



**Compass Greenfield Development  
Almonte 1 and 2 Commissioning &  
Decommissioning Plan**

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# 1 Commissioning Activities

## 1.1 Fire Safety Feature Commissioning

The Tesla Megapack 2/XL is equipped with a number of fire safety features designed to mitigate the propagation of a battery failure or prevent the failure from occurring altogether. These protections are aligned with the NFPA 855 requirements, as well as the 2021 International Fire Code §1207 Electrical Energy Storage Systems.

### 1.1.1 Deflagration Control System Commissioning

Each Megapack 2/XL is provided with an integral and proprietary explosion mitigation system (deflagration control). This explosion mitigation system is comprised of numerous pressure-sensitive (overpressure) vents located at the top of the Megapack and a sparker system; working in conjunction to ignite any flammable gasses that could be generated within the unit during a failure event. The Megapack 2 XL is provided with twenty-six (26) overpressure vents and 12 sparkers. Any overpressures generated from the ignition of flammable gasses within the unit will be relieved via the nearest pressure-sensitive vents and routed upwards, protecting the Megapack's structural integrity and preventing any hazardous pressure build-up within. The sparkers are located throughout the Megapack at various heights and continuously operate to ensure that any flammable gas build-up is ignited early – limiting the concentration of flammable gas within the unit and activating the pressure-sensitive vents to create a natural ventilation pathway to the exterior. During commissioning, the Tesla Megapack performs a self-test on each component of this system and reports a PASS/FAIL status.

### 1.1.2 Battery Management System (BMS)

An integrated Battery Management System (BMS) monitors key datapoints such as voltage, current, and state of charge (SOC) of battery cells, in addition to providing control of corrective and protective actions in response to any abnormal conditions. Each battery module is equipped with a dedicated BMS, with a Megapack-level bus controller supervising output of all modules at the AC bus level. Critical BMS sensing parameters include battery module over / under voltage, cell string over / under voltage, battery module over temperature, temperature signal loss, and battery module over current. In the event of any abnormal conditions, the BMS will generally first raise an information warning, and then trigger a corresponding corrective action should certain levels be reached. At commissioning, a SCADA commissioning procedure is followed to ensure that all data points are visible and mapped correctly.

### 1.1.3 Fire Detection

Thermal sensors within the Megapack are monitored by the BMS – anomalies are immediately transmitted to Tesla's 24/7 Operations Center, and Compass' network operations center for immediate response. Communications are tested and verified upon commissioning.

#### **1.1.4 Site Controller and Monitoring**

The Tesla Site Controller provides a single point of interface to control and monitor the entire energy storage site. It hosts the control algorithm that dictates the charge and discharge functions of the battery system units, aggregating real-time information and using the information to optimize the commands sent to each individual Megapack unit. The Megapack 2/XL is supported by Tesla's 24/7 Operations Center, which is designed to support the global fleet of energy storage products. In conjunction with Compass' local operation center, the Megapack 2/XL has 24/7 remote monitoring, diagnostics, and troubleshooting capabilities. In the event of an emergency, this information becomes available to a Subject Matter Expert (SME) responsible for the system to inform emergency response personnel.

#### **1.1.5 Fire Suppression Systems**

NFPA 855 and the 2021 IFC Chapter 12 both require fire control and suppression systems to be provided in certain installation conditions for battery ESS. These fire suppression systems, however, are typically required for rooms, areas within buildings, and "walk-in" units when installed outdoors. All components of the Tesla Megapack 2/XL are housed in a cabinet-style enclosure, with access for maintenance provided via enclosure doors that cannot be physically entered by any person. The installation codes and standards, thus, would not consider the Tesla Megapack 2/XL walk-in container, occupied building, or structure as defined by NFPA 855 and IFC.

The Tesla Megapack 2/XL does not rely on any external or internal fire suppression systems to limit cascading thermal runaway. Additional bespoke testing and subsequent fire modeling has indicated that the Megapack's passive construction provides a robust thermal resistance from the impacts of an adjacent Megapack during a large-scale failure.

#### **1.1.6 Electrical Fault Protection Devices**

Multiple levels of passive and active electrical protections are provided for the Megapack 2/XL. At the battery module level, overcurrent protection is provided for each module in the form of single-use fusible links, providing interruption of overcurrent in the battery module in the case of an abnormal electrical event. Inverter modules, which are installed at each of the battery modules, are equipped with both DC protection via high-speed pyrotechnic fuse for passive or active isolation of battery module, as well as dedicated AC contactor and AC fuses should an abnormal electrical event occur at the inverter module on the AC side of the circuit. Additionally, the Megapack 2/XL is equipped with DC ground fault detection system and AC circuit breaker with ground fault trip settings for distribution system protection. During commissioning, the Tesla Megapack performs a self test on each component of this system and reports a PASS/FAIL status.

### **1.2 Record of Commissioning**

Upon completion of commissioning, a record of completion for the Tesla Megapack commissioning, SCADA commissioning, electrical commissioning, and utility commissioning is provided to Compass, and can be made available to any relevant AHJ.

## **2 Decommissioning Plan**

### **2.1 Decommissioning and Recycling at End of Project Life**

#### **2.1.1 Introduction**

The decommissioning of the Almonte Battery Energy Storage System (BESS) Project includes the removal of all components associated with the Project and the restoration of the Project site to as close to its original condition as possible. This plan is to provide detail on that process, with supporting time frames or milestones, after operations have ceased.

#### **2.1.2 Project description**

Compass Greenfield Development has proposed the development of two Battery Energy Storage Systems comprised of a total of 18 Tesla Megapack lithium-ion energy storage units, associated switchgears, transformers, and protection and control equipment required to enable a 44.0kV electrical interconnection to the local electricity distribution network (grid). The BESS units will be installed upon concrete pads and the entire BESS will be enclosed by 8 feet high chain link fencing. Underground conduit will connect the BESS to transformers. The commercial life of the facility is expected to be 22 years. At the end of commercial life, Compass will cease operations and decommission the facility including necessary demolition and site reclamation. To the greatest degree possible, decommissioning will attempt to maximize the recycling of all BESS components.

#### **2.1.3 Site Condition Pre-Storage System**

The Almonte 1 and 2 BESSs are located at 6299 County Road 29 in the Municipality of Mississippi Mills on a section of land that was previously used for grazing. A gravel access road will connect the BESS area to Highway 29.

#### **2.1.4 Decommissioning Expectations**

Compass expects to meet the same exacting standards during deconstruction, and it will during construction of the BESS. This will include but may not be limited to:

- Environmentally appropriate methods of deconstruction will be applied including the recycling of as much equipment as can be done within a reasonable timeframe
- Excellent standards of Health and Safety adhered to; and
- All laws and regulations will be followed, local, provincial and federal.

#### **2.1.5 Decommissioning Preparation**

Pre-closure activities and reclamation planning includes:

- Set up and document a Site-specific health and safety plan and determine the specific sequence and procedures to be followed.

- Complete an analysis of the project materials and their composition to identify those specific components that can be recycled. For items that can't be recycled, determine what the most appropriate method of disposal will be.
- Identify specific recycling facilities and disposal sites for materials.
- Coordinate with local officials to develop plans for the transportation of materials and equipment to and from the site.
- Secure any municipal demolition or electrical permits necessary.
- Develop specifications for demolition and reclamation.
- Develop training for the personnel who will manage and perform the actual work, and document appropriately.
- A full assessment of the local zoning requirements, permitting needs and applicable environmental regulations, to ensure the compliance of the final plans.

#### **2.1.6 Disassembly and Demolition**

Site decommissioning and equipment removal is expected to take up to 12 weeks. Access roads, fencing, some electrical power, and other facilities may temporarily remain in place for use by the decommissioning workers as needed before they too are removed. A plan for de-energizing portions of the facility to allow safe decommissioning and formal lock-out and tag-out procedures will be implemented. This will ensure all electrical components are placed and maintained in a safe condition for demolition activities prior start of work. The decommissioning will begin with the de-energization of the Project by qualified electricians. Next, any hazardous or regulated materials shall be removed (in this case, this is minimal – the oil from the transformers being the only component to highlight). Various components will be removed from the site, including batteries, steel foundation tie-ins, concrete pads, inverters and transformers. These activities will take place in approximately the inverse order to which they were installed. Excavation of the conduit trenched to the connection point to the south-east will be discussed with the Host Property, but we anticipate it will be required for the removal of foundations, piping, and utilities. Demolition debris will be placed in temporary on-site storage area(s) pending final transportation and disposal and/or recycling according to the procedures listed below. Stockpiled on-site waste will be transported off site for recycling or waste. All aspects of the decommissioning process will be in compliance with all applicable federal, provincial and municipal laws.

**The decommissioning procedure found in Section 8 of the Tesla Megapack 2 XL Operation and Maintenance Manual will be used to determine specific decommissioning steps and procedure.**

#### **2.1.7 Site Restoration**

All electrical equipment and cabling will be removed from the site Above-ground concrete pads will be demolished and materials removed from site or disposed of at the preference of the landowner.

#### **2.1.8 Project Quality Control and Documentation**

During the entire decommissioning process, from planning to site monitoring, the project will be subject to quality control and documentation. Compass will ensure the effective execution of the

decommissioning plan through project oversight and quality assurance. Additionally, the decommissioning process will be documented and progress reported to the landowner.

## 2.2 Decommissioning and in the event of emergency

### 2.2.1 Post incident response

In the event of a critical failure such as a battery failure, the site-specific Emergency Response Plan and guidelines within the Megapack 2 XL Operation and Maintenance Manual are to be followed. Per section 8.4.1 of the Megapack 2 XL Operation and Maintenance Manual, the Megapack battery unit is not to be approached post-incident until the following occurs:

If not already present on site or contacted, contact technical support for guidance prior to any interaction with the Megapack (Emergency Number: +1 650-681-6060)

Once all immediate risks have been mitigated, follow these steps to determine whether Megapack is safe to approach:

1. Isolate the Megapack as required per Isolating Megapack from Upstream AC Sources on page 42. Of the Megapack 2 XL Operation and Maintenance Manual
2. Ensure that there have been no visible signs of risks (such as smoke, flames, suspicious odor) for 12 hours.
3. From a distance, use a thermal imaging camera to determine that the damaged Megapack's temperatures have decreased to safe enough levels to touch and that there is no evidence of cell vent gases.
4. From a safe distance, use a hydrogen meter to validate that no vented gases are present.

### 2.2.2 Performing Diagnostics

Once Megapack is deemed safe to approach, Megapack diagnostics can begin.

**WARNING: Megapack diagnostics must only be performed by authorized Service Providers.**

Diagnosing the Megapack aims at evaluating its status and determining how to handle the damaged unit until recycling, and as a result whether, for example, to disassemble and ship its sub-components to various recycling facilities, or not disassemble and ship to a single recycling facility. This process generally begins with a visual inspection of the unit in order to establish an initial plan that may evolve during the inspection.



Subsequent steps generally proceed as per below:

1. Once Megapack temperatures are deemed touch-safe and no hydrogen gas is detected, you may begin to physically interact with the system.
2. Take electrical measurements of the Megapack System to determine if any faults are present.
3. If faults are found to be present, these must be cleared before proceeding with decommissioning.

### **2.2.3 Preparing Damaged Equipment for Transport**

After performing diagnostics, Tesla will determine the best and safest way to handle the equipment and transport it to a recycling facility. Refer to the local applicable transportation regulations for such equipment. Transportation regulations can vary by region. The shipper must always comply with the applicable regulations in the region in which Megapack will be transported. Following Tesla's diagnostics, Tesla may establish that disassembly of battery modules is necessary in order to safely transport the equipment back to a recycling facility. Tesla may also determine that battery modules must be discharged for safe transportation.

In this case, the following should be performed:

1. Identify whether energy is still stored in Megapack battery cells.
2. Discharge all detected energy per Tesla-approved methods.
3. Once all energy is removed from the Megapack System, disassembly and shipping can commence.

## 2.2.4 Process Area

The area identified in Figure 1 – Process Area is sufficiently isolated to be used as a storage location for battery modules that are awaiting transportation.



Figure 1 - Process Area

## 2.2.5 Disposal/Recycling of Damaged Modules

When a damaged Tesla product must be decommissioned, we request that it be returned to a Tesla facility for disassembly and further processing. Contact Tesla with any questions regarding recycling of damaged equipment.

## 2.2.6 Transportation of Battery Modules

Full details on the transportation of Battery modules can be found in the latest version of Megapack 2XL Transportation and Storage Guidelines.

**Appendix A - Megapack 2 XL Transportation and Storage Guidelines**



# Megapack 2 XL Transportation and Storage Guidelines

Revision 1.8

CONFIDENTIAL INFORMATION - SHARED UNDER NDA ONLY

## PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Tesla, we reserve the right to make product or documentation modifications at any time, with or without notice.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

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# 1 Introduction

## 1.1 Purpose

This document provides customers and Tesla-approved partners the details about **Tesla Megapack 2 XL** (Megapack) packaging, shipping, and storage requirements. Requirements for transportation of dangerous goods vary by region. To ensure compliant transportation, always refer to local regulations as applicable.

 **WARNING:** Loading, unloading, and lifting of Megapack must be performed by qualified personnel only. Contact Tesla with any questions about necessary qualifications.

 **NOTE:** Where used in this publication, Incoterms® is a trademark of the International Chamber of Commerce (ICC).

## 1.2 Safety

Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) on the Tesla First Responders Information Page at <https://www.tesla.com/firstresponders> for detailed hazard information specific to Megapack's lithium-ion batteries. The *Transportation* section of the ERG provides guidance and cites example regulations for shipment of dangerous goods. All logistics and transportation companies in the supply chain are responsible for knowing and following all applicable regulations pertaining to the storage, handling, and transportation of dangerous goods. The ERG is periodically updated. Download the latest revision of the ERG from <https://www.tesla.com/firstresponders>.

Tesla recommends that a physical copy of the ERG is transported along with Megapack, and subsequently remains on site and accessible at all times, for the life of the product.

Safety Data Sheets (SDS) are available for materials in Tesla Energy products. Refer to the Tesla Partner Portal for more information.

## 1.3 Technical Support

For technical support or information on returning damaged units, contact the Tesla support team using one of the methods below:


- Online at <https://ion.tesla.com/>
- Via telephone:
  - Asia (24x7): +1 571 573 9163
  - Australia/New Zealand (24x7): +61 2 432 802 81
  - Europe/Middle East/Africa: +31 2 08 88 53 32
  - France: +33 173218702
  - Japan: +0120 312-441 / (24x7) +1 571 573 9163
  - North America (24x7): +1 650-681-6060
  - Slovenia: +38 617778699
  - South Africa: +27 213004878
  - Switzerland: +41 445155607
  - The Netherlands: +31 208885332



- United Kingdom: +44 1628450645

Have this information ready when contacting Tesla:

- Site name
- Best point of contact for Tesla to return contact (name, phone number, email)
- Brief description of the observed issue, including the time, date, and symptoms of the event

 **NOTE:** For any shipment other than a new unit shipped directly from Tesla's manufacturing facility, contact Tesla to request verification that the component is at a state of charge that is safe to ship. Obtain Tesla's approval before proceeding.



## 2 Packaging

### 2.1 Contents

Each Megapack ships individually. With each Megapack shipment, the carrier should expect:

- Megapack enclosure: The physical Megapack unit, fitted with a protective shipping cover
- The following paperwork:
  - *Megapack 2 XL Driver Guidelines*, including applicable hazmat shipping paperwork (road, vessel, etc.)
  - Packing list
  - Bill of Lading (BOL)
  - Commercial invoice (if applicable)



**NOTE:** An accessory kit, which contains items required for installation, is shipped inside each Megapack enclosure (in the Customer Interface Bay).

### 2.2 Packaging Specifications

Each Megapack unit is self-contained and comes pre-assembled as one enclosed unit from the Tesla factory in accordance with UN P903. The unit ships with a protective shipping cover.

Table 1. Megapack Dimensions and Mass (Weight)

Width	Depth	Height	Max. Shipping Mass
8800 mm	1650 mm	2785 mm	38,100 kg
(346 ½ in)	(65 in)	(110 in)	(84,000 lb)



**CAUTION:**

- Enclosure dimensions are provided for nominal design guidance. Do not use the dimensions above as anchoring specifications. For precise dimensions and structural and anchoring details, see the *Megapack 2 XL Drawings* on the Partner Portal.
- Dimensions as listed are as measured for the enclosure envelope exclusive of anchor brackets.
- Mass (weight) as listed is maximum shipping mass. Mass changes depending on product configuration and can be configured lighter based on project-specific requirements.

Each Megapack may ship with an accessories kit located in a cardboard box inside the Customer Interface Bay inside Megapack.

Additional site-level components and templates may be shipped separately from Megapack.

### 2.3 Inverter and Battery Module Shipping Crates

Although the inverter and battery modules are shipped pre-installed in Megapack, they may be shipped separately for service purposes. The preferred shipment packaging is in a battery module or inverter crate.

Up to two (2) battery module crates can be stacked.



**CAUTION:** Do not stack unpackaged battery modules on top of one another on a pallet.




**CAUTION:** Do not stack battery module crates more than two (2) high.



**CAUTION:** Do not ship any Tesla part or product without Tesla-provided crate or packing material.



## 3 Shipping

 **NOTE:** Regulatory requirements differ by transportation mode and country-specific requirements as applicable.

Megapack can be transported by land and sea. Megapack is designed for easy and convenient shipping through a consolidated design and simple and accessible lifting points.

Megapack will always leave its manufacturing facility on a trailer pulled by a truck. North American shipments will usually only require truck shipping, while international destinations will usually require the combination of truck-boat-truck. In such cases, Megapack will require cross-docking from truck onto a roll-on/roll-off (ro-ro) vessel once at or near the port of destination. Refer to [Cross-Docking on page 11](#) for details. Refer to [Shipping by Truck on page 8](#) for trailer requirements.

Because of its pre-assembled and pre-tested nature, Megapack is considered a non-divisible entity, which means it cannot and should not be disassembled during any portion of its transportation. Doors should not be opened and parts should not be removed under any circumstance.

Megapack can reach the maximum weight specified in [Packaging Specifications on page 4](#). In most cases, when shipping by truck, the total truck weight will exceed the typical allowable road weight limits. In such cases, an overweight permit may be required for the country or state(s) of transport. Refer to [Overweight Guidance on page 9](#) for details.

### 3.1 General Shipping and Handling Guidance

Megapack is a Class 9 dangerous good when transported in commerce.

Each distributor is responsible for shipping the product in accordance with applicable local transportation regulations.

The UN Number and Proper Shipping Name for a Megapack is as follows:

- UN 3480, Lithium-Ion Batteries, Class 9 Materials, OR
- UN 3536, Lithium batteries installed in cargo transport unit, Class 9 Materials

The UN Number and Proper Shipping Name are the same by any mode of transport, across the world. Each distributor is responsible for ensuring that staff who transport or offer Megapack for transport are trained in accordance with the applicable transportation regulations. This includes, but is not limited to, staff who:

- Prepare the dangerous goods shipping papers and apply marks and labels to the package
- Prepare hazardous material for transport or who load/unload/handle dangerous goods
- Are responsible for the safety of transporting dangerous goods
- Operate a vehicle used to transport dangerous goods

#### 3.1.1 Coolant and Refrigerant

Megapack uses two materials in its thermal management system that have available safety data sheets (SDS):

Table 2. Thermal Capacities

	Composition	Max Quantity (Approx)
Coolant	50-50 ethylene glycol-water	380 L / 100 gal



Refrigerant	Composition	Max Quantity (Approx)	
		4-Hour systems	Up to 1.5 kg / 3.3 lb
		2-Hour systems	Up to 3 kg / 6.6 lb

The **coolant** is not a regulated substance for transportation purposes (not a dangerous good).

