## LISEGA Pipe Supports for the REFORMER Industry

For over 50 years, LISEGA has been furnishing high quality engineered pipe hangers, supports, hydraulic shock suppressors and restraints, as well as all associated engineering and field support services to the Petro-Chemical, Pulp & Paper, Power as well as Process industries worldwide. Starting as a one-manshow in 1964 in Hamburg (Germany), LISEGA has enjoyed steady growth and currently has around 1,200 employees worldwide. LISEGA is presently the world's largest and leading manufacturer of engineered pipe support products with an annual turnover of ca. 200 Million USD for pipe supports only. LISEGA owns large manufacturing facilities in Germany, France, India, China, UK and the United States. Additionally there are wholly owned sales offices in Russia, Malaysia, South Africa and in the United Arabic Emirates.

The key to LISEGA's success has always been the standardization of pipe supports by means of a unique and fully symmetrical constant (and not lever arm) hanger system, allowing for minimum load deviations and minimum physical stress in the tubes. This is particularly true for the support of catalyst tubes in which high temperatures induce high stresses to the tubes if they are not supported adequately.



Minimizing stress loading of the catalyst tubes is essential in all different kinds of reformers. Steam Methane Reformers as well as Hydrogen Reformers all require high performing constant hangers with minimal deviation of the supported load throughout the whole travel of the relevant catalyst tubes.

Temperatures inside the furnace of a typical steam reformer range between 840 °C to 900 °C driving a thermal growth of the catalyst tubes of around 200 mm. In order to allow this type of growth and eliminate any bowing of the catalyst tubes, the constant hangers have to be operating with minimal load deviations.

The majority of the key players in the reformer market, value and use the LISEGA constant hanger to support the catalyst tubes, which in turn allows them to extend the life time cycle of the tubes. If you are interested in further references please ask us for more details.

The fully symmetrical design of LISEGA's constant hangers is unique in the pipe support industry and requires only one single attachment point to the structure. This allows not only for easy design (360° rotatability) and minimum space requirements, but also for a max. constancy throughout the whole travel.

The LISEGA constant hanger in its standard design has a main spring in the vertical and two helping springs in the horizontal. The two helping springs compensate the load changes in the main spring as it is compressed or released based on the direction of the travel.



The diagram above shows how the helping springs are equalizing the load change of the main spring as the constant hanger is going through its travel.

In the majority of reformer applications, the hanger will be in the sweet spot for the operational conditions. The sweet spot indicates that the hysteresis has the smallest band-with; meaning the difference of the load going up and the load going down is the smallest.



The spring coils are the heart of the constant hanger and therefore – as standard – fully traceable. The coils are sourced in Western Europe from a few selected suppliers and do undergo a patented treatment regarding their coating which is called a cathodic immersion process. In this process the coating, a 2-part epoxy resin, is bonding with the base metal of the coil. In addition to the special coating the coils do undergo a heat treatment that takes the work hardening out of the coil.

This work hardening occurs during the winding on the outer edge of the coil whereas in a non pre-relaxed coil the stress of the work hardening leaves the coil under load over time in form of a loss of elasticity. This is not a desirable effect since it not only changes load setting but also load carrying capability of the constant hanger.

And in order to avoid an aging effect of the spring, LISEGA exclusively uses – as standard - springs that, through an artificial aging process (pre-relaxing process), show no appreciable settling loss during the lifetime of the plant.

Based on the configuration and type of reformer, it is common to attach or hang anywhere from 1 to 4 catalyst tubes off to a single constant hanger. Due to large range of LISEGA's constant hangers in the standard catalog, virtually all applications can be covered by our standard and existing designs.

And whereas the traditional lever-arm design of constant hangers, used by all other suppliers for pipe supports, do only allow for proportional reading of travel and load units, LISEGA's symmetrical design allows for direct reading of load and travel, which makes inspections at site and documentation very much easier. In addition to those application advantages, the symmetrical constant hangers of LISEGA have a much better performance/weight ratio of approximately 30% on average against the conventional lever arm hangers.



LISEGA's supports are completely maintenance-free, very user-friendly for the selection and installation and designed for the lifetime of a plant.

After several years of operation the catalysts will have to be replaced inside the catalyst tubes therefore changing the overall tube weight. The LISEGA constant hangers can be easily adjusted in installed condition to accommodate the weight difference of the new catalyst. In most cases, the LISEGA constant hangers have large load adjustment reserves – even from 40% to over 100% - so they can be easily readjusted, without an impact onto the constancy, to the new load even when the whole catalyst tubes are to be replaced.

For further information please go to our website <u>www.lisega.com</u> or ask us for any support(s) you might require under <u>reformer@de.lisega.com</u>.

Astolf Witte / Harald Lange - Zeven, March 2019