Briefing Note
PSA Plant Oxygen Purity

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Objective

This memo aims to address the range of oxygen purities advertised by manufacturers, as well as requested by end users.

93% oxygen purity meets WHO medical oxygen standards

The WHO's International Pharmacopoeia (Eleventh Edition, 2022) states that the standard medicinal oxygen at Oxygen 93% “is produced from ambient air by pressure swing adsorption (PSA)”. The oxygen purity range for Oxygen 93 is between 90-96%; this purity range is often stated by manufacturers and users as 93 ± 3%.

While some PSA plant manufacturers have equipment that produces 95 ± 1% oxygen purity, it should be noted that a PSA plant with a 93 ± 3% oxygen purity has much the same tolerance for oxygen purity. A 95 ± 1% purity plant would produce oxygen in the range of 94-96% oxygen, while a 93 ± 3% purity plant would produce 90-96% oxygen. Regardless of the specification, the maximum oxygen purity does not exceed 96%, due to the limits of pressure swing adsorption technology. While the 93 ± 3% purity plant does have a lower tolerance range (down to 90%), this is still acceptable with no impact on patient care per the WHO’s standards for medicinal oxygen.

95% or higher oxygen purity plants require larger investments

As more oxygen product is demanded from the PSA plant, the purity will decrease. For example, a 20 Nm3/h PSA plant set to produce oxygen at a purity of 93 ± 3% could produce 20 Nm3/h of oxygen output flow, while the same equipment set to produce 95 ± 1% oxygen purity would produce 18 Nm3/h. This means that with the same budget, a larger PSA plant can be procured if the oxygen requirement is specified to be 93 ± 3%. If one were to look at a 95 ± 1% purity and 93 ± 3% purity plant with the same output flow (for example, 20 Nm3/h), the 95 ± 1% purity plant would need to have larger equipment in order to achieve the same flow rate. The larger equipment will require a larger initial capital investment for equipment, site preparation and will also have increased operating expenses due to the increased power consumption of the larger equipment when compared to a 93 ± 3% purity plant.