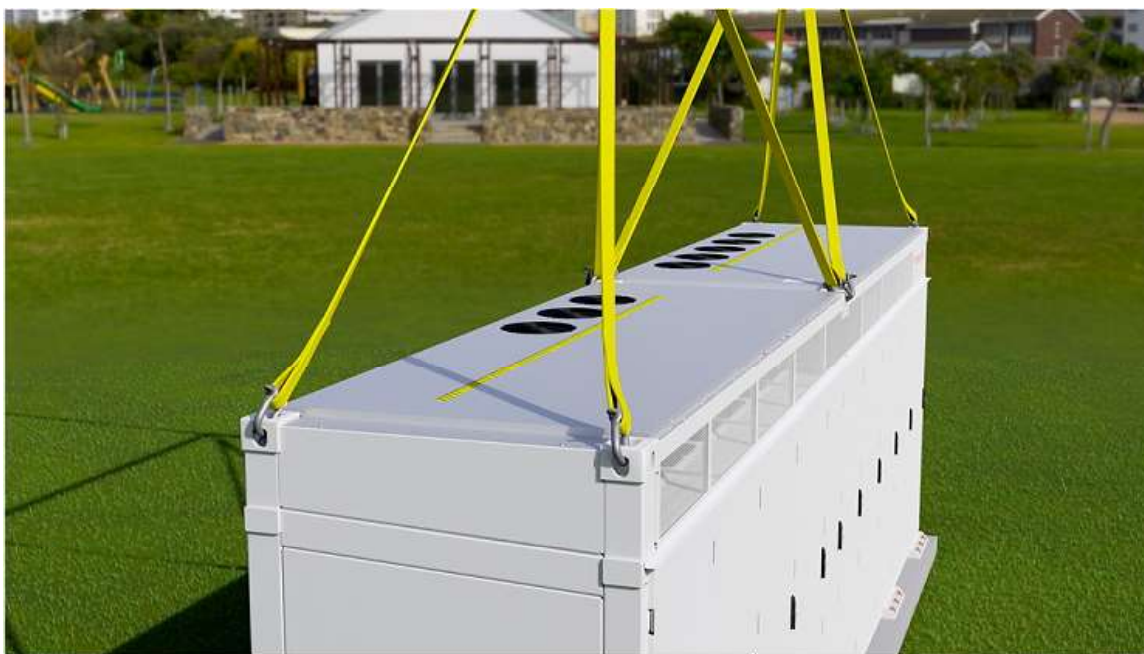
The **refrigerant** is exempted from the transportation rules in the United States in accordance with 49 CFR 173.307(a)(4). Outside the United States, shippers should review applicable regulations depending on transportation mode and country-specific requirements.

See [Safety on page 2](#) for information about the *Industrial Lithium-Ion Battery Emergency Response Guide* and related safety information.

## 3.2 Moving and Lifting Provisions

Megapack is designed for easy transportation and handling. It includes built-in permanent ISO 1161-type fittings on the top of the unit. The ISO fittings shall be used when lifting Megapack with a crane or securing Megapack to a trailer. These are identical fittings to those found on most commercial ISO shipping containers. Detailed dimensions of the ISO fittings are found in [Appendix A: ISO Fittings on page 15](#). The figure below shows the location of the fittings on the product:

Figure 1. Megapack Lifting Provisions: ISO Fittings



Refer to [Craning on page 11](#) for shackling guidance.

**WARNING:** Megapack must never be lifted from underneath. Always use ALL SIX (6) ISO fittings as illustrated above.

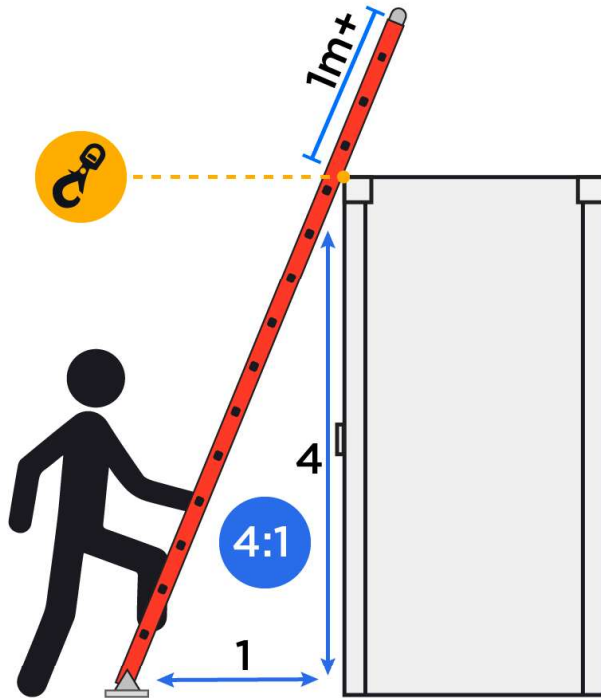
### 3.2.1 Accessing the Lifting Points

When using an extension ladder in order to access Megapack's ISO fittings, observe the following guidance:



- The top of the ladder must extend at least 1000 mm (40 in) beyond the top of Megapack, as illustrated below
- The base of the ladder must be secure, with its feet on a firm, level surface
- The ladder must be positioned with a 4:1 ratio in accordance with the 4-to-1 rule
- The ladder should be secured to the Megapack or held in place by a second person


Figure 2. Proper Extension Ladder Placement




### 3.3 Shipping by Truck

Megapack may be shipped by truck on a trailer that meets the following requirements:

- The deck height of the trailer must not exceed 1070 mm (42 in)
- The minimum deck well length of the trailer must be 9144 mm (360 in)
- The trailer must allow for the Megapack enclosure to be lifted directly on and off from above
- The trailer should be sufficiently long to accommodate the Megapack enclosure and all securing equipment
- The trailer must be rated to sustain the weight of Megapack


 **NOTE:** Typical flatbed trailers are not allowed for transport of Megapacks. Supported trailers include trailers with lower decks such as *step deck* or *lowboy* trailers.

 **CAUTION:** Dangerous goods transportation regulations can vary by region. The shipper must always comply with the applicable regulations in the region where Megapack will be transported.



### 3.3.1 Hazardous Material Transportation Regulation

Refer to applicable regulations when transporting Class 9 dangerous goods in commerce. Requirements include but are not limited to hazardous materials (hazmat) shipping papers, emergency response information, labeling, marking, and placarding.

 **NOTE:** Megapack must be transported with its shipping cover.

### 3.3.2 Overweight Guidance


Megapack will usually come in a configuration that exceeds the standard permitted road freight load in most countries and may require overweight permits.


Refer to contractual Incoterms® Rules for overweight permits, freight cost, and other items for which parties are responsible.

Contact Tesla with any questions regarding proper preparations or guidance for overweight shipments.

### 3.3.3 Trailer On-Loading Guidance

Megapack can be placed directly onto the trailer deck without additional supports (such as wood planks or beams). In all cases, Megapack must be fitted with its protective shipping cover and be adequately secured, per local regulation, using the guidance below before any transportation activities.

 **WARNING:** If wood planks or beams are used as support, the Megapack center of gravity on the trailer will consequently change and move upwards.

 **NOTE:** For center of gravity location, refer to the *Megapack 2 XL Design and Installation Manual*.


#### 3.3.3.1 Securing the Package

Due to the delicate nature of some Megapack components, care must be taken to follow the instructions below to prevent damage to the unit. At a high level, ensure that the securement system meets the following requirements:

Table 3. Supported Securement Configurations

Chain Size	With Rubber Friction Mat	Number of Chains	Chain Locations
1/2 gr 70	Yes	4	4 chains crossed: 2 front, 2 rear ( <b>preferred</b> )
3/8 gr 70	Yes	8	8 chains crossed: 4 front, 4 rear
1/2 gr 70	No	8	8 chains crossed: 4 front, 4 rear

Megapack ships with a shipping cover and does not need a tarp.

 **NOTE:** Refer to *Megapack 2 XL Driver Guidelines* for more information.



**WARNING:** If blocks must be used for support, the material used must be strong enough to withstand being split or crushed by the Megapack or tiedowns.

If wood is used for blocking:

- Hardwood is recommended
- The wood should be properly seasoned
- The wood should be free from rot or decay, knots, knotholes, and splits
- The grain of the wood should run lengthwise

Figure 3. Preferred Securement System - Example - Chains and Friction Mat Locations Highlighted



### 3.3.4 Trailer Off-Loading Guidance

Upon arrival at its final destination, Megapack should be prepared for a crane lift for final installation by performing the following:

- Coordinate the appropriate staging area with the installation team to ensure optimal positioning for a crane lift. Megapack is designed to be lifted directly off of the truck and onto the installation foundation. If the Megapack will not be directly placed onto its foundation, it can be placed on an even staging surface, such as gravel, dirt, or concrete. In such cases, beams or planks should be placed between Megapack and the surface to prevent damage to the paint finish.
- For a lift into its final position, refer to the *Preparing the Enclosure* section in the *Megapack 2 XL Design and Installation Manual*.

## 3.4 Shipping by Sea

In addition to truck shipping, all international deliveries will typically be performed by ocean shipping.

### 3.4.1 Hazardous Material Transportation Regulation

Refer to local regulations as applicable for labeling, marking, and placarding Class 9 dangerous goods when transporting in commerce.

**NOTE:** Megapack must be transported with its shipping cover.

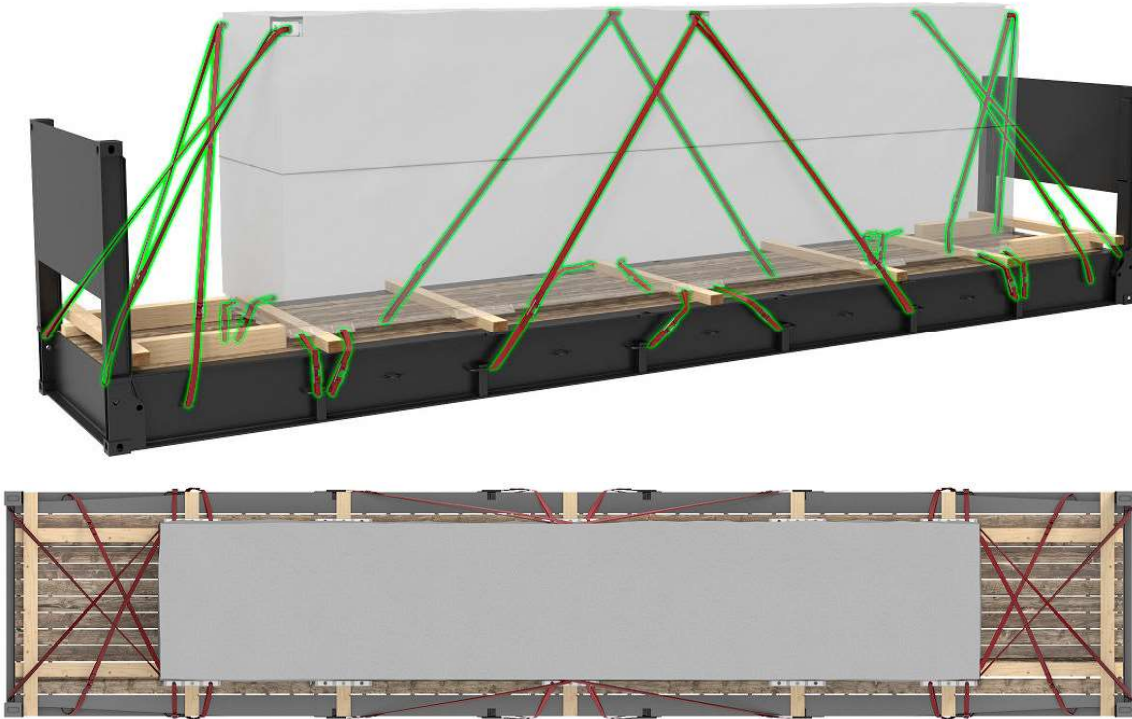
### 3.4.2 Ocean Shipping Guidance

Megapack cannot be shipped using standard (ISO-668 40-ft High Cube dry) container types due to the height of the overall product. Megapack is capable of withstanding transient ocean vessel. Tesla's recommendation for ocean transit is via flat rack or a trailer on roll-on/roll-off (ro-ro) vessels. Based on the applicable Incoterms® Rules, should a flat rack or ro-ro vessel option not be available, Tesla can work with customers to determine what specialized equipment will be necessary on a case-by-case basis.

### 3.4.2.1 Securing for Ocean Shipping

When securing Megapack on a trailer or flat rack for ocean shipping, Tesla recommends the use of cordlash. Straps should be affixed to the enclosure via the ISO fittings and anchor brackets as indicated in the figures below.

Figure 4. Preferred Securement System - Example - Ocean Shipping: Side and Top Views



## 3.5 Cross-Docking

Cross-docking should only be performed by approved and qualified personnel with the latest guidance from Tesla.

Megapacks must arrive at the final installation site on a trailer that allows them to be lifted by a crane (see [Shipping by Truck on page 8](#) for trailer requirements).

The Incoterms® Rules will define if Tesla or the customer is responsible for cross-docking at the final destination, but services should only be performed by qualified personnel with the latest guidance from Tesla.

For more information, contact your Tesla representative.

## 3.6 Lifting Ratings and Certifications

Megapack is tested and listed to the AS4991-2004 “Lifting Devices” lift rating.

## 3.7 Craning

When lifting by a crane, Megapack must be lifted using all top six (6) ISO fittings ONLY. Straps, shackles, and a spreader bar should be used as deemed necessary by the crane operator.





Figure 5. Lifting Using Straps and a Spreader Bar



Some appropriately rated shackles may not fit within the ISO fittings. In this case, crane operators may use straight rather than curved shackles, drop-in ISO fitting lifting adapters such as the Tandemloc 20901AA series, or other appropriately rated devices.

As a best practice, the shackle should be pointed in the upwards direction, as illustrated below.

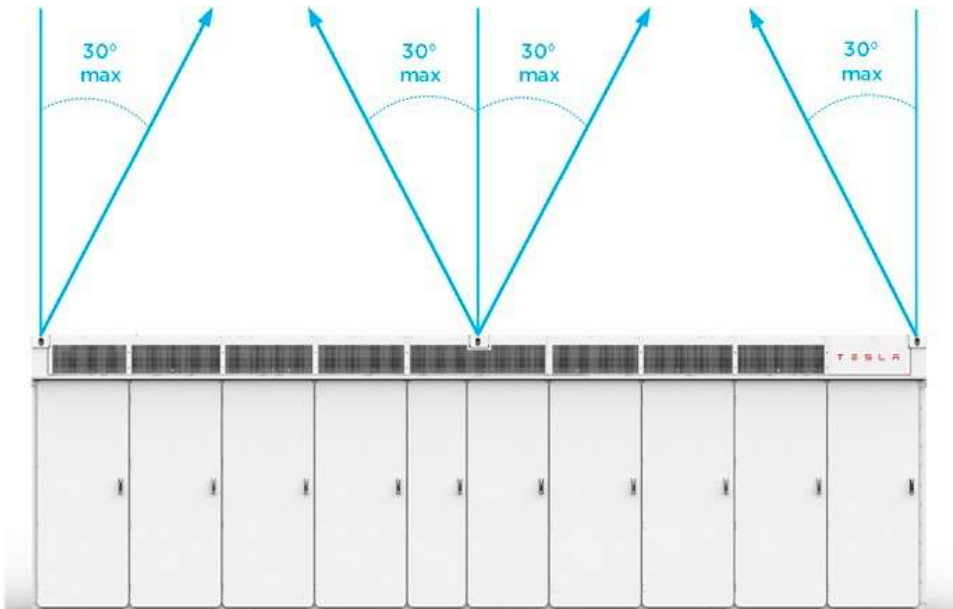
Figure 6. Shackles Installed in the ISO Fittings in the Upward Direction



Rigging angles from the Megapack connections should not exceed 30 degrees from vertical, as shown in the figure below. Megapack should not be tilted more than five (5) degrees from horizontal at any point during the lifting process.



Figure 7. Rigging Angles



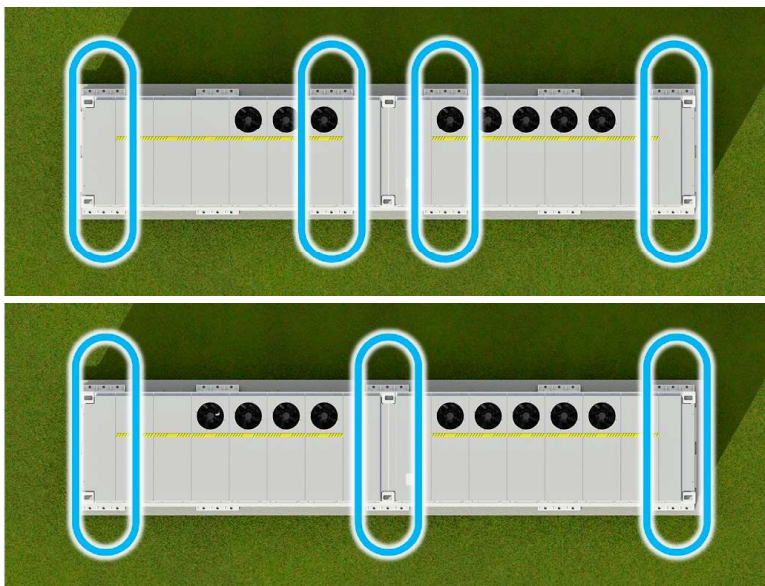
**WARNING:** Ensure lifting equipment is rated appropriately for lifting and moving Megapack. Use of insufficiently rated/designed equipment will result in failure to move the Megapack properly, and may cause damage to equipment or injury/death to personnel.

### 3.8 Off-Pad Staging

If Megapack requires staging or temporary storage before it is placed onto its foundation, the following guidelines must be observed:

- Megapack should be placed on a minimum of four (-C enclosure variant) or three (-D enclosure variant) beams that fully support the anchor brackets and plinth structure, at locations highlighted in the figure below.
- The beams should be placed on an even staging surface. Ensure the Megapack is not tilted by more than 2% grade (1.15 degrees) in any direction.
- Ensure that all support surfaces directly in contact with Megapack do not damage the paint finish.

Figure 8. Megapack Laydown Support Locations (-C Enclosure, -D Enclosure)





## 4 Storage

If Megapack has not yet been installed, you may store it given the conditions outlined in this section.

**CAUTION:** If Megapack has already been installed and commissioned, you must abide by the conditions in this section **and** follow the critical procedures in the *Megapack 2 XL Design and Installation Manual* to shut down for storage.

