

Loma Linda University Medical Center (LLUMC) Case Study.

LLUMC Counts on Messer to Provide New Bulk Medical Oxygen Station Specially Designed for High Seismic Activity.



The main and reserve vaporizers and main O₂ tank after installation at the LLUMC bulk O₂ compound. The bracing is in the base plate, the saddle and the anchors into the outer shell of the tank.

In 2015, Loma Linda University Medical Center (LLUMC) in Loma Linda, California decided to undergo a major hospital expansion. The project scope included a new bulk medical oxygen supply station. Because LLUMC sits on seismic fault lines, the oxygen supply station needed to be specially designed and constructed. Complexities with regulatory approvals and design challenges necessitated precise project management. LLUMC partnered with Messer to provide a Design, Build, Provide turnkey project, which included the relevant design, installation and project management services. Messer completed the custom high-seismic installation on budget and in time for the opening of LLUMC's expansion, resulting in a satisfied customer.

Background

LLUMC has been ranked among the top hospitals in its metro area for

2019-20 by U.S. News & World Report. The 714-bed LLUMC treats more than 16,000 inpatients and receives about 470,000 outpatient visits a year. Loma Linda University Health has embarked on a Campus Transformation Project, which includes the new LLUMC tower and the adjacent Loma Linda University Children's Hospital Tower. The approximately 1 million square-foot addition entails 320 new single-patient rooms plus new neurosurgical, trauma and transplant surgical suites and services. At 268 feet high, the new towers are fixed on 126 seismic base isolators designed to withstand a major earthquake. After determining that the existing bulk medical oxygen (O₂) equipment was inadequate, Messer installed a new, larger O₂ storage station with these seismic considerations in mind.



The centerpiece of the LLUMC Campus Transformation Project, at 268 feet high, the 1 million square-foot tower is the tallest hospital in California.

Campus Transformation

Rockton Hill, LLUMC's project manager, said the Campus Transformation Project construction timeline dictated the schedule for the bulk O₂ station installation.

"We had to have a new bulk O₂ system up and running by the time the contractors working on the Campus Transformation Project team needed O₂ for testing and commissioning followed by Office of Statewide Health Planning and Development (OSHPD) occupancy," said Hill. "It resulted in a three- to four-year-long project, with multiple levels of activity, governed by a joint permitting process. Obtaining local, state and OSHPD permits takes a couple of years of planning, design and receiving plan approval."

Bulk Medical O₂ Specifications

Hill knew Messer as a leading provider of bulk medical gas supply systems and services. "Based on our O₂ supply requirement, Messer established a

basis of design requirements for new medical bulk installation,” says Hill. “Messer determined the necessary equipment and sizing.” From LLUMC’s specified needs and the proximity from Messer’s oxygen plant, Messer specified main tank, reserve tank, required vaporization to provide O₂ to the Campus Transformation Project, a faculty medical office and a future hyperbaric O₂ therapy suite. The team designed the system for a high flow (more than twice their average consumption) to accommodate possible future expansion.

Messer recommended and LLUMC agreed to increase the size of the O₂ reserve above mandated levels to increase security of supply. “In California due to seismic concerns, it is sensible for a hospital to be able to function for three days without outside assistance such as O₂ deliveries,” says Mark DiMaggio, Vice President of Applications, Marketing & Execution at Messer Americas. “By having reserve capacity of three days vs. one day required by code, it helps ensure the hospital has reserve capacity to tide it through an earthquake or other unforeseen event.”

Seismic Bracing

LLUMC sits on seismic faults so the design had to withstand a major earthquake of 7.0-magnitude. “It was a learning curve for everyone, and it was certainly challenging,” said Hill. “But Messer acquired the necessary resources to calculate and derive the information we needed to obtain a building permit,” said Hill.

Messer routinely faces permitting and design challenges, but the added

severe seismic requirements made the project more complex than a typical bulk equipment installation. For instance, standard bulk equipment is rated for 200 percent spectral response acceleration (Ss) which accommodates the vast majority of geographies in the United States but LLUMC’s location requires 244 percent Ss. Therefore, Messer needed to produce site-specific documents and drawings for LLUMC to move the project through OSHPD permitting, including the earthquake-proof specifications for the tank and its supports.

Installation

In June 2020, both tanks were safely lowered into place on the braced saddles specially designed and constructed for them. The tanks were first filled January, 2021. LLUMC is using the bulk O₂ now to test the medical gas outlets in the new tower ahead of a tentative opening in late spring 2021.

Of course, no facet of business has escaped considerations from COVID-19 and this project was no exception. While no design or capacity requirements needed increasing to cope with the pandemic, safety protocols were put in place for on-site work. The construction crews followed all CDC safety guidelines regarding masks, sanitizing stations, social distancing and other measures.

“Working with Messer was a great experience,” says Hill. “I am proud and thankful to be part of this team and to produce something of this nature for our hospital.” All in all, a good turnkey project for Messer and flagship project for all involved.



The main (left) and reserve tanks, plus the vaporizers and associated piping at the LLUMC bulk O₂ compound.



Messer lowers bulk O₂ tank into place. The new bulk O₂ compound is across the street from the new hospital, then under construction, at LLUMC.



Messer Americas

200 Somerset Corporate Blvd
Suite 7000
Bridgewater, NJ 08807
Phone: 1-800-755-9277
sales@messer-us.com
www.messer-us.com

