of catalyst entering the loading tubes, a special motorised funnel system has been developed. The automatic system ensures a consistent and high loading rate.



Spiral inside loading tube



Two SpiraLoad™ units in operation

## Commercial experience

As it can be seen from the table below the SpiraLoad™ Technology has been successfully in a wide range of reformer designs, reformer tube IDs and catalyst sizes:

Reformer types	Kellogg, Foster-Wheeler, Topsøe, Howe-Baker & Selas
Number of reformers loaded	101
Total number of tubes loaded	22,099
Range of reformer tube ID, mm	From 72 mm up to 132 mm
Catalyst sizes loaded (ODxH)	16 x 8 mm, 12 x 12 mm, 16 x 11 mm, 20 x 13 mm & 20 x 18 mm
Unloading frequency	Less than 1 per thousand tubes has been unloaded due to a too high pressure drop across the catalyst
Effective loading time per tube	Between 15 and 45 minutes per tube