Megapacks may be stored for a maximum of 12 months (365 days) from the shipping date without being provided with charge. Charge **must** be made available to the system at the end of the storage duration. Make arrangements prior to the end of storage to ensure that charge will be available. If you are unclear on your ability to charge the system after storage, contact Tesla immediately. If the 12-month storage will extend past 365 days from the date of shipping, contact Tesla to ensure system storage readiness.

The following conditions must be met to ensure system integrity during storage:

Table 4. Storage Conditions

Total Storage Duration	Allowable Temperature Range (Ambient)	Allowable Humidity
Up to 12 months (365 days)	-30°C to 50°C (-22°F to 122°F) <i>At no time, including during shipping, may storage temperatures exceed this range.</i>	Up to 100% relative humidity, condensing

Table 5. Storage Clearance

Front	Back-to-Back	Side-to-Side
1060 mm (42 in)	150 mm (6 in)	150 mm (6 in)

**CAUTION:** Failure to provide charge to Megapack at the end of its storage period may result in permanent system damage and loss of warranty. Tesla may be able to assist in system charge at end of storage. This service may incur additional fees, depending on customer contract. Contact your Tesla representative for more information.

**CAUTION:** Do not store or install adjacent to or expose to any external heat source. The batteries used in this device may present a risk of fire or chemical burn if mistreated.

**CAUTION:** Megapacks must only be stored upright and should never be placed on inclined or unstable surfaces. If not positioned upright, coolant internal to the product could leak and sensitive equipment could become damaged.

**CAUTION:** In all cases, water ingress and moisture build-up within the Megapack should be prevented during storage. In order to maintain Megapack's IP66 (NEMA 3R) rating, and as with all sensitive electrical equipment, Megapack enclosures must be treated with care. **Doors may only be opened with permission from a Tesla representative. At all times, every effort should be made to maintain the integrity of the Megapack enclosure to keep moisture from entering during transportation and storage.** Refer to additional critical access information in the *Megapack 2 XL Design and Installation Manual*.

**CAUTION:** Failure to adhere to the conditions in this section may result in permanent system damage during storage.

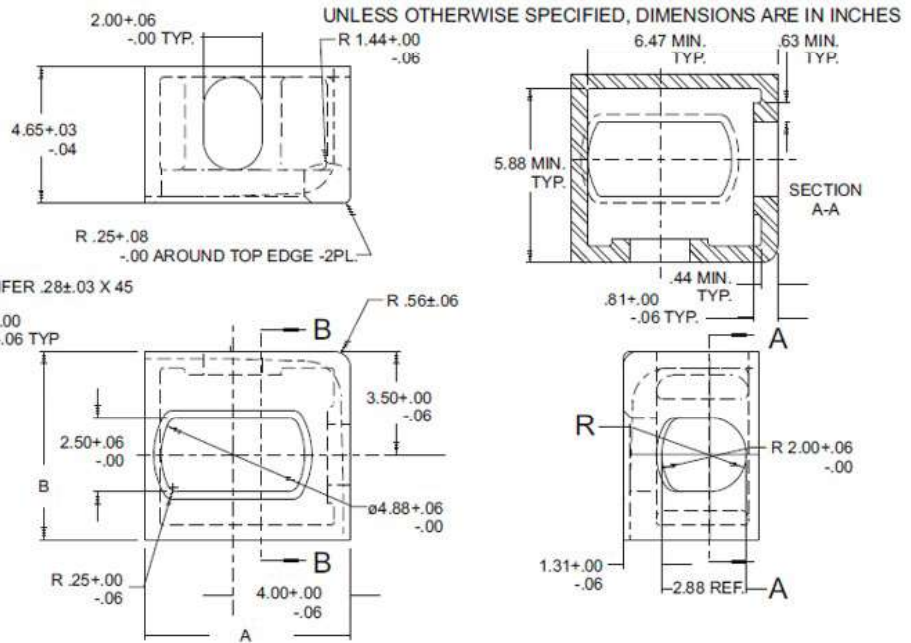


# Appendix A: ISO Fittings

Figure 9. ISO Fitting Dimensions

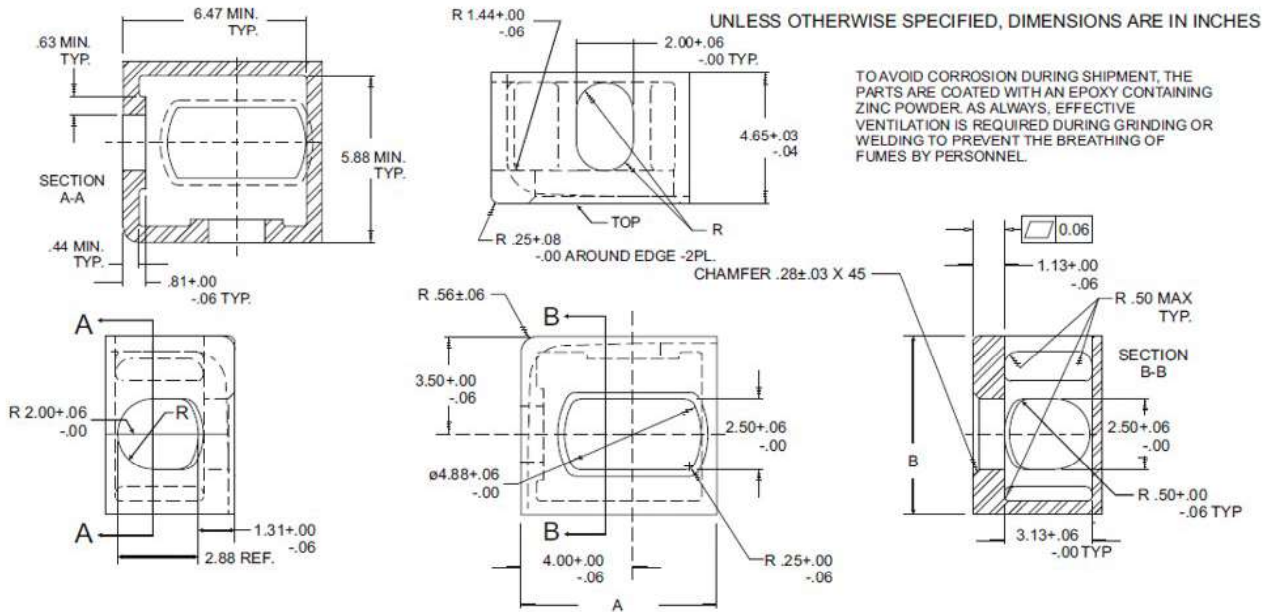
## CORNER FITTING ISO 1161 TYPE - TOP RIGHT (243000C-TR)

TO AVOID CORROSION DURING SHIPMENT, THE PARTS ARE COATED WITH AN EPOXY CONTAINING ZINC POWDER. AS ALWAYS, EFFECTIVE VENTILATION IS REQUIRED DURING GRINDING OR WELDING TO PREVENT THE BREATHING OF FUMES BY PERSONNEL.



## CORNER FITTING ISO 1161 TYPE - TOP LEFT (243000C-TL)

TO AVOID CORROSION DURING SHIPMENT, THE PARTS ARE COATED WITH AN EPOXY CONTAINING ZINC POWDER. AS ALWAYS, EFFECTIVE VENTILATION IS REQUIRED DURING GRINDING OR WELDING TO PREVENT THE BREATHING OF FUMES BY PERSONNEL.







## Appendix B: Delivery Checklist and Process Flow

### Delivery Checklist

The steps in this section must generally be performed before Megapack delivery to site can be arranged.

 **NOTE:** These steps provide general guidelines for consideration. The actual required steps may vary by site and according to the applicable Incoterms® Rules. Contact your Tesla representative for more information.

1. Project manager (PM) provides a window of expected Megapack transport at least 14 days before the first transport.
2. Logistics service provider (LSP) identifies the possibilities for trucking route and number of trucks per day, and initiates a site inspection by the trucking company.

 **NOTE:** Typically up to a maximum of 8 Megapacks can be lifted and transported per day per crane, depending on various factors including distance to port of entry, as applicable.

3. Once the following conditions are confirmed, PM orders transport:
  - Access road conditions are sufficient for receiving Megapack (including crane):
    - Access road is checked for sufficient turning space, roadway width, and condition, and is free from obstacles and overhead lines (written report is available with photos)
    - Roads support the combined weight of Megapack, chassis, and truck (are able to withstand ~50 metric tons / 110,000 lbs), and a road strength test is available and communicated to Tesla
  - Crane is confirmed (in writing)
  - Crane operation hours and applicable costs are confirmed (in writing)
  - Site delivery communication plan and responsibilities are confirmed, including roles according to [Example Delivery Process and Responsibilities on page 17](#).
4. Within two days of the expected delivery window, PM checks the wind and weather forecast and confirms with logistics provider.

 **NOTE:** If high winds or heavy rains are forecast, the delivery window may need to be adjusted.



## APPENDIX B: DELIVERY CHECKLIST AND PROCESS FLOW

### Delivery Process Flow

The process per responsible party flows generally as per below.

Table 6. Example Delivery Process and Responsibilities

Phase	Tesla Origin	LSP Origin	LSP Destination	Tesla Logistics Destination	Trucker Destination	Tesla PM / Client Site PM
<b>Initiation</b> (weeks to months before expected delivery)	Places booking, shares production schedule with LSP Origin.	Checks next sailings and aligns pick up with cut offs.				
<b>Weekly Coordination</b>		Advises sailings, vessel names, estimated delivery and arrival.  Coordinates during weekly calls with Tesla Logistics Destination.		Identifies local needs, collaborates with LSP origin for details (such as carrier name).  Coordinates during weekly calls with LSP Origin.  Informs PM.		Runs delivery checklist ( <a href="#">Delivery Checklist on page 16</a> ) with client / site manager.
<b>Ocean Shipping Arrangement</b> (if needed)		Arranges shipping and sends pre-alert to LSP Destination and Tesla Logistics Destination.				
<b>Preparation to Receive</b>			Creates import file (if needed), and informs local trucking partner.	Creates overview with expected delivery time and details.  Informs PM.		Rechecks with client / site manager ( <a href="#">Delivery Checklist on page 16</a> ).



# APPENDIX B: DELIVERY CHECKLIST AND PROCESS FLOW

Phase	Tesla Origin	LSP Origin	LSP Destination	Tesla Logistics Destination	Trucker Destination	Tesla PM / Client Site PM
<b>Coordination with Trucker</b>			<p>Aligns with PM and Trucker for inspection.</p> <p>Shares site PM and contact details with Trucker Destination.</p>	<p>Orders for site inspection and coordinates with LSP Destination.</p>	<p>Aligns with PM for pre-site inspection.</p>	<p>Performs site inspection together with trucker.</p>
<b>Site Verification</b>						<p>Works on action points to ensure delivery is possible.</p> <p>Informs and coordinates with LSP Destination, Tesla Logistics Destination, and Trucker Destination.</p>
<b>Delivery</b>			<p>Completes delivery instructions for trucker.</p>	<p>Initiates meetings to align on deliveries.</p>	<p>Performs deliveries as requested with site details in mind.</p>	



## Revision History

Revision	Date	Description
1.8	March 6, 2024	<ul style="list-style-type: none"> <li>Updated (decreased) coolant volume (<a href="#">Coolant and Refrigerant on page 6</a>)</li> </ul>
1.7	December 1, 2023	<ul style="list-style-type: none"> <li>Modified battery module crate stacking guidance (<a href="#">Inverter and Battery Module Shipping Crates on page 4</a>)</li> <li>Modified flat-rack renders and guidance (<a href="#">Securing for Ocean Shipping on page 11</a>)</li> </ul>
1.6	November 1, 2023	<ul style="list-style-type: none"> <li>Updated Asia hotlines (<a href="#">Technical Support on page 2</a>)</li> <li>Modified UN number information (<a href="#">General Shipping and Handling Guidance on page 6</a>)</li> </ul>
1.5.1	August 30, 2023	<ul style="list-style-type: none"> <li>Repaired small typo in <a href="#">Storage on page 14</a></li> </ul>
1.5	August 25, 2023	<ul style="list-style-type: none"> <li>Added delivery checklist and process flow (<a href="#">Appendix B: Delivery Checklist and Process Flow on page 16</a>)</li> <li>Provided laydown support locations for the -D enclosure variant (<a href="#">Off-Pad Staging on page 13</a>)</li> </ul>
1.4	July 21, 2023	<ul style="list-style-type: none"> <li>Added storage clearance requirements (<a href="#">Storage on page 14</a>)</li> <li>Added ocean shipping securement guidance (<a href="#">Securing for Ocean Shipping on page 11</a>)</li> <li>Provided minimum trailer deck well length (<a href="#">Shipping by Truck on page 8</a>)</li> </ul>
1.3	December 9, 2022	<ul style="list-style-type: none"> <li>Added extension ladder guidance (<a href="#">Accessing the Lifting Points on page 7</a>)</li> <li>Updated contact information (<a href="#">Technical Support on page 2</a>)</li> </ul>
1.2	September 29, 2022	<ul style="list-style-type: none"> <li>Clarified trailer requirements (<a href="#">Shipping by Truck on page 8</a>)</li> <li>Clarified supported and preferred securement and friction mat configurations <a href="#">Securing the Package on page 9</a></li> </ul>
1.1	August 12, 2022	<ul style="list-style-type: none"> <li>Clarified truck configuration</li> <li>Clarified minimum and recommended chain configuration (<a href="#">Securing the Package on page 9</a>)</li> </ul>
1.0	May 13, 2022	<ul style="list-style-type: none"> <li>Initial revision</li> </ul>



TESLA

*CONFIDENTIAL INFORMATION - SHARED UNDER NDA ONLY*

**Appendix B - Megapack 2 XL Operation and Maintenance Manual**



# Megapack 2 XL Operation and Maintenance Manual

Revision 1.4

CONFIDENTIAL INFORMATION - SHARED UNDER NDA ONLY

## PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Tesla, we reserve the right to make product or documentation modifications at any time, with or without notice.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

This document does not create contractual obligations for Tesla or its affiliates and is provided without warranty of any kind, except to the extent expressly agreed in a contract.

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# IMPORTANT SAFETY INFORMATION


## SAVE THESE INSTRUCTIONS


THIS MANUAL CONTAINS IMPORTANT INFORMATION THAT MUST BE READ, UNDERSTOOD, AND FOLLOWED DURING OPERATION AND MAINTENANCE OF THE MEGAPACK SYSTEM.


## SYMBOLS

This manual uses the following symbols to highlight important information:


 **DANGER:** Indicates a hazardous situation which, if not avoided, could result in severe injury or death.


 **WARNING:** Indicates a hazardous situation which, if not avoided, could result in injury.


 **CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor injury or damage to the equipment.


 **NOTE:** Indicates an important step or tip that leads to best results but is not safety- or damage-related.


## PRODUCT WARNINGS


 **DANGER:** Servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing unless you are qualified to do so.


 **DANGER:** Electric shock can occur when touching live components.


 **DANGER:** Risk of electrical shock. Multiple energy sources terminate inside this equipment. Always check with a properly rated voltmeter that there is no voltage on the bus before touching.


 **DANGER:** Control all forms of hazardous energy at the source before servicing Megapack or removing the Megapack AC circuit breaker or bus bar access panels in the Customer Interface Bay.


 **DANGER:** Controlling hazardous energy by isolating Megapack from other sources does not de-energize the battery, and thus a shock hazard may still be present.


 **DANGER:** Hazardous voltage can cause severe injury or death.

 **DANGER:** Megapack, even in a normally discharged condition, is likely to contain substantial electrical charge and can cause injury or death if mishandled.

 **DANGER:** The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, operate above 50°C (122°F), or incinerate.

 **DANGER:** The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, operate above 50°C (122°F), or incinerate.

 **WARNING:** Failure to read, understand and comply with all instructions in this manual may result in injury.

 **WARNING:** Personal Protective Equipment (PPE) is required when working inside Megapack enclosures. Service personnel must wear safety glasses and gloves with a minimum voltage rating of 1500 V DC, Class 0 per ASTM D120 and IEC EN60903 standards.



**WARNING:** Megapack has no user-serviceable parts. All service must be performed by Tesla authorized parties or Tesla employees. Only trained service personnel are allowed access.

**WARNING:** Only use this equipment as specified by Tesla. Use of this equipment in a manner not specified by Tesla may result in impaired protection features and injury to personnel.

**WARNING:** Batteries are not user-serviceable. Only Tesla-approved personnel must remove, replace, or dispose of batteries.

**WARNING:** For continued protection against risk of fire, use only replacement fuses of the same type and rating as the original fuse. Fuses must only be replaced by trained personnel.

**CAUTION:** Do not paint any part of Megapack other than external white metal surfaces, using only Tesla-provided touch-up paint. Internal or external components such as exterior cabinets or grilles should not be painted.

**CAUTION:** Do not use cleaning solvents to clean the Megapack or expose the system to flammable or harsh chemicals or vapors.

**CAUTION:** Do not use fluids, parts, or accessories other than those specified in Tesla manuals, including use of non-genuine Tesla parts or accessories, or parts or accessories not purchased directly from Tesla or a Tesla-approved party.


 **CAUTION:** Hearing damage could occur if not wearing hearing protection while Megapack is in operation.

Refer to the Tesla *Industrial Lithium-Ion Battery Emergency Response Guide* for detailed hazard information specific to the lithium-ion battery. The guide also provides hazard information for a single Tesla Megapack.

## Voltage Classification

This section defines voltage classification as used in this document.

The table below represents Tesla's standard voltage ranges. The defined ranges, comparable to global codes and standards, help categorize potential electrical hazards where applicable.

 **NOTE:** Any voltage referred to in this document is low voltage unless otherwise specified.


 **CAUTION:** In general, voltages above 49 V are potentially hazardous. What is considered hazardous depends on many factors including your local codes and regulations.

Table 1. Voltage Classifications

Classification	Short Form	Alternating Current (AC) Range	Direct Current (DC) Range
Ultra-low voltage	ULV	0-49 V	0-49 V
Low voltage	LV	50-1,000 V	50-2,000 V
Medium voltage	MV	1,001-35,000 V (1 kV-35 kV)	2,001-35,000 V (2 kV-35 kV)
Sub-transmission medium voltage	STMV	35,001-69,000 V (35 kV-69 kV)	35,001-69,000 V (35 kV-69 kV)
High voltage	HV	Above 69,000 V (>69 kV)	Above 69,000 V (>69 kV)



## Shutting Down in an Emergency



**DANGER:** If smoke or fire is visible, do not approach the Megapack and do not open any of its doors.



**DANGER:** Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* for details on response to a hazardous event ([Emergency Response Guide on page 20](#)).



**CAUTION:** External safety features such as E-Stops and upstream breakers differ by region and design. Always be aware of your site's safety design and external safety features.

To shut down the system in an emergency or for unknown behavior:

1. If an external E-Stop button or remote shutdown contact to Megapack is present, engage it.
2. If Megapack is serviced upstream by an external AC circuit breaker or disconnect, open the breaker or disconnect.
3. Only if safe to do so and if needed, proceed with de-energizing the Megapack ([Performing Lockout/Tagout on page 42](#)).
4. Contact Tesla ([Contact Information on page 22](#)) to advise that the system has been shut down.





