

Biosafety Level Criteria for using SARS-CoV-2 in Research Laboratories

Biosafety levels are designated by degree of protection provided to laboratory personnel, the environment, and the community. Below are the levels of containment for laboratories working with SARS-CoV-2 or handling specimens obtained from COVID-19 patients.

BSL2 Containment

- Analysis of inactivated specimens (e.g., blood, serum, plasma, tissues, feces, urine, sputum, mucosal swabs collected from any species infected with SARS-CoV-2)
- Molecular analysis of extracted nucleic acid preparations
- Pathologic/microscopic examination of fixed specimens (e.g., formalin-fixed or other inactivated tissues)
- Staining and microscopic analysis of fixed smears
- Routine examination of bacterial cultures
- Flow cytometry analysis of fixed samples
- Specimens from suspected or confirmed COVID-19 cases should be transported as UN3373, "Biological Substance," Category B

BSL3/ABSL3 Containment

- SARS-CoV-2 virus isolation in cell culture
- Initial characterization and/or expansion of the viral agents in cultures derived from COVID-19+ specimens
- Using the virus to infect cultured cells
- Storage of the viral stocks
- Using infectious SARS-CoV-2 virus in functional assays
- Flow cytometry cell sorting with intact virus
- Viral cultures or isolates should be transported as UN2814, "Infectious substance, affecting humans", Category A
- Use of SARS-CoV-2 with animals (currently there is no ABSL3 facility available at Temple University)

BSL2 and 3 standard practices are stipulated in [CDC's Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 6th Edition](#).

Related References:

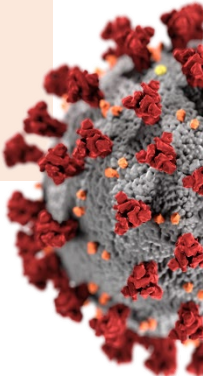
- [CDC Guidance for Laboratory](#)
- [WHO Laboratory Guidance](#)
- [ABSA International SARS-CoV-2/COVID-19 Toolbox](#)

BSL2 Enhanced Containment

- Processing specimens for research use and storage (including aliquoting or diluting specimens)
- Preparation of chemical- or heat-fixed specimens for microscopic analysis
- RNA/DNA extraction from COVID-19+ specimens
- Inoculating bacterial culture media

Enhanced BSL2 containment includes the following modifications of the standard BSL2 requirements:

- 1) Use Class II Biological Safety Cabinet (BSC) for all procedures (decontaminate after each experiment)
- 2) Wear a closed front gown and double pair of gloves
- 3) Use sealed centrifuge rotors or safety buckets with caps for spinning or transferring specimens between centrifuge and BSC
- 4) Use of sharps should be eliminated if is experimentally avoidable
- 5) Transport specimens between laboratory spaces in sealed, biohazard labeled secondary containers

A 3D rendering of a SARS-CoV-2 virus particle, showing its characteristic spherical shape with a grey outer shell and red, spike-like projections.

Quick Take

- All research with SARS-CoV-2 (COVID-19) requires review and approval by the [Institutional Biosafety Committee \(IBC\)](#).
- Contact the [Biosafety Manager and BSO](#) for concerns related to safe work with SARS-CoV-2 virus.