



## N2LOCK®. Maximum safety even in manual charging operations.



N2LOCK® system integrated in the charging hole of a mixer with a capacity of 2,000 kg.

**Objective** When mixers, reactors or other vessels are charged with bulk solids, air or oxygen is entrained into the vessel along with the charge. The amount of entrained oxygen should be minimised in order to provide the utmost degree of safety even in manual charging operations.

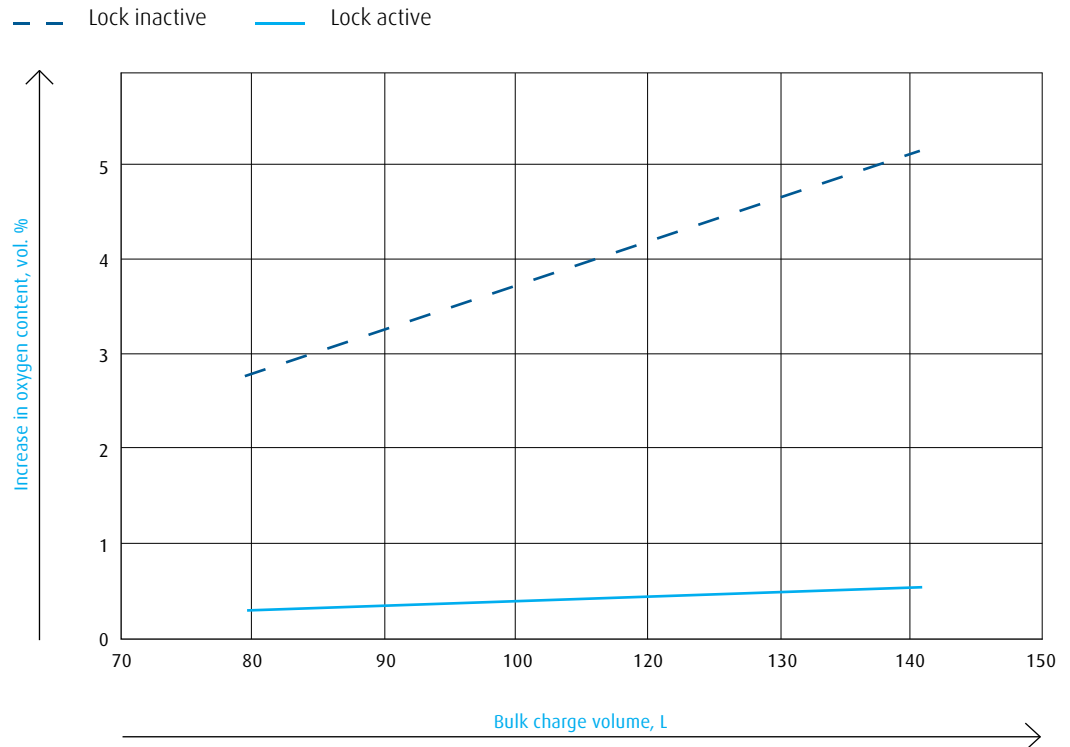
**Description** The N2LOCK® concept is an effective way to reduce the quantity of (atmospheric) oxygen admitted when vessels are opened and manually charged. The charging hole is purged with inert gas through an inerting lock specially developed by Linde. Locks can be installed permanently or mounted temporarily before charging is started. The N2LOCK® concept features a variety of patented locks, which can be easily adapted to the application in question, and a nitrogen control and supply system matched to the relevant requirements. An oxygen analysis system can be added if appropriate.

**Applications** The range of applications is broad. Inert gas locks can be employed wherever reactor vessels or mixers are charged manually in cyclical fashion and an inert atmosphere is to be maintained for safety and/or quality reasons.

- Features**
- Variety of lock designs, hence a solution tailored to every application
  - Minimal admission of oxygen into the vessel during opening and charging
  - Low nitrogen consumption
  - Easy installation in charging holes of existing vessels
  - Easy day-to-day operation

**Example** The diagram below presents results from practical charging of a vessel. The vessel volume is approx. 2.3 m<sup>3</sup>; the charging hole diameter is approx. 500 mm; the O<sub>2</sub> content before charging is approx. 2 vol. %. The rise in O<sub>2</sub> level varies linearly with the charge volume. The increase in oxygen concentration can be greatly reduced by activating the nitrogen-purged lock (approx. 5 to 20 Nm<sup>3</sup>/h depending on model). In other words, the inert gas lock is an effective way to cut down the admission of air or oxygen entrained with the charge material.

#### Change in O<sub>2</sub> concentration in vessel versus bulk charge volume with and without active lock



**Inert gas supply** Normally, nitrogen is chosen as the inert gas. It can be supplied in gaseous form from cylinder bundles. For this kind of application, however, nitrogen is normally delivered in liquid form in a vacuum-insulated tank combined with an evaporator. The tank size is selected to suit the application; standard tanks have liquid capacities from 3,000 to 80,000 L.

**Range of services**

- Experimental testing
- Safety analyses (explosion diagrams generated with Linde Safety System™)
- Software-assisted, customised problem solving and determination of optimal nitrogen supply mode
- Delivery of inert gas locks and requisite nitrogen instrumentation and control
- Installation and commissioning
- Nitrogen supply