## Reference Documents

Visit the Tesla Partner Portal at <https://partners.tesla.com/> to find reference material referred to within this guide and other relevant content, including:

- Application Note: Megapack Capacity Augmentation - [https://partners.tesla.com/home/en-us/content/download/megapack\\_capacity\\_augmentation\\_appnote.pdf](https://partners.tesla.com/home/en-us/content/download/megapack_capacity_augmentation_appnote.pdf)
- Application Note: On-Site Maintenance infrastructure Requirements - [https://partners.tesla.com/home/en-us/content/download/on-site\\_maintenance\\_infrastructure\\_requirements\\_appnote.pdf](https://partners.tesla.com/home/en-us/content/download/on-site_maintenance_infrastructure_requirements_appnote.pdf)
- Application Note: Megapack Site Design Best Practices - [https://partners.tesla.com/home/en-us/content/download/megapack\\_site\\_design\\_application\\_note.pdf](https://partners.tesla.com/home/en-us/content/download/megapack_site_design_application_note.pdf)
- Controls and Communications Manual - [https://partners.tesla.com/home/en-US/content/download/Controls\\_and\\_Communications\\_Manual.pdf](https://partners.tesla.com/home/en-US/content/download/Controls_and_Communications_Manual.pdf)
- Emergency Response Site Information Form - [https://partners.tesla.com/home/en-US/content/download/Emergency\\_Response\\_Site\\_Information\\_Form.docx](https://partners.tesla.com/home/en-US/content/download/Emergency_Response_Site_Information_Form.docx)
- Industrial Lithium-Ion Battery Emergency Response Guide - <https://www.tesla.com/firstresponders>
- Megapack 2 XL Design and Installation Manual - [https://partners.tesla.com/home/en-US/content/download/Megapack\\_2\\_XL\\_Design\\_and\\_Installation\\_Manual.pdf](https://partners.tesla.com/home/en-US/content/download/Megapack_2_XL_Design_and_Installation_Manual.pdf)
- Megapack 2 XL Safety Overview - [https://partners.tesla.com/home/en-us/content/download/megapack\\_2\\_xl\\_safety\\_overview.pdf](https://partners.tesla.com/home/en-us/content/download/megapack_2_xl_safety_overview.pdf)
- Megapack 2 XL Transportation and Storage Guidelines - [https://partners.tesla.com/home/en-US/content/download/Megapack\\_2\\_XL\\_Transportation\\_and\\_Storage\\_Guidelines.pdf](https://partners.tesla.com/home/en-US/content/download/Megapack_2_XL_Transportation_and_Storage_Guidelines.pdf)
- Microgrid Controller Owner's Manual - [https://partners.tesla.com/home/en-US/content/download/MicrogridController\\_Manual\\_Owners.pdf](https://partners.tesla.com/home/en-US/content/download/MicrogridController_Manual_Owners.pdf)
- Application Note: Powerhub for Megapack and Powerpack - [https://partners.tesla.com/home/en-US/content/download/Powerhub\\_for\\_Megapack\\_Powerpack\\_Appnote.pdf](https://partners.tesla.com/home/en-US/content/download/Powerhub_for_Megapack_Powerpack_Appnote.pdf)
- Tesla Energy Operations Contact List and Response Times - [https://partners.tesla.com/home/en-US/content/download/Tesla\\_Energy\\_Operations\\_Contact\\_List\\_and\\_Response\\_Times.pdf](https://partners.tesla.com/home/en-US/content/download/Tesla_Energy_Operations_Contact_List_and_Response_Times.pdf)
- Tesla Industrial Energy Controls and Communications Manual - [https://partners.tesla.com/home/en-us/content/download/tesla\\_industrial\\_energy\\_controls\\_and\\_communications\\_manual.pdf](https://partners.tesla.com/home/en-us/content/download/tesla_industrial_energy_controls_and_communications_manual.pdf)
- Tesla Industrial Energy Approved Vendor List - [https://partners.tesla.com/home/en-us/content/download/tesla\\_industrialenergy\\_approved\\_vendor\\_list.pdf](https://partners.tesla.com/home/en-us/content/download/tesla_industrialenergy_approved_vendor_list.pdf)
- Application Note: Considerations for Hazardous Materials Business Plans (HMBP) - [https://partners.tesla.com/home/en-US/content/download/Considerations\\_for\\_Hazardous\\_Materials\\_Business\\_Plans\\_AppNote.pdf](https://partners.tesla.com/home/en-US/content/download/Considerations_for_Hazardous_Materials_Business_Plans_AppNote.pdf)



# 1 Introduction

## 1.1 About this Publication

Tesla Megapack 2 XL (Megapack) is a modular, fully integrated, AC-coupled battery energy storage system (BESS). This publication is targeted for operators of large sites in which the Megapack System is in an operational state. It provides guidance for the safe and productive lifetime operation and maintenance of the Megapack System, which is defined as one or more Megapack 2 XL units and the Tesla System Controller.

An operator is the person responsible for the day-to-day operations of the Megapack site, which consists of the Megapack System plus additional equipment required by the site and supplied by the customer. The operator includes owner-operators, control room operators, performance engineers, maintenance engineers, facility managers, site managers, and non-Tesla field staff.

In addition to the work that you perform to operate the site, which typically includes the maintenance of the site and balance of plant, a Service Provider also performs work that includes various activities to ensure Megapack performance over the system's life.

A Service Provider is defined as one of the following:

- Tesla Energy Service
- Certified Service Provider:
  - System owner certified by Tesla
  - Third party certified by Tesla

Service activities can include:

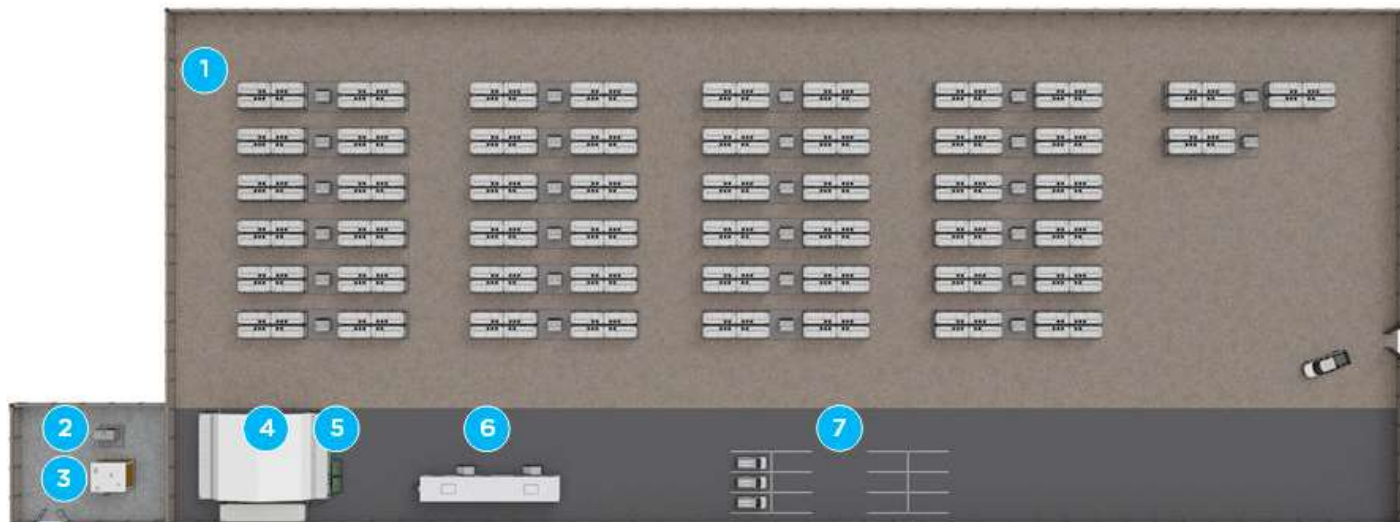
- Corrective maintenance as part of the Megapack Limited Warranty and your contracts
- Preventative maintenance as part of your contracts
- Supporting system augmentation or capacity maintenance, if applicable

The Service Provider performs the required preventative maintenance services, or "services," to ensure Megapack System performance. The operator typically performs the required maintenance for the "balance of plant" and of the site. Refer to your contracts for details regarding your maintenance responsibilities.

The following figure shows an example site layout for a large utility with a typical supporting maintenance infrastructure for a Megapack site. Your infrastructure may differ. For more information regarding Megapack maintenance infrastructure requirements, refer to the *Application Note: On-Site Maintenance Infrastructure Requirements*.



Figure 1. Example ~400 MWh Megapack Site with Supporting (Level 4) Infrastructure



1. Megapack area
2. Medium voltage (MV) switchgear
3. Tesla System Controller in control room
4. Storage container and staging area
5. Waste disposal dumpsters
6. Office trailer for Tesla use
7. Parking area



**CAUTION:** If you are making changes to the site that may affect its design, you must ensure that the site continues to abide by all requirements in the product's *Design and Installation Manual*.



**NOTE:** For information about typical routes and zones at the site, refer to [Routes and Zones on page 27](#).

## 1.2 Tesla System Components

A Megapack System consists of the following components:


- One or more Megapacks ([Megapack on page 7](#))
  - Megapack 2 XL – Part number 1848844-XX-Y<sup>1</sup>
- Tesla System Controller ([Tesla System Controller on page 15](#))
  - Standard Tesla System Controller Enclosure (for sites up to 18 MW) – Part number 1471208-XX-Y<sup>1</sup>
  - Large Tesla System Controller (for sites greater than 18 MW) – Part number 1700130-XX-Y<sup>1</sup>

<sup>1</sup>Where X is a number between 0 and 9, and Y is a letter.

## 1.3 Megapack

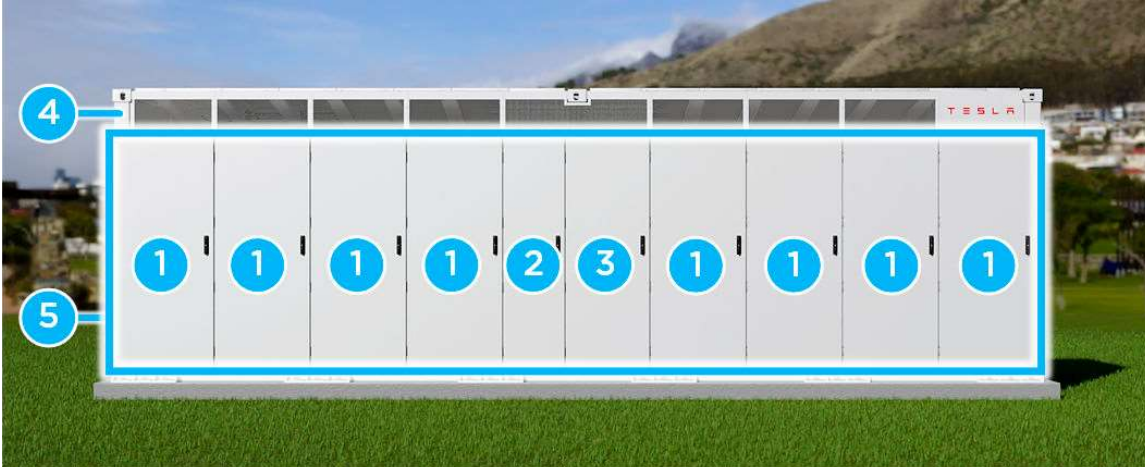
Megapack is a fully integrated battery energy storage unit capable of charging and discharging real power and injecting and absorbing reactive power. Megapack converts power for storage in rechargeable lithium-ion battery modules and is designed to support a range of AC power and energy.



 **NOTE:** Individual Megapack specifications are detailed on the product label (see [Megapack Labels on page 17](#)).

A Megapack unit consists of the following components:

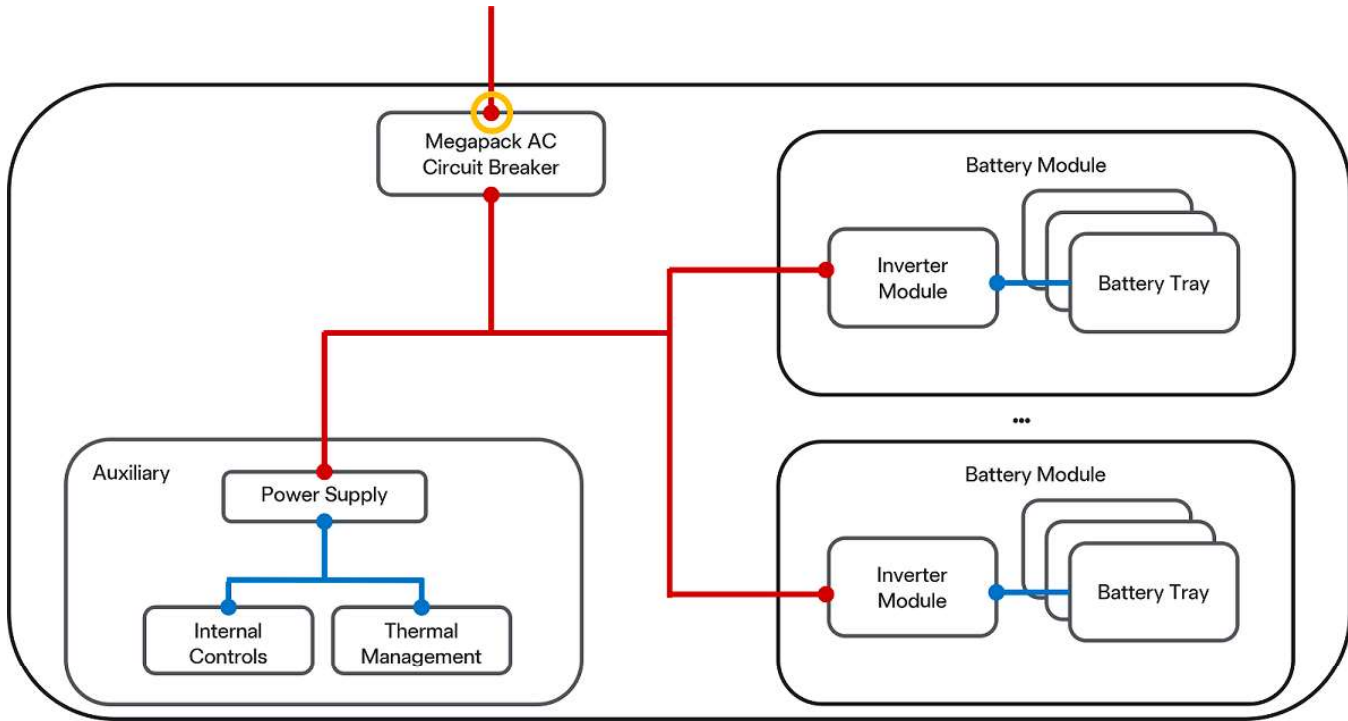
Figure 2. Megapack Overview



1. Battery module bays ([Battery Modules on page 9](#))
2. Thermal cabinet ([Thermal System on page 10](#))
3. Customer Interface Bay ([Customer Interface Bay on page 10](#))
4. Thermal roof ([Thermal System on page 10](#))
5. IP66 enclosure ([Enclosure on page 14](#))



Figure 3. Megapack Internal Architecture



**Legend**

- AC
- AC Output Terminals
- Internal DC

The AC output terminals are the point on the AC bus bars at which the external AC connections to the Megapack are terminated.

**1.3.1 Battery Modules**

Battery modules are factory-installed into Megapack battery module bays and contain prismatic lithium-ion battery cells, the smallest non-divisible energy storage components of the Megapack. A battery module in turn is the smallest field-replaceable battery unit. Each Megapack contains up to 24 battery modules.

Figure 4. Battery Module





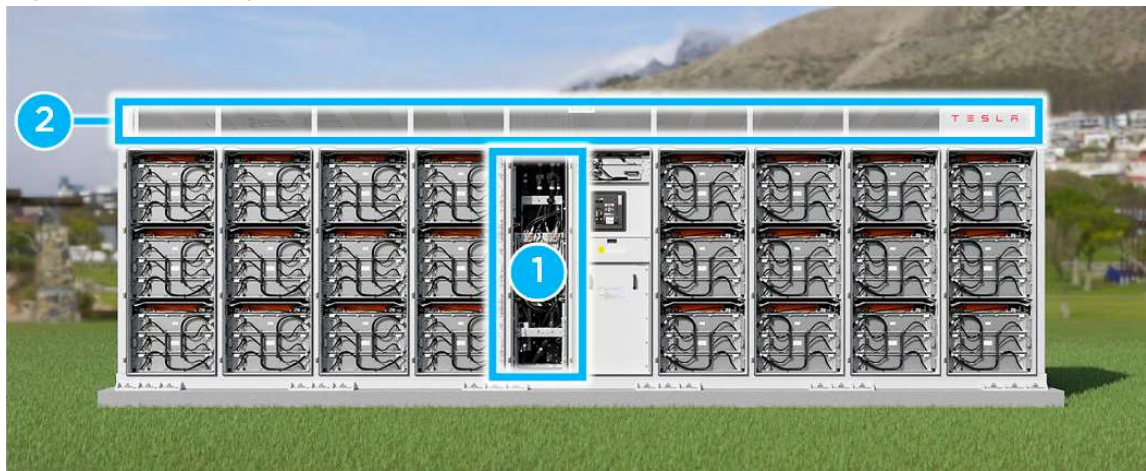
Each battery module includes an integrated inverter module for power conversion. Battery modules are connected in parallel to Megapack's internal AC bus, each with an AC power and communications output connection. The modules do not require any field assembly or adjustments and may only be replaced by Service Providers.

### 1.3.2 Thermal System

The thermal system provides active cooling and heating to the internal Megapack components. An external HVAC or thermal system is therefore not required for Megapack to operate.

The thermal system is comprised of the thermal cabinet and the thermal roof.

Figure 5. Thermal System



1. Thermal cabinet
2. Thermal roof

The thermal cabinet includes pumps that circulate coolant through the Megapack and a compressor that maintains thermal control, in addition to an in-line heater that can warm the coolant. The thermal cabinet also contains a power conversion system for drawing power from Megapack's internal AC bus. The thermal cabinet is accessible for servicing from ground level.

The thermal roof, or top cabinet of the enclosure, provides ventilation airspace and contains fans and radiators that cool the ethylene glycol-water coolant solution. The thermal roof is accessible for servicing with the help of a ladder or mechanical lift.

**WARNING:** The thermal management section is locked during operation. Do not open this cabinet while fans are in use, to avoid hazard from moving parts.

**NOTE:** Megapack includes an enable circuit as a safety feature. Opening the door to the thermal bay shuts down the Megapack. The thermal components located on the roof should not be serviced during operation.

### 1.3.3 Customer Interface Bay

All of the interface customers require for installation, operation, and maintenance is located in Bay 6, the Customer Interface Bay:



Figure 6. Customer Interface Bay

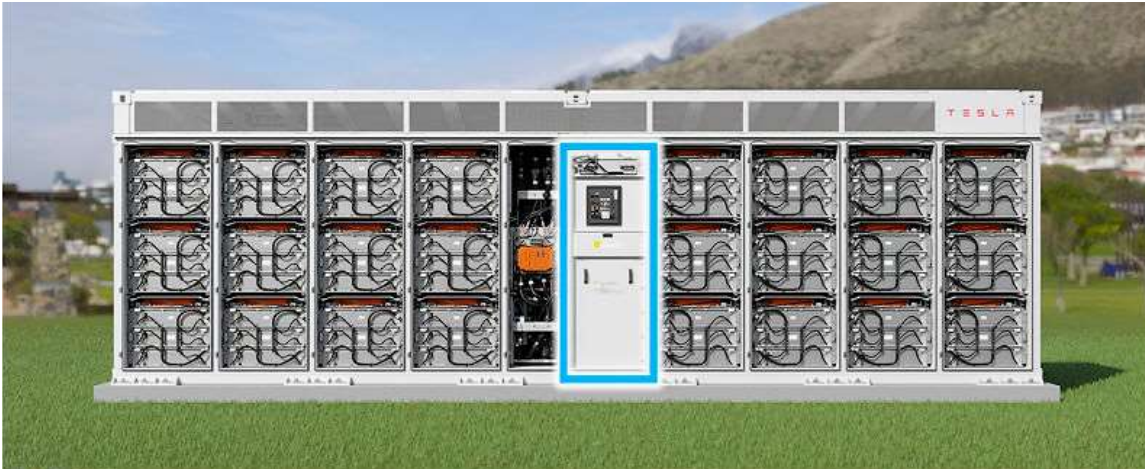


Figure 7. Customer Interface Bay Details



1. Megapack AC circuit breaker – provides distribution system protection
2. Customer I/O area – where all terminations aside from AC bus bars are made
3. AC bus bar area – where terminations to the site distribution transformer or AC distribution panel are made
4. Wireway openings

### 1.3.4 Megapack AC Circuit Breaker

The Customer Interface Bay contains the Megapack AC circuit breaker, a pre-installed circuit breaker that provides distribution system protection. This breaker is lockable for safe maintenance of the Megapack. Refer to [Safety Disconnect Features on page 23](#).

**NOTE:** Additional protection or switching means at the output of the Megapack may be required depending on the jurisdiction. Protection and switching philosophy must be verified by the customer's engineer of record and should comply with regional and local codes.



Figure 8. Megapack AC Circuit Breaker – UL 489

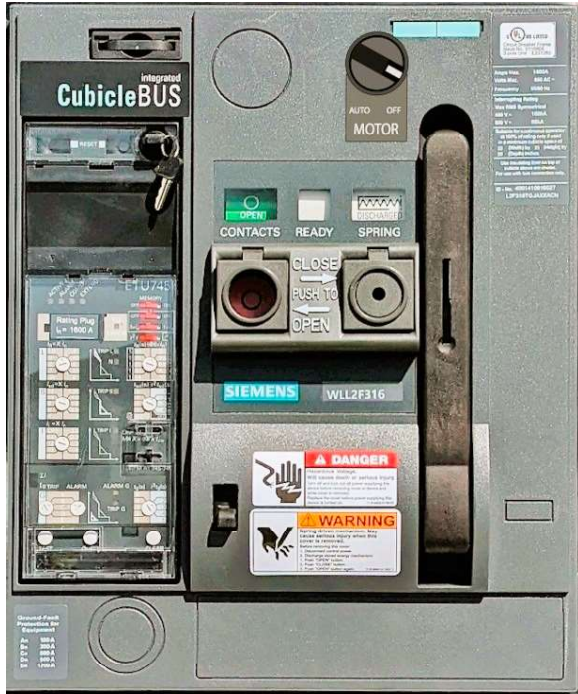


Table 2. Megapack AC Circuit Breaker Specifications – UL 489

<b>Model</b>	UL 489 Siemens WL model with an ETU745 programmable protection unit
<b>Manufacturer Documentation</b>	Siemens Low Voltage WL Circuit Breakers: <a href="https://new.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/wl-power-circuit-breakers.html">https://new.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/wl-power-circuit-breakers.html</a> → UL 489 content
<b>Control Power</b>	A separate power source is not required.  While operating normally (above 0% state of charge and not faulted), power is provided by the battery modules.  If a separate power source is desired, jumpstart power can also be used.
<b>Button Location</b>	1818 mm (71.6 in) from the base of the Megapack.  If the chosen foundation will place these buttons outside of local regulatory height requirements, ensure that another method of compliance is provided (such as raised workstation or remote open/close terminals).
<b>Spring Charge</b>	Megapack comes standard with motor to allow automatic charging of the spring-loaded breaker. The circuit breaker spring may also be manually charged for actuation.
<b>Part Number</b>	<ul style="list-style-type: none"> <li>Option code BB02: L2F330WGJAXEACN</li> <li>Option code BB01: L2F316TGJAXEACN</li> </ul> <p>Refer to the <i>Megapack 2 XL Option Codes Quick Reference Guide</i> for more information.</p>





Figure 9. Megapack 2 XL Circuit Breaker – UL 1066



Table 3. Megapack AC Circuit Breaker Specifications – UL 1066

<b>Model</b>	UL 1066 Siemens WA model with an ETU600 programmable protection unit
<b>Manufacturer Documentation</b>	Siemens Low Voltage WA Circuit Breakers:  <a href="https://www.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/3wa-power-circuit-breakers.html">https://www.siemens.com/us/en/products/energy/low-voltage/low-voltage-circuit-breakers/3wa-power-circuit-breakers.html</a> → UL 1066 content
<b>Control Power</b>	A separate power source is not required.  While operating normally (above 0% state of charge and not faulted), power is provided by the battery modules.  To view the ETU600 screen, power must be supplied from laptop and/or portable power supply via USB-C port.
<b>Button Location</b>	1818 mm (71.6 in) from the base of the Megapack.  If the chosen foundation will place these buttons outside of local regulatory height requirements, ensure that another method of compliance is provided (such as raised workstation or remote open/close terminals).
<b>Spring Charge</b>	Megapack comes standard with motor to allow automatic charging of the spring-loaded breaker. The circuit breaker spring may also be manually charged for actuation.
<b>Part Number</b>	<ul style="list-style-type: none"> <li>• Option code BB02: 3WA3232-5AF02-2KA5-Z B30+D80+F40+P61+S40</li> <li>• Option code BB01: 3WA3216-5AF02-2KA5-Z B30+D80+F40+P61+S40</li> </ul> <p>Refer to the <i>Megapack 2 XL Option Codes Quick Reference Guide</i> for more information.</p>



For information about the default AC circuit breaker settings, refer to the *Megapack 2 XL Design and Installation Manual*.

### 1.3.4.1 Controlling the Circuit Breaker

A circuit breaker is either closed, allowing electricity to flow, or it is open, preventing the flow of electricity. Upon fault detection, the circuit breaker will trip to open state to isolate the Megapack. Megapack will only close the circuit breaker if the system has been deemed safe by Megapack firmware, based on the information provided by its status circuits:

- Enable circuit ([Enable Circuit on page 23](#))
- Remote shutdown circuit
- Breaker close circuit

Generally, if all three of these status circuits are closed, the Megapack AC circuit breaker will close. Conversely, if any one of these status circuits are open, the breaker will not close.

A Megapack's circuit breaker can be controlled in three ways:

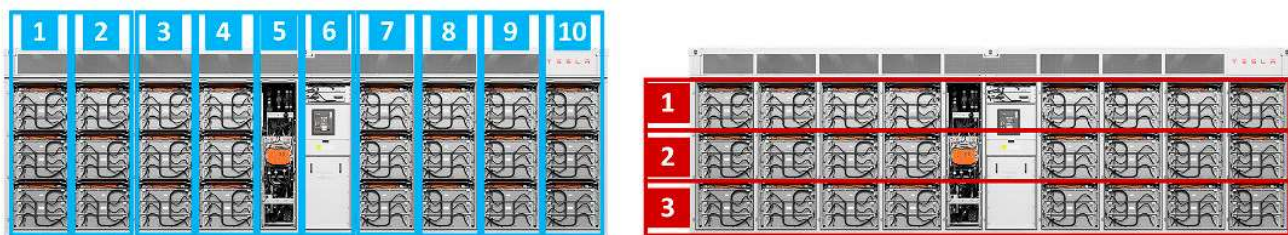
Table 4. Control Method Summary

Control Method	Open Circuit Breaker	Close Circuit Breaker
Manual	Open button	Close button
DNP3	Point = Open Megapack Breaker	Point = Close Megapack Breaker
Remote	Remote shutdown terminals	Breaker close terminals

### 1.3.5 Megapack Numbering Key

A numbering key can help identify locations of Megapack enclosure components to assist you when referring to them during installation or service. Below are the numbering keys for **bay** (vertical tower) and **shelf** (horizontal row) locations:

Figure 10. Megapack Bay Numbering (Left) and Shelf Numbering (Right)



For example, as depicted in [Megapack Overview on page 8](#):

- The thermal bay is in bay 5
- The Customer Interface Bay is bay 6
- Battery modules are located on shelves 1-3 in bays 1-4 and 7-10.

### 1.3.6 Enclosure

Megapack's enclosure is rated according to IP (ingress protection) code IP66. This means it provides a high level of protection against particle and water ingress for components internal to the enclosure.



**This high protection rating must be maintained at all times. In particular, special precautions must be observed while installing or servicing Megapack to prevent particles, water, or debris from entering the enclosure.**

Refer to the *Megapack 2 XL Design and Installation Manual* for more information.

There are two enclosure variants:

Table 6. Megapack Enclosure Variants

Variant	Number of Anchor Brackets	Wireway Configuration
-C enclosure	12	Two single-channel trays
-D enclosure	10	Two four-channel trays

Graphics in this publication reflect the -C enclosure variant unless otherwise specified.

Refer to the *Megapack 2 XL Layout* drawings in the *Megapack 2 XL Drawings* package for detailed information.

## 1.4 Tesla System Controller

The Tesla System Controller is the single point of interface with which to monitor and control the entire Megapack System and approved third-party generation sources as specified in the *Tesla Industrial Energy Approved Vendor List*. It hosts the Tesla Controls Suite, which manages control functions of the Megapack System and approved third-party generation sources, aggregating real-time information and using it to optimize commands. The Tesla System Controller communicates over a private TCP network.

By default, Tesla provides two Tesla System Controllers. Refer to the *SCADA Design Manual* for additional details on alternative configurations. Tesla does not include additional networking equipment that may be required for the system to operate.

The Tesla System Controller has three network interfaces:

- LAN 1 RJ45/Ethernet port, which connects to the Customer Network and can be configured for WAN access
- LAN 2 RJ45/Ethernet port, which connects to the Tesla Network
- Integrated cellular modem, which by default provides cellular access for Tesla's remote connection

Refer to the relevant *Controls and Communications Manual* for complete instructions on how to interface with the Tesla System Controller.

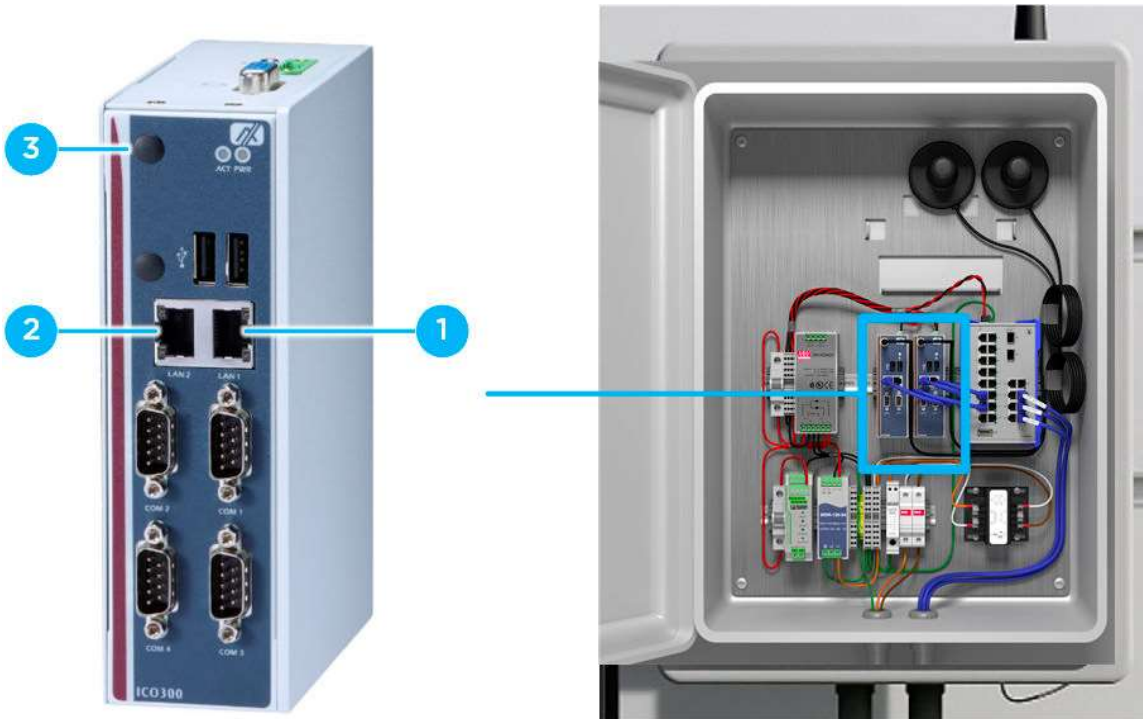
Tesla requires network separation between the Tesla Network and the Customer Network. The Tesla Network shall only contain devices that are critical for Megapack System operation. System operators can interface with the Tesla System Controller over the Customer Network.

There are two physical variations of the Tesla System Controller:

- **Standard Tesla System Controller:** Used in Megapack Systems up to 18 MW. Delivered in the Standard Tesla System Controller Enclosure, which includes two Standard Tesla System Controllers. Refer to the *Standard Tesla System Controller Enclosure Installation Manual* for installation details.
- **Large Tesla System Controller:** Used in Megapack Systems larger than 18 MW. A single Large Tesla System Controller (or pair of controllers acting in automatic failover) supports up to 300 Megapacks. For projects with more than 300 Megapacks, additional Large Tesla System Controller(s) may be required. Contact your Tesla representative for more information on controller architectures for larger system sizes.

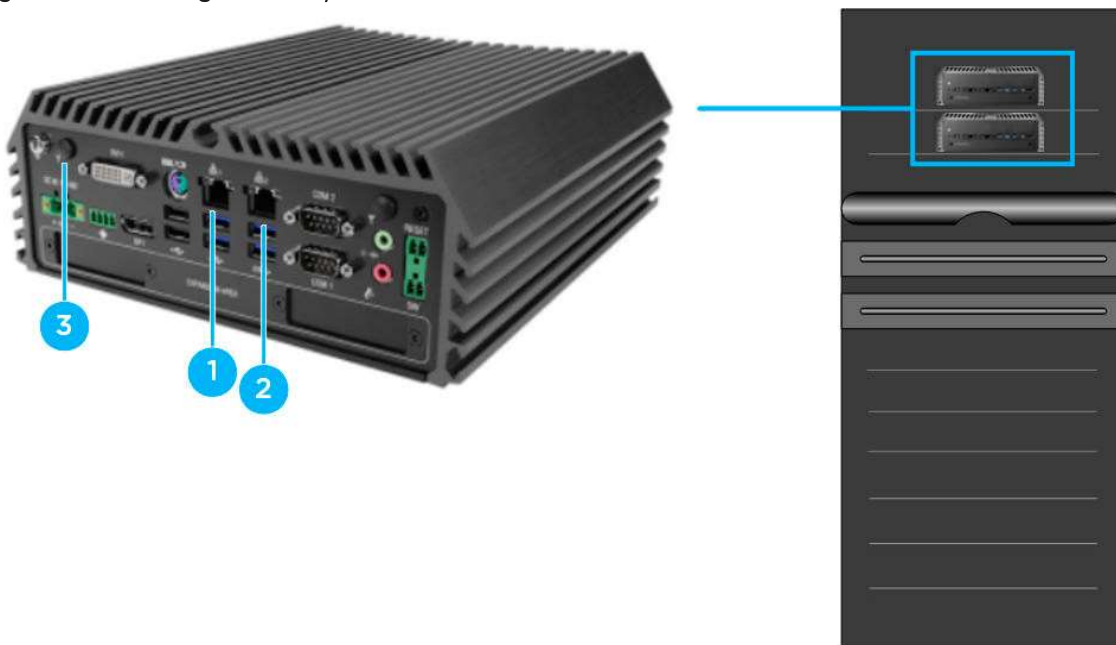


Figure 11. Two Standard Tesla System Controllers in the Standard Tesla System Controller Enclosure



- 1. LAN 1 port - Customer Network
- 2. LAN 2 port - Tesla Network
- 3. Cellular WAN connection

Figure 12. Two Large Tesla System Controllers in a SCADA Network Enclosure



- 1. LAN 1 port - Customer Network
- 2. LAN 2 port - Tesla Network
- 3. Cellular WAN connection



## 1.5 Labels and Serial Numbers

### 1.5.1 Megapack Labels

Megapack labels provide the specifications and product reference for each individual Megapack.

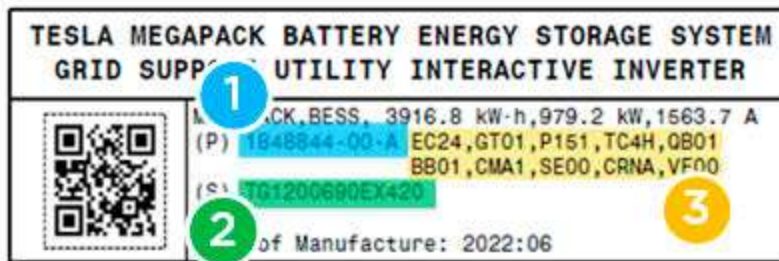
**NOTE:** The labels pictured here are example labels. Refer to the actual labels for applicable ratings and specifications per option codes.

**NOTE:** For more information about option codes, refer to the *Megapack 2 XL Option Codes Quick Reference Guide*

The **Megapack external label** is a small metal label laser-etched onto the outside of the Customer Interface Bay door above the handle. It contains:

- Description of the product, with kWh, kW, and amp ratings
- Part number followed by option codes for battery and inverter ratings only
- Serial number
- Date of manufacture

Figure 13. Megapack External Label - Example



1. Part number
2. Serial number
3. Option codes

**NOTE:** The external label lists selected option codes only. For the complete list of option codes, refer to the Megapack nameplate label.

The **Megapack nameplate label** is a large sticker affixed to the inside of the Customer Interface Bay door, and contains nameplate information such as:

- AC input/output specifications including relevant power and energy ratings, in kWh, kW, and amps
- Part number followed by complete list of option codes
- Serial number
- Date of manufacture
- Weight (mass)
- Other detailed product specifics and compliance marks



Figure 14. Megapack Nameplate Label - Example

<b>TESLA MEGAPACK BATTERY ENERGY STORAGE SYSTEM</b> <b>GRID-SIDE UTILITY INTERACTIVE INVERTER</b>	
	
(P) 1349844-001A EC24,GT01,P151,TC4H,QB01 (S) BBO1,CMA1,SE00,CRNA,VF00	
1	2 manufacture: 2022:06
	
Protective Class	Class I
Enclosure Type	Type 3R/IP66
Ingress Protection (Enclosure/Thermal Roof)	IP66 / IP2x
Operating Temperature Range	-20°C to +50°C
Inverter Topology	Non-Isolated
Nominal Battery Energy (AC) at 979.2 kW	2016.8 kWh
Battery Type	Li-Ion
Mass	26346 kg
<b>AC Input/Output</b>	
Nominal Voltage (3-Phase)	480 VAC
Maximum Continuous Power	1512 kVA
Voltage Range	422.4-552 V
Maximum Continuous Current	1819.7 A
Frequency	45-60 Hz
Power Factor Range	-1 to 1
Maximum Output Fault Current	2182.4 A
Maximum Utility Backfeed Current	4200 A
Maximum Supply Fault Current	85 kA AC
Refrigerant	R-134a 1.5 kg
Refrigerant Oil	POE 0.22 L
Coolant Volume	EGW 260 L
Certified to:	CAN/CSA-STD C22.2 No. 107.1
Conforms to:	ANSI/CAN/UL 1973, ANSI/CAN/UL 9540 UL STD. 1741
CAUTION: RISK OF ELECTRIC SHOCK. WARNING: POWER FED FROM MORE THAN ONE SOURCE. DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING.	
ENERGY STORED IN CAPACITOR. DO NOT REMOVE COVER UNTIL 5 MINUTES AFTER DISCONNECTING THE EQUIPMENT.	
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.	
ATTENTION: RISQUE DE CHOC ÉLECTRIQUE. AVERTISSEMENT: L'ALIMENTATION PROVIENT DE PLUS D'UNE SOURCE COUPER TOUTES LES SOURCES D'ALIMENTATION AVANT UN SERVICE	
(ÉNERGIE STOCKÉE DANS DES CONDENSATEURS. ATTENDRE 5 MINUTES AVANT DE RETIRER LE COUVERCLE APRÈS AVOIR COUPÉ TOUTES LES SOURCES D'ALIMENTATION.	
CONFIER L'ENTRETIEN À DU PERSONNEL QUALIFIÉ.	
	
	Tesla, Inc. 700 D'Arcy Pkwy Lithrop, CA 95330, USA Tel: 1(877)798-3762 www.tesla.com

1. Part number
2. Serial number
3. Option codes

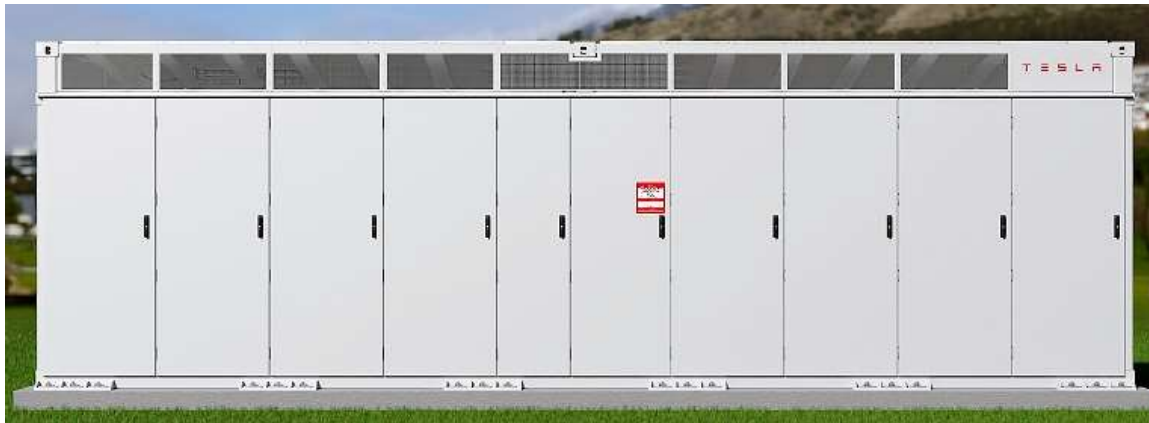
### 1.5.2 Arc Flash Label

An arc flash label is affixed to the outside of the Customer Interface Bay door for each Megapack. The label designates:

- Working distance
- Expected incident energy
- Recommended PPE
- Nominal voltage



Figure 15. Example Location of Arc Flash Label



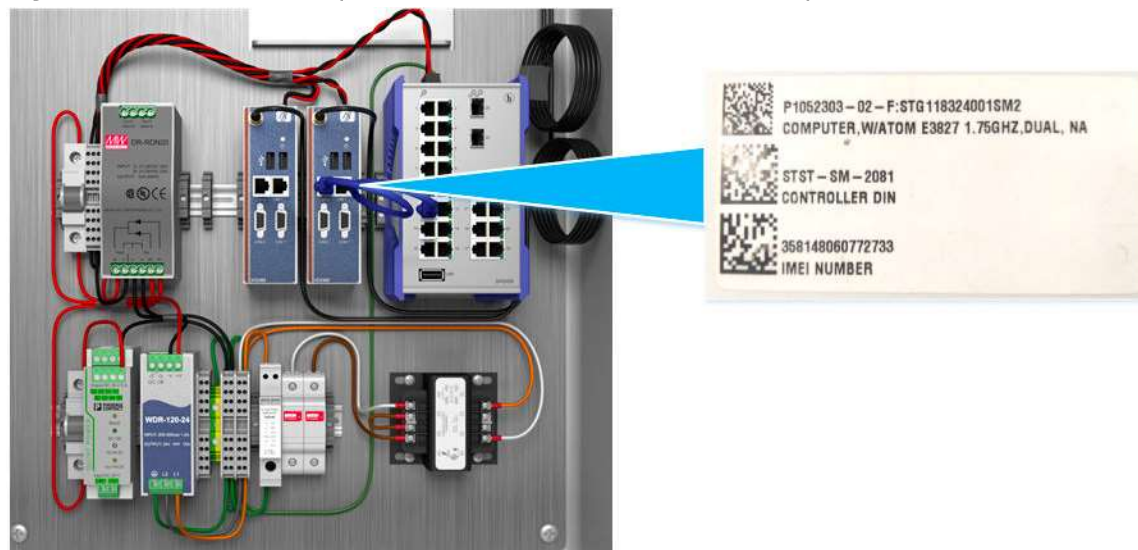
**NOTE:** Arc flash labels are required for Service Providers to perform any work on Megapack. If the label is not present, Tesla will require Megapack and upstream devices to be completely de-energized before any work on Megapack can take place.

### 1.5.3 Tesla System Controller Serial Number

For both variants of the Tesla System Controller, look on the controller computer or computers to identify the serial number.

The Standard Tesla System Controller serial number and VIN are located on a label on the side of the Standard Tesla System Controller computer in the Standard Tesla System Controller Enclosure:

Figure 16. Standard Tesla System Controller Serial Number (Example) - Location



P1052303-02-F:STG118324001SM2  
COMPUTER, W/ATOM E3827 1.75GHZ, DUAL, NA

STST-SM-2081  
CONTROLLER DIN

358148060772733  
IMEI NUMBER

The VIN is typically labeled *CONTROLLER DIN* and takes the format *STST-SM-####*.

**NOTE:** There may be two Standard Tesla System Controllers in the Standard Tesla System Controller Enclosure. Each has its own identifiers.

The Large Tesla System Controller serial number is located on the side of the Large Tesla System Controller computer.



## 1.6 Emergency Response Guide

The *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) provides an overview of product materials, handling and use precautions, hazards, emergency response procedures, and storage and transportation instructions. Tesla recommends that a physical copy of the ERG is transported along with Megapack, and subsequently remains on site and accessible at all times for the life of the product. The ERG is periodically updated. Download the latest revision from <https://tesla.com/firstresponders>.

The ERG may be used in place of traditional Safety Data Sheets (SDS) commonly associated with the health and safety of a chemical product, however Safety Data Sheets are available for materials in Tesla Energy products. Refer to the Tesla Partner Portal or contact Tesla for more information.



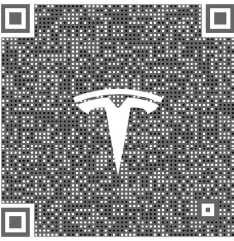
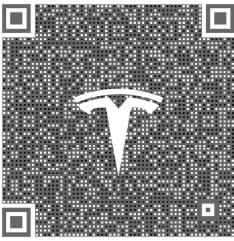
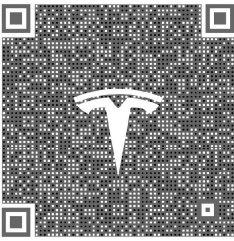
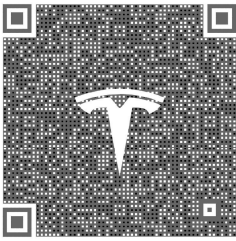
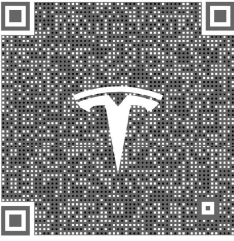
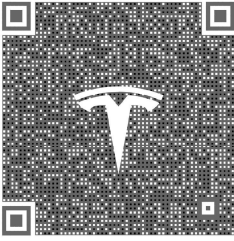
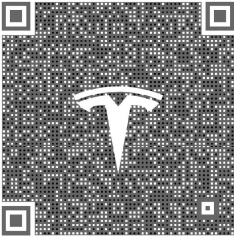
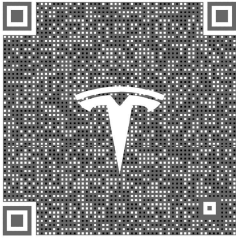
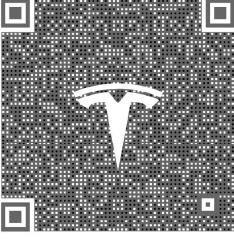
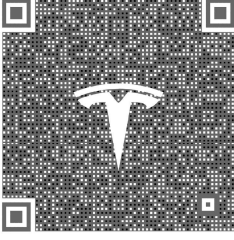
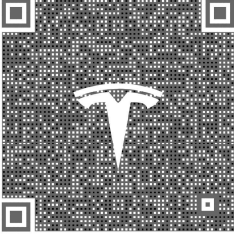
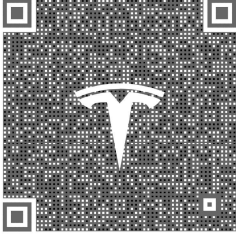
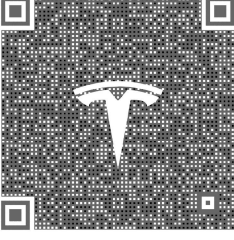
**NOTE:** Tesla BESS coolant is not a regulated substance according to the United States Department of Transportation (USDOT). Tesla BESS refrigerant is a regulated substance according to the USDOT.

### 1.6.1 Available ERG Translations

The *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) is available in various languages as indicated below. As information in the ERG is periodically updated and translations are periodically added, always check the Tesla First Responders Information page at <https://www.tesla.com/firstresponders> for the latest revision of this guide, for ERGs for other Tesla products, and for the latest additional translated versions.





<p><i>English</i></p> 	<p><i>Deutsch</i></p> 	<p><i>Español</i></p> 	<p><i>Français</i></p> 
<p><i>עברית</i></p> 	<p><i>Italiano</i></p> 	<p><i>日本語</i></p> 	<p><i>한국어</i></p> 
<p><i>Nederlands</i></p> 	<p><i>简体中文</i></p> 	<p><i>繁體中文</i></p> 	<p><i>Português</i></p> 
<p><i>Slovenščina</i></p> 			

## 1.7 Getting Support

For Megapack support or to provide product feedback, contact Tesla via <https://ion.tesla.com/>.

For urgent support, refer to [Contact Information on page 22](#).

Have the following information ready when contacting Tesla:

- Site name
- Best point of contact for Tesla to return contact (name, phone number, email)



- Tesla System Controller VIN (Example VIN format: STST-SM-XXXX)
- Brief description of the observed issue, including the time, date, and symptoms of the event
- If the issue is specific to one Megapack, the Megapack serial number

### 1.7.1 Contact Information

In case of critical performance issues (for example, if the Tesla site is 100% non-operational), call the appropriate Tesla telephone number listed below and select **Urgent** for 24/7 support.

For other inquiries, visit the **Online Support and Ticketing Portal** or telephone the support contacts provided below.

#### Online Support and Ticketing Portal

<https://ion.tesla.com/>

For information about using the Portal, refer to the *Tesla ION User Guide*:

[https://partners.tesla.com/home/en-us/content/download/tesla\\_ion\\_user\\_guide\\_en-na.pdf](https://partners.tesla.com/home/en-us/content/download/tesla_ion_user_guide_en-na.pdf)

#### Urgent Support via Telephone (24x7)

Asia: +1 571 573 9163

Australia/New Zealand: +61 2 432 802 81

Europe/Middle East/Africa: +31 2 08 88 53 32

Japan: +1 571 573 9163

North America: +1 650-681-6060

#### Technical Support via Telephone


North America: +1 650-681-6060	Asia/Pacific: +61 2 432 802 81	France: +33 173218702
Japan: +0120 312-441	The Netherlands: +31 208885332	Slovenia: +38 617778699
South Africa: +27 213004878	Switzerland: +41 445155607	United Kingdom: +44 1628450645



## 2 Megapack Safety Features

### 2.1 Fire Protection


Megapack does not contain built-in smoke, gas, or fire detection or suppression features, but is designed to mitigate such hazards from spreading to surrounding units or exposures. If fire or smoke is observed emanating from a Megapack at any time, evacuate the area and notify appropriately trained first responders and the local fire department. Consult the *Industrial Lithium-Ion Battery Emergency Response Guide* for details around hazards and recommended response. For emergency shutdown procedures, see [Shutting Down in an Emergency on page 4](#).

 **NOTE:** As part of a site's fire safety preparations, site owners can use the *Emergency Response Site Information Form* provided by Tesla to coordinate and establish communication with local fire departments.

### 2.2 Safety Disconnect Features

#### 2.2.1 Megapack AC Circuit Breaker

The Customer Interface Bay contains an AC circuit breaker that can be locked in the open position.

 **WARNING:** Operating the Megapack AC circuit breaker does not completely de-energize the Megapack. See [Performing Lockout/Tagout on page 42](#) for more information.

#### 2.2.2 Enable Circuit

Megapack includes an internal safety circuit called an *enable circuit* (also known as *HVIL - high-voltage interlock loop*) that isolates all major power components whenever the circuit is opened. Certain factors trigger opening this circuit, including opening bay doors or turning the enable switch ([Enable Switch on page 24](#)) off. The Customer Interface Bay door is not part of the enable circuit, as it does not provide direct access to high-voltage equipment. The enable circuit does not trip the Megapack AC circuit breaker.

The Megapack internal monitoring system uses the enable circuit to monitor for critical system faults and prevent operation of the Megapack unit if needed. It is not recommended to open a Megapack door during operation.


 **WARNING:** Opening the enable circuit does not completely de-energize the Megapack. See [Performing Lockout/Tagout on page 42](#) for more information.



Figure 17. Enable Circuit Examples



1. The enable circuit is closed. Megapack is able to operate.
2. The enable circuit is open due to an open bay door that is not the Customer Interface Bay door. Megapack is unable to operate.
3. The enable circuit is open because the enable switch in the off position. Megapack is unable to operate.

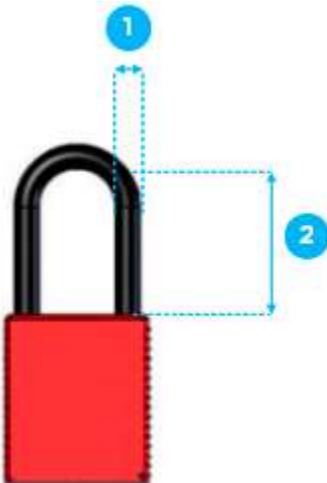
### 2.2.3 Enable Switch

The customer I/O area in the Customer Interface Bay includes an enable switch that can interrupt the enable circuit and prevent the system from energizing. This switch is part of the enable circuit, and provides a lockable isolation point for procedures that involve actively working inside Megapack. It is the recommended customer interface to the enable circuit. When the switch is turned off, the enable circuit is open and the product will not actively operate.

**WARNING:** The enable switch must be turned off at any time when working inside Megapack. See [Performing Lockout/Tagout on page 42](#) for more information.

If applying a lock to the enable switch, the lock must observe the specifications indicated below:

Figure 18. Lock Specifications



1. Nominal shackle diameter: 6.4 mm (1/4 in)
2. Minimum shackle clearance: 38.1 mm (1 1/2 in)



### 2.2.4 Remote Shutdown Terminals

The customer I/O area in the Customer Interface Bay contains a pair of terminals used to perform a remote shutdown, which commands the inverter to cease operation (isolating the Megapack AC bus from the battery DC source) and opens the Megapack AC circuit breaker. These terminals may be used by the customer to provision an E-Stop button, for example, which can be activated to place the system in a standby state. Refer to [Controlling the Circuit Breaker on page 14](#) for more information.



**NOTE:** Remote shutdown is software-driven functionality that may not comply with emergency stop regulations in all locales. Check with the local codes and AHJ before using this functionality to provision an E-Stop button.

### 2.2.5 Remote Shutdown in Islanding Applications

Systems used in islanding applications may be configured to provide an additional source of power in the absence of utility power. Therefore, an additional means may be required to prevent the Megapack System from creating a hazardous situation by introducing unexpected power to interconnected equipment during emergency response.

Using the remote shutdown terminals or a locally accessible human machine interface (HMI), an E-Stop button shall prevent the connected Megapack unit from providing an additional source of power to interconnected equipment. Tesla strongly recommends the E-Stop be readily accessible to emergency responders.



**NOTE:** As a best practice, add any E-Stop information to the *Emergency Response Site Information Form* and use that to inform local fire authorities about this functionality at your site.

## 2.3 Service De-Energization

In order to perform many of the service actions, de-energization of the Megapack is required, including of the line-side bus bars entering the Megapack.

Follow the procedures in [Performing Lockout/Tagout on page 42](#) to de-energize Megapack.



## 3 Operations

Operators, as designated by system owners, are responsible for the day-to-day operations of the Megapack site. Responsibilities of operators include:

- Monitoring and operating the site as required
- Providing for site access for Service Providers ([Maintaining Access, Routes, and Zones on page 35](#))
- Providing a safe work environment for Service Providers ([Providing a Safe Work Environment on page 41](#))
- If requested by a local authority, providing total material quantities as indicated in the *Application Note: Considerations for Hazardous Materials Business Plans (HMBP)*
- Arranging for decommissioning ([Decommissioning and Disposal on page 52](#))

The Tesla System Controller provides the single point of interface through which you control and communicate with the Megapack System. For more information about the Tesla System Controller, refer to the *Controls and Communications Manual - Tesla System Controller*.

For troubleshooting the Megapack System, refer to [Appendix A: Troubleshooting on page 56](#).

### 3.1 Critical Operational Considerations

If the system reaches a 0% state of charge, it must be re-charged within 30 days. If the system stays at 0% state of charge for more than 30 days, it may result in permanent system damage and loss of warranty. Contact Tesla for more information.



## 4 Site and Balance-of-Plant Maintenance

Typically, as the operator, you are responsible for the maintenance of the site and the balance of plant, which may include MV transformers, MV switchgear, meters, field network enclosures, cabling connecting these units, thermal imaging cameras, air quality, and site lighting. You are also responsible for the upkeep of the maintenance infrastructure for the Megapack System, described in [On-Site Maintenance Infrastructure Requirements Overview on page 36](#).

Refer to your contracts with Tesla to confirm the maintenance obligations between the parties.

Refer to *Application Note: Megapack Site Design Best Practices* for additional information on the site design best practices for operations and maintenance.



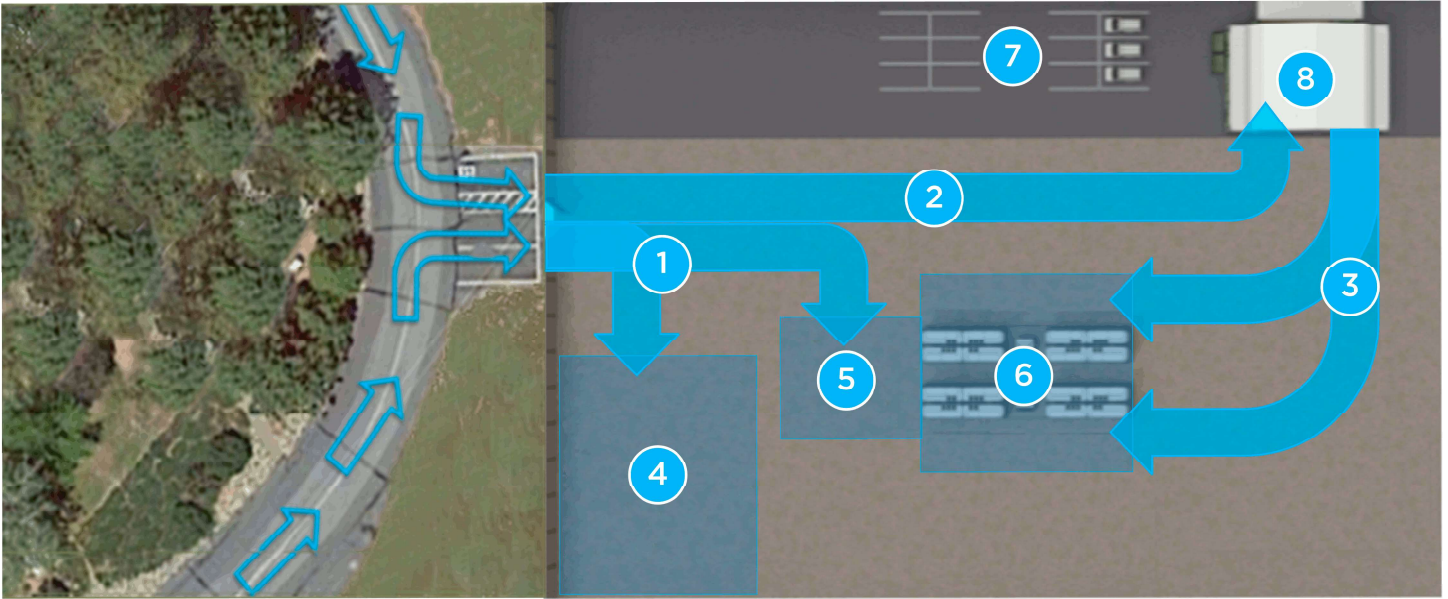
**WARNING:** Before operating or maintaining Megapack, read and understand all safety information as detailed in [IMPORTANT SAFETY INFORMATION on page 2](#).

### 4.1 Routes and Zones

A site generally consists of routes and zones as indicated below. A **route** is defined as the full path between two or more locations and includes the surface being traveled upon. A **zone** is a defined area of the site that is typically distinguished by function. A zone can be in multiple locations on a site and is dependent on the site layout. Routes and zones are generally allowed to overlap as needed.




Figure 19. Routes and Zones -- Example



1. Delivery Route
2. Service Access Route
3. Battery Service Route
4. Construction Staging Zone
5. Crane Zone
6. Battery Zone:
  - o Foundation Zone
  - o Battery Service Zone
7. Parking Zone
8. Service Staging Zone

### 4.1.1 General Requirements

The site must maintain routes and zones to the requirements described in this section for the life of the project. For vehicle descriptions and specifications, refer to [Typical Vehicles on page 32](#). Any temporary obstructions to routes or zones, such as snow or storm debris, are the responsibility of the owner to clear and may impact service if left unaddressed.

 **CAUTION:** Standing water in any routes or zones may impact serviceability or structural integrity and should be mitigated as much as possible.


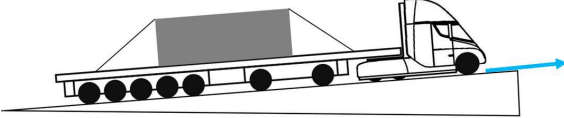
 **NOTE:** The requirements for routes and zones generally apply at any site regardless of whether it is a single- or multiple-battery site. Contact your Tesla representative for more information.

Table 7. General Requirements for All Routes and Zones

Slope	Vehicle Requirements	Surface Conditions
Battery Service Zone: <ul style="list-style-type: none"> <li>• Maximum 5% in any direction</li> </ul> Foundation Zone:	<ul style="list-style-type: none"> <li>• Support for axle loads for designated vehicle types.</li> </ul>	Required: <ul style="list-style-type: none"> <li>• No potholes, ruts, or standing water.</li> </ul>





Slope	Vehicle Requirements	Surface Conditions
<ul style="list-style-type: none"> <li>Refer to the product <i>Design and Installation Manual</i></li> </ul> <p>All other routes and zones:</p> <ul style="list-style-type: none"> <li>Maximum 5% cross-slope</li> <li>Maximum 10% elevation (grade)</li> </ul> 	<ul style="list-style-type: none"> <li>Support for adequate width for designated vehicle travel.</li> <li>Support for minimum turning radii of designated vehicle types.</li> </ul>	<ul style="list-style-type: none"> <li>Adequately compacted and safe for people to work on and for designated vehicle types to operate on.</li> <li>Engineered with sufficient grip to provide tire traction.</li> </ul> <p>Recommended:</p> <ul style="list-style-type: none"> <li>All-weather surfaces that will not require major upkeep and resurfacing after significant weather events.</li> <li>A material that has been specified by the local or regional Department of Transportation.</li> <li>Graded or crowned surface to shed water and prevent ponding.</li> </ul>

### 4.1.2 Route Requirements

Uses and additional requirements and recommendations specific to each route are described below.

Table 8. Route Uses and Requirements

Route or Zone	Use	Designated Vehicle Types	Requirements and Recommendations
Delivery Route	Transport between the public right-of-way, the designated project entrance, and the vehicle unloading point (Crane Zone or Construction Staging Zone).	<ul style="list-style-type: none"> <li>Megapack delivery vehicle</li> <li>Crane</li> <li>Utility vehicle</li> <li>Telescopic forklift</li> <li>Fixed-mast forklift</li> <li>Service delivery vehicle</li> </ul>	<p>Required:</p> <ul style="list-style-type: none"> <li>Delivery vehicles and cranes must have a valid route to all designated Crane Zones and/or Construction Staging Zones for installation.</li> </ul> <p>Recommended:</p> <ul style="list-style-type: none"> <li>Looped route or cul-de-sac to avoid needing to reverse the delivery vehicle for long distances.</li> <li>Ability for delivery vehicle to back into or pull alongside the Crane Zone for greatest efficiency.</li> </ul>



Route or Zone	Use	Designated Vehicle Types	Requirements and Recommendations
Service Access Route	Transport between the public right-of-way and the Service Staging Zone.	<ul style="list-style-type: none"> <li>• Megapack delivery vehicle</li> <li>• Crane</li> <li>• Utility vehicle</li> <li>• Telescopic forklift</li> <li>• Fixed-mast forklift</li> <li>• Service delivery vehicle</li> </ul>	No additional requirements.
Battery Service Route	Transport between the Service Staging Zone and each Battery Service Zone.	<ul style="list-style-type: none"> <li>• Fixed-mast forklift</li> <li>• Utility vehicle</li> </ul>	Required: <ul style="list-style-type: none"> <li>• Designated vehicle types must have a valid route from the public right of way to the Service Staging Zone to <b>every</b> Battery Service Zone.</li> </ul>



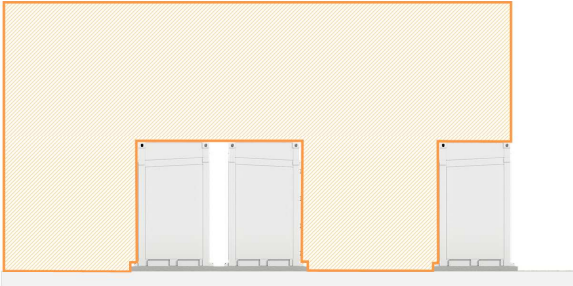

### 4.1.3 Zone Requirements

Descriptions and additional requirements and recommendations specific to each zone are described below.


Table 9. Zone Descriptions and Requirements

Route or Zone	Description	Designated Vehicle Types	Requirements and Recommendations
Construction Staging Zone	Portions of the site set aside for construction activities. Typical uses include material handling and temporary stockpiling, equipment and contractor parking, and occasionally the storage of battery units.	<ul style="list-style-type: none"> <li>• Megapack delivery vehicle</li> <li>• Crane</li> <li>• Utility vehicle</li> <li>• Telescopic forklift</li> <li>• Fixed-mast forklift</li> </ul>	Recommended: <ul style="list-style-type: none"> <li>• Consider that it is common for the construction staging zone to overlap with the service staging zone.</li> </ul>
Crane Zone	Portions of the site that have been allocated for the set up or operation of a crane.	<ul style="list-style-type: none"> <li>• Crane</li> </ul>	Required: <ul style="list-style-type: none"> <li>• Depending on the delivery logistics plan, additional clearances or surface load considerations may be required if delivery vehicles need to be within close proximity of the crane.</li> </ul>



Route or Zone	Description	Designated Vehicle Types	Requirements and Recommendations
<p>Battery Zone – Foundation Zone</p>	<p>The area upon which the battery unit is installed.</p> <p>The Foundation Zone must be considered in profile as well as in plan view:</p>  <div data-bbox="293 611 938 825" style="border: 1px solid black; padding: 5px;"> <p> <b>CAUTION:</b> The Foundation Zone must be protected from flooding. If more than 15 cm (6 in) of water are standing in the zone for longer than 30 minutes, the system must be shut down and a Service Provider must be contacted.</p> </div>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<p>Refer to the product <i>Design and Installation Manual</i>.</p>
<p>Battery Zone – Battery Service Zone</p>	<p>Megapack <i>Front</i> and <i>Vertical</i> clearances, as defined in the product <i>Design and Installation Manual</i>, both of which are used for all service actions.</p> <p>The Battery Service Zone must be considered in profile as well as in plan view:</p>  <div data-bbox="293 1381 938 1566" style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE:</b> Small inclusions for foundations are allowed as long as the foundation does not infringe on the <i>Foundation overhang</i> and <i>Drive aisle</i> clearances, as defined in the product <i>Design and Installation Manual</i>.</p> </div>	<ul style="list-style-type: none"> <li>• Utility vehicle</li> <li>• Fixed-mast forklift</li> </ul>	<p>Required:</p> <ul style="list-style-type: none"> <li>• Supporting at least two egress routes, one in each direction, for people to vacate the zone on foot in the event of an emergency.</li> </ul>
<p>Parking Zone</p>	<p>Vehicle parking, required at all stages of the project life, but the quantity and usage of the parking will vary.</p>	<ul style="list-style-type: none"> <li>• Utility vehicle</li> </ul>	<p>Required:</p> <ul style="list-style-type: none"> <li>• Cannot overlap with listed equipment clearances on site.</li> <li>• Does not obstruct any of the delivery or service routes.</li> </ul>



Route or Zone	Description	Designated Vehicle Types	Requirements and Recommendations
			<ul style="list-style-type: none"> <li>• Parking stalls no smaller than 5.5 m x 2.75 m (18 ft x 9 ft).</li> </ul> <p>Recommended:</p> <ul style="list-style-type: none"> <li>• Temporary parking may be a good option for the surge in parking need during the construction of the project.</li> </ul>
Service Staging Zone	<p>Portions of the site set aside for service preparation activities. Typical uses include material handling and temporary stockpiling, and occasionally the storage of supplies.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <b>NOTE:</b> Requirements for this zone are detailed in the <i>Application Note: On-Site Maintenance Infrastructure Requirements</i>.                 </div>	<ul style="list-style-type: none"> <li>• Utility vehicle</li> <li>• Telescopic forklift</li> <li>• Fixed-mast forklift</li> <li>• Service delivery vehicle</li> </ul>	<p>Required:</p> <ul style="list-style-type: none"> <li>• Must be able to support a service delivery vehicle being unloaded by a forklift with sufficient room for the forklift and load to maneuver around the delivery vehicle.</li> </ul>

### 4.1.4 Typical Vehicles

Various vehicles are required to access routes and zones at the site as designed by the engineer of record.

The figure below shows the relative scale of typical vehicles compared to the Megapack:






Figure 20. Typical Vehicle Scale Compared to Megapack (Examples)



Examples of vehicles that may require access during construction, delivery, and for serviceability are listed below.



Table 10. Typical Vehicle Examples and Requirements

Type and Usage	Design Gross Vehicle Weight	Design Axle Weight	Approx. Dimensions	Vehicle (Example) - Not to Scale
<p><b>Utility vehicle</b></p> <p>Van or truck. Transports personnel and supplies.</p>	<p>4,545 kg (10,000 lb)</p>	<p>2,723 kg (6,000 lb)</p>	<p>Length: 6.7 m (22 ft)</p> <p>Height: 2.7 m (9 ft)</p> <p>Width: 2.4 m (8 ft)</p>	
<p><b>Service delivery vehicle</b></p> <p>Transports personnel and supplies for service and maintenance activities.</p>	<p>15,000 kg (33,000 lb)</p>	<p>8,165 kg (18,000 lb)</p>	<p>Length: 8 m (26 ft)</p> <p>Height: 4.2 m (13.6 ft)</p> <p>Width: 2.6 m (8.5 ft)</p>	
<p><b>Fixed-mast forklift</b></p> <p>Used during certain service activities to move components, most notably the battery module, as well as to unload service delivery vehicles.</p>	<p>6,350 kg (14,000 lb)</p>	<p>3,629 kg (8,000 lb)</p>	<p>Length: 3.8 m (12.4 ft)</p> <p>Height: 2 m (6.8 ft)</p> <p>Width: 1.6 m (5.4 ft)</p>	 <p><i>Shown with battery module removal tool for context.</i></p>
<p><b>Telescopic forklift</b></p> <p>Typically used during construction to move various materials or components. Not typically used by Tesla during service.</p>	<p>5,910 kg (13,000 lb)</p>	<p>3,175 kg (7,000 lb)</p>	<p>Length: 5.8 m (19 ft)</p> <p>Height: 6 m (20 ft)</p> <p>Width: 3 m (8 ft)</p>	
<p><b>Crane</b></p>	<p>112,000 kg (246,918 lb)</p>	<p>9,072 kg (20,000 lb)</p>	<p>Length: 15.7 m</p> <p>Height: 4 m (13.1 ft)</p> <p>Width: 3 m (9.3 ft)</p>	



Type and Usage	Design Gross Vehicle Weight	Design Axle Weight	Approx. Dimensions	Vehicle (Example) - Not to Scale
Lifts heavy equipment such as Megapack units and other units for system augmentation or other construction activities.				
<p><b>Megapack delivery vehicle</b></p> <p>Brings Megapack units to a Construction Staging Zone or a Crane Zone.</p>	63,200 kg (139,000 lb)	9,072 kg (20,000 lb)	<p>Length: 24.1 m (79 ft)</p> <p>Height: 4.2 m (13.5 ft)</p> <p>Width: 2.6 m (8.5 ft)</p>	

## 4.2 Maintaining the Perimeter

- When deterring access, maintain fence height as specified in the product's *Design and Installation Manual*.
- Fencing may be locked and posted with a placard stating "Authorized Users Only" or similar. Refer to local code for fencing placard requirements.
- Any fencing must follow clearance requirements as designated in the product's *Design and Installation Manual*, or as noted per the following exceptions:
  - If the installation is located within a property that already contains perimeter fencing to prevent unauthorized public access, additional fencing might not be required.
  - Permanent chain link fence without fill or slats can be installed according to the clearances specified in the *Design and Installation Manual*.
  - Removable chain link fencing (such as with a swing gate, or similar) without fill or slats may be installed according to the clearances specified in the *Design and Installation Manual*. When removed, the fence and its support structure must allow unobstructed equipment maintenance access and clearance for equipment door swing.

## 4.3 Maintaining Exposures and Fire Clearances

The dimensions and requirements as specified below are the product minimums and persist throughout the design, installation, and operating life of the system. Many jurisdictions have guidelines or restrictions about how close potentially combustible objects can be located to battery systems. Designers, owners, and operators are responsible for ensuring that the site meets the requirements of the local jurisdictions.



Figure 21. Exposure Clearances - Isometric View / Side View

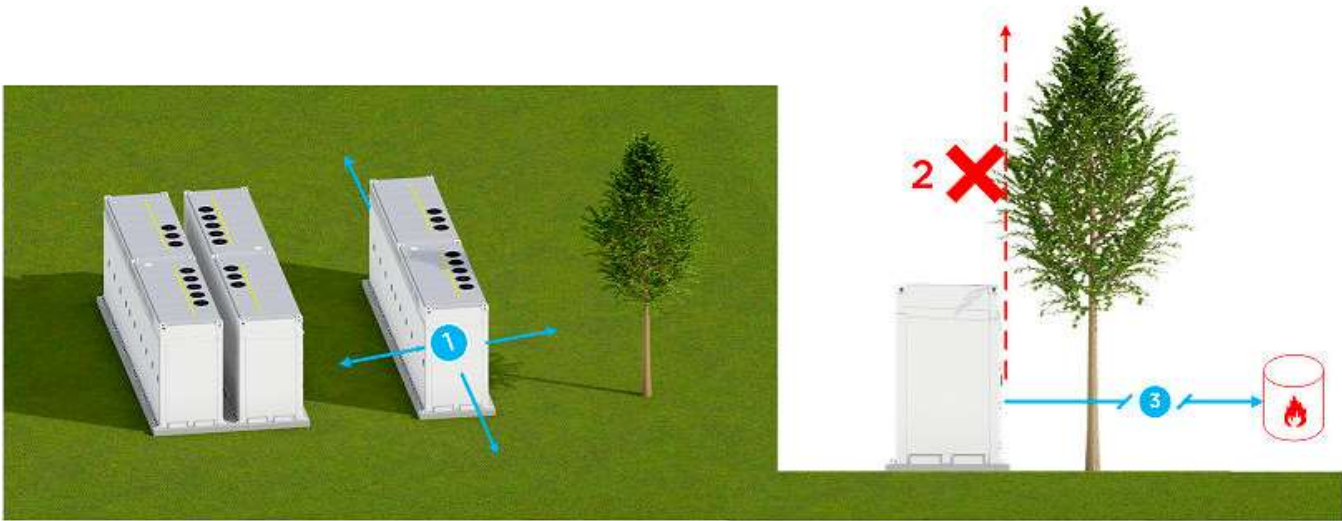


Table 11. Exposure Clearance Requirements

Callout	Type	Minimum	Maximum	Notes
1	Ordinary combustibles	1530 mm (60 in)	None	Minimum clearance as noted is required on all sides to ordinary combustible objects including trees, wooden fences, and other combustible structures.
2	Vertical combustible or ignitable	NA	NA	<b>Do not install Megapack under combustible or ignitable objects, at any distance.</b>
3	Ignitable liquids	6096 mm (240 in)	None	Minimum clearance as noted is required on all sides to ignitable liquids sources.

**NOTE:**

- Megapack is not intended to be installed within 3050 mm (120 in) from accessible means of egress and exposures (such as buildings, public ways, and hazards not associated with electrical grid infrastructure as defined by the clearance requirements in the International Fire Code and NFPA 855).
- Any installation that requires clearances of less than 3050 mm (120 in) to accessible means of egress or exposures may require a freestanding fire barrier per requirements in the International Fire Code and NFPA 855.


### 4.4 Maintaining the Enclosure

- Enclosures must be regularly visually inspected for any areas of damage, which shall be reported to a Service Provider.
- Enclosures must be regularly visually inspected to ensure they remain free of debris or rodents.

### 4.5 Maintaining Access, Routes, and Zones

To service Megapack, Service Providers will require frequent access to the site and to the Megapacks themselves, over the full duration of the project's life. Routes and zones at the site must allow for year-round access, including for support of all vehicles as designated by the site's engineer of record. Refer to [Routes and Zones on page 27](#) for more information.



 **NOTE:** For installations not at grade, owners must provide the ability for Service Providers to safely service Megapack and the Tesla System Controller. A written agreement must be approved by Tesla before commissioning for installations not at grade.

### 4.5.1 Megapack Access

- The Service Provider must be allowed to have the ability to remove any locks preventing access. Refer to [Megapack Door Security on page 48](#) for information on securing and locking doors while retaining Service Provider access.
- You must keep the doors of all enclosures free of all obstructions such as snow, sand, and blown debris during system operation.
- You must ensure the area in front of each Megapack can support any of the vehicles described in [Typical Vehicles on page 32](#).

### 4.5.2 Lift Plan

The original lift plan used to install Megapack at commissioning must be provided to Service Providers. This provides background information that can be used to plan for Megapack removal or replacement during the operations phase.

## 4.6 On-Site Maintenance Infrastructure Requirements Overview

On-site maintenance infrastructure (OMI) is essential to the rapid and effective maintenance of Megapack sites. The table below summarizes the aspects of the installed infrastructure for on-site maintenance infrastructure. Most on-site maintenance infrastructure is contained within the Service Staging Zone.

Refer to your contracts for more information.

Table 12. On-Site Maintenance Infrastructure

Level	Applicability	Minimum On-Site Maintenance Infrastructure Requirements	Minimum Critical Services Requirements
1	Projects with 1 or more Megapacks require Level 1 or higher	<ul style="list-style-type: none"> <li>• Service Staging Zone</li> <li>• Parking Zone</li> </ul>	<ul style="list-style-type: none"> <li>• Portable Restroom</li> <li>• Cellular service</li> <li>• Electricity</li> </ul>
2	Projects with 15 or more Megapacks require Level 2 or higher	<ul style="list-style-type: none"> <li>• One 20-foot storage container</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Portable Restroom</li> <li>• Cellular service</li> <li>• Electricity</li> <li>• Waste disposal</li> </ul>
3	Projects with 36 or more Megapacks require Level 3 or higher	<ul style="list-style-type: none"> <li>• One 40-foot storage container</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Portable Restroom</li> <li>• Cellular service</li> <li>• Electricity</li> <li>• Waste disposal</li> </ul>
4	Projects with 75 or more Megapacks require Level 4 or higher	<ul style="list-style-type: none"> <li>• Two 40-foot storage containers</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> </ul>	<ul style="list-style-type: none"> <li>• Portable Restroom</li> <li>• Cellular service</li> <li>• Electricity</li> </ul>





Level	Applicability	Minimum On-Site Maintenance Infrastructure Requirements	Minimum Critical Services Requirements
		<ul style="list-style-type: none"> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Waste disposal</li> </ul>
<b>5</b>	Projects with 146 or more Megapacks require Level 5 or higher	<ul style="list-style-type: none"> <li>• Three 40-foot storage containers</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Portable Restroom</li> <li>• Cellular service</li> <li>• Electricity</li> <li>• Waste disposal</li> </ul>
<b>6</b>	Projects with 261 or more Megapacks require Level 6 or higher	<ul style="list-style-type: none"> <li>• Four 40-foot storage containers</li> <li>• One 60 x 12-foot office trailer</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Restroom</li> <li>• Electricity</li> <li>• Internet and cellular service</li> <li>• Waste disposal</li> <li>• Water</li> </ul>
<b>7</b>	Projects with 376 or more Megapacks require Level 7	<ul style="list-style-type: none"> <li>• Five 40-foot storage containers</li> <li>• One 60 x 12-foot office trailer</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Restroom</li> <li>• Electricity</li> <li>• Internet and cellular service</li> <li>• Waste disposal</li> <li>• Water</li> </ul>
<b>8</b>	Projects with 501 or more Megapacks require Level 8	<ul style="list-style-type: none"> <li>• Six 40-foot storage containers</li> <li>• One 60 x 24-foot double-wide office trailer</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Restroom</li> <li>• Electricity</li> <li>• Internet and cellular service</li> <li>• Waste disposal</li> <li>• Water</li> </ul>
<b>9</b>	Projects with 651 or more Megapacks require Level 9	<ul style="list-style-type: none"> <li>• Eight 40-foot storage containers</li> <li>• One 60 x 24-foot double-wide office trailer</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Restroom</li> <li>• Electricity</li> <li>• Internet and cellular service</li> <li>• Waste disposal</li> <li>• Water</li> </ul>
<b>10</b>	Projects with 800 or more Megapacks require Level 10	<ul style="list-style-type: none"> <li>• Ten 40-foot storage containers</li> <li>• One 60 x 36-foot triple-wide office trailer</li> <li>• Service Staging Zone</li> <li>• Parking Zone</li> <li>• Storage Clearance Area</li> </ul>	<ul style="list-style-type: none"> <li>• Restroom</li> <li>• Electricity</li> <li>• Internet and cellular service</li> <li>• Waste disposal</li> <li>• Water</li> </ul>



Level	Applicability	Minimum On-Site Maintenance Infrastructure Requirements	Minimum Critical Services Requirements
11	Projects with 1000 or more Megapacks require Level 11	<ul style="list-style-type: none"> <li>Contact Tesla for infrastructure requirements</li> </ul>	<ul style="list-style-type: none"> <li>Contact Tesla for infrastructure requirements</li> </ul>



**NOTE:**

- This table provides general guidance on the minimum requirements for the preliminary development of a site
- Project-specific requirements may vary based on site-specific factors
- The applicable category of maintenance and project-specific requirements are defined in the contract
- Always follow all local codes and regulations

### 4.7 Environmental Considerations

Each Megapack contains coolant and refrigerant in its thermal system ([Thermal System on page 10](#)). Depending on the number of Megapacks installed on a site, storage, use and handling of these substances may require reporting, hazard management plans, or containment procedures as required by local codes and regulations. All local codes and regulations related to this matter must be followed. Refer to the *Megapack 2 XL Design and Installation Manual* on the Tesla Partner Portal for more information.

### 4.8 Energy Meters

The Tesla System Controller uses various meter inputs for different control functions. The meters are expected to be installed during the installation phase of the project and are the operator's responsibility to maintain.

For additional information and for a list of supported meters, refer to the *Megapack 2 XL Design and Installation Manual*.



**NOTE:** When communication to any of the meters is lost during on-grid normal operation, the system ceases to operate until communication is resumed. If communication is lost, the values reported are the last values read from the meter until communication is resumed.



## 5 Megapack System Maintenance

The Megapack System requires maintenance to ensure performance over its lifetime. The Service Provider performs this maintenance, which includes Megapack preventative maintenance, Megapack corrective maintenance and Tesla System Controller maintenance.

For Tesla to perform this service, you must provide access to the system and a safe work environment. For accessing the Megapack System, refer to [Maintaining Access, Routes, and Zones on page 35](#). For providing a safe work environment, refer to [Providing a Safe Work Environment on page 41](#).

It is not recommended that personnel without sufficient training and product knowledge work within Megapack without explicit guidance from Tesla. If individuals other than Service Providers perform maintenance on Megapack or the Tesla System Controller, the project's warranty may be voided.



**NOTE:** Access is only allowed for Service Providers.



**CAUTION:** Do not power wash the unit. Only use a low-pressure hose to wash it.

### 5.1 Tesla System Controller Maintenance

If required, Service Providers will need to be able to safely work at the Tesla System Controller, wherever the Tesla System Controller is installed.

### 5.2 Megapack Maintenance

#### 5.2.1 Preventative Maintenance

Service Providers will perform specific preventative maintenance activities that are scheduled annually. This section outlines these maintenance schedules.

#### Annual Maintenance

Table 13. Annual Maintenance Activities

Type	Activity
General	<ul style="list-style-type: none"> <li>• Inspect anchor torque marks</li> <li>• Inspect door locks</li> <li>• Inspect enclosure cleanliness and integrity – touch up paint or clean as needed</li> <li>• Inspect exposure clearances as specified in <a href="#">Maintaining Exposures and Fire Clearances on page 34</a></li> <li>• Inspect grade conditions as specified in the product <i>Design Manual</i></li> </ul>
Bay Checks	<ul style="list-style-type: none"> <li>• Inspect door latches, replacement in kind if damaged</li> <li>• Inspect door gaskets, replacement in kind if damaged</li> <li>• Inspect door grounding conductors, replacement in kind if damaged</li> <li>• Inspect door switch, replacement in kind if damaged</li> </ul>



Type	Activity
	<ul style="list-style-type: none"> <li>• Harness inspection or replacement in kind if damaged (protective sleeve failure, rodents, and so on)</li> <li>• Thermal system inspection, service as needed</li> <li>• Torque checks</li> <li>• Check for moisture</li> </ul>
Thermal Roof	<ul style="list-style-type: none"> <li>• Coolant level check, fill if needed</li> <li>• Inspect cabinet ventilation system</li> <li>• Clean radiators if needed</li> <li>• Remove any debris blocking air inlets</li> </ul>
Close Out	<ul style="list-style-type: none"> <li>• Secure door locks</li> <li>• Update service records</li> </ul>
--	<ul style="list-style-type: none"> <li>• Tesla System Controller inspection, service as needed</li> </ul>
--	<ul style="list-style-type: none"> <li>• Provide a Preventative Maintenance Report as outlined in Exhibit G Reports</li> </ul>

**5-Year Maintenance**

Table 14. 5-Year Maintenance Activities

Activity
Annual maintenance
BESS stirring fan replacement, if needed

**10-Year Maintenance**

Table 15. 10-Year Maintenance Activities

Activity
Annual maintenance
BESS coolant refill
BESS radiator fan replacement, if needed
BESS coolant pump replacement, if needed
BESS door gasket replacement, if needed

**5.2.2 Corrective Maintenance**

As part of the Megapack Warranty, Service Providers will perform corrective maintenance on the Megapack System. This includes component replacements, configuration, and troubleshooting.



## 6 Providing a Safe Work Environment

Over the operating life of your Megapack System, you may need to isolate and de-energize the Megapack for various reasons:

- For Tesla to perform service on the Megapack System
- For providers other than Tesla to perform work upstream or around the Megapack
- To put the Megapack in an idle state by de-energizing the equipment due to an upstream fault or other reason

If a Service Provider needs to perform maintenance, you will need to provide both access to the Megapack System and a safe work environment. Providing a safe work environment will typically require the Megapack to be isolated and de-energized.

Depending on the scope of service and the site design, the Megapack will either need to be de-energized at the Megapack AC circuit breaker or at an upstream AC disconnect.

### 6.1 AC Disconnect Responsibilities

Service Providers will begin maintenance services when the Megapack(s) that need to be serviced are safely de-energized ([Performing Lockout/Tagout on page 42](#)).

As a standard practice, Tesla Energy Service only takes on AC disconnect responsibilities at the Megapack AC circuit breaker. If Tesla Energy Service requires upstream MV AC disconnect to safely perform maintenance, the site operator is responsible for performing that disconnect. Operators are responsible for all AC disconnect actions upstream of the Megapack AC breaker.

There are some exceptions. Refer to your contracts to confirm AC disconnect responsibilities.

Any deviations from standard practice that are not documented in the contracts must be provided in writing to Tesla. For example, if you determine that you want to own all AC disconnect responsibilities or if you want Tesla to manage any AC disconnect actions upstream of the Megapack AC breaker, this must be provided in writing.

Table 16. Tesla Service Standard

Disconnect Location	Responsible Party
Megapack AC circuit breaker	Tesla
All other AC disconnects upstream of the Megapack AC circuit breaker	Operator

### 6.2 Accessing the Megapack Enclosure

Megapack is an IP66-rated enclosure ([Enclosure on page 14](#)) and affords high protection against particle and water ingress. This section contains critical information about when and how to properly access Megapack in order to both maintain its high protection rating and to provide a safe work environment.

**At any time when accessing the enclosure is required, ensure that all information in this section is taken into account.**




#### 6.2.1 Critical Door-Opening Considerations

**Do NOT open a Megapack's doors in any of the conditions below.**

**CAUTION:** Megapack doors should never be opened when it is actively raining or snowing, with no exceptions, to prevent damage to Megapack.



**Conditions Under Which Megapack Doors Should NOT Be Opened**

<p>Actively raining or snowing</p> 	<p>Wind speeds 25 MPH or higher. Wind speed must be monitored.</p> 	<p>Airborne dust and debris present on site.</p> 
--	--	--

**CAUTION:** When opening a Megapack door, do not force its door handle. Excessive torque could damage the handle. If the handle does not readily rotate, contact Tesla for assistance.

**6.2.2 Performing Lockout/Tagout**

Operators are responsible for ensuring a safe work environment. When work is required inside Megapack, the unit must first be de-energized the unit by performing the lockout/tagout procedure (LOTO). Before beginning these procedures, refer to [AC Disconnect Responsibilities on page 41](#) and ensure you are aware of whether operators or Tesla must perform certain steps in this section.

The LOTO procedure for Megapack consists of the tasks below, which must be performed in order:

1. [Isolating Megapack from Upstream AC Sources on page 42](#)
2. [Opening and Locking the Megapack AC Circuit Breaker on page 43](#)
3. [Turning the Enable Switch Off on page 45](#)
4. [Verifying Load-Side De-Energization on page 46](#)
5. [Verifying Line-Side De-Energization on page 47](#)

**DANGER:** Refer to [IMPORTANT SAFETY INFORMATION on page 2](#) for information on safety warnings and PPE recommendations before beginning any work on Megapack.

**NOTE:** Only Service Providers shall perform any corrective maintenance within the Megapack.

**NOTE:** Some equipment isolation can be performed by sending commands using the Tesla System Controller or other SCADA devices. For more information, see the [SCADA Design Manual](#) or the [Controls and Communications Manual – Tesla System Controller](#), or reach out to your Tesla project engineer.

**6.2.2.1 Isolating Megapack from Upstream AC Sources**

Megapack may need to be isolated from upstream AC sources, including other Megapacks, before performing work. Isolating Megapack is required if work is being performed in the AC bus bar area or if the arc flash incident energy values exceed the maximum allowed.

To determine arc flash incident energy, check the arc flash label on the outside of the Customer Interface Bay door ([Arc Flash Label on page 18](#)). The arc flash label contains information about expected arc flash incident energy and recommended PPE.



Figure 22. Arc Flash Label -- Example

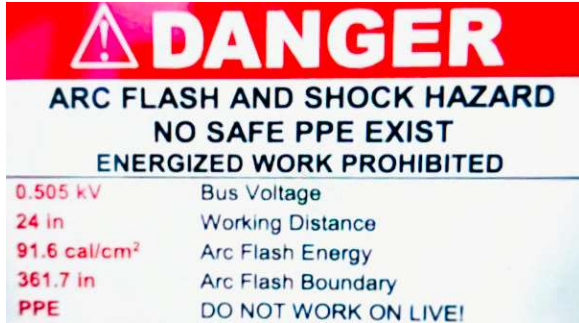


Table 17. Maximum Allowable Arc Flash Incident Energy

North America	Non-North America
8 cal/cm <sup>2</sup>	14 cal/cm <sup>2</sup>

If the label specifies either that no safe PPE exists or the arc flash incident energy exceeds the maximum allowed per the table above, you must first ensure that external AC power is removed from the Megapack by opening the upstream AC disconnect before continuing the LOTO procedure.

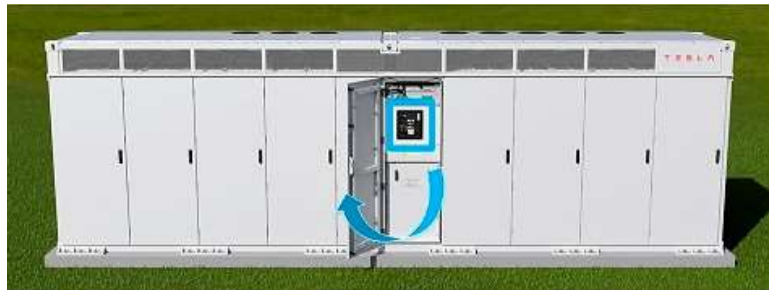
If the label specifies that the arc flash incident energy falls below the maximum allowed, opening an upstream AC disconnect is not required unless work is being performed in the AC bus bar area or if it is required by a Service Provider. Follow the recommended PPE and other details on the label and then continue the LOTO procedure.

**DANGER:** If no arc flash label exists and Megapack has already been commissioned and is operating, all upstream devices must be completely de-energized before work can take place. Contact your site owner or Tesla about the arc flash label requirement.

**6.2.2.2 Opening and Locking the Megapack AC Circuit Breaker**

Perform this procedure only after [Isolating Megapack from Upstream AC Sources on page 42](#).

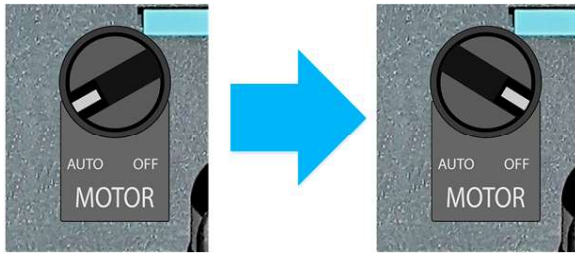
1. Assess the steps in [Critical Door-Opening Considerations on page 41](#) and proceed if conditions allow.
2. Open the Customer Interface Bay door to access the Megapack AC circuit breaker:



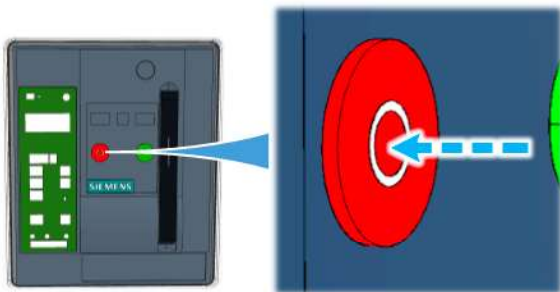



1 - Lock ring. 2 - Motor switch (some models). 3 - Contacts window. 4 - Open button. 5 - Spring-loaded lever.

3. If present, turn the motor switch from **auto** to **off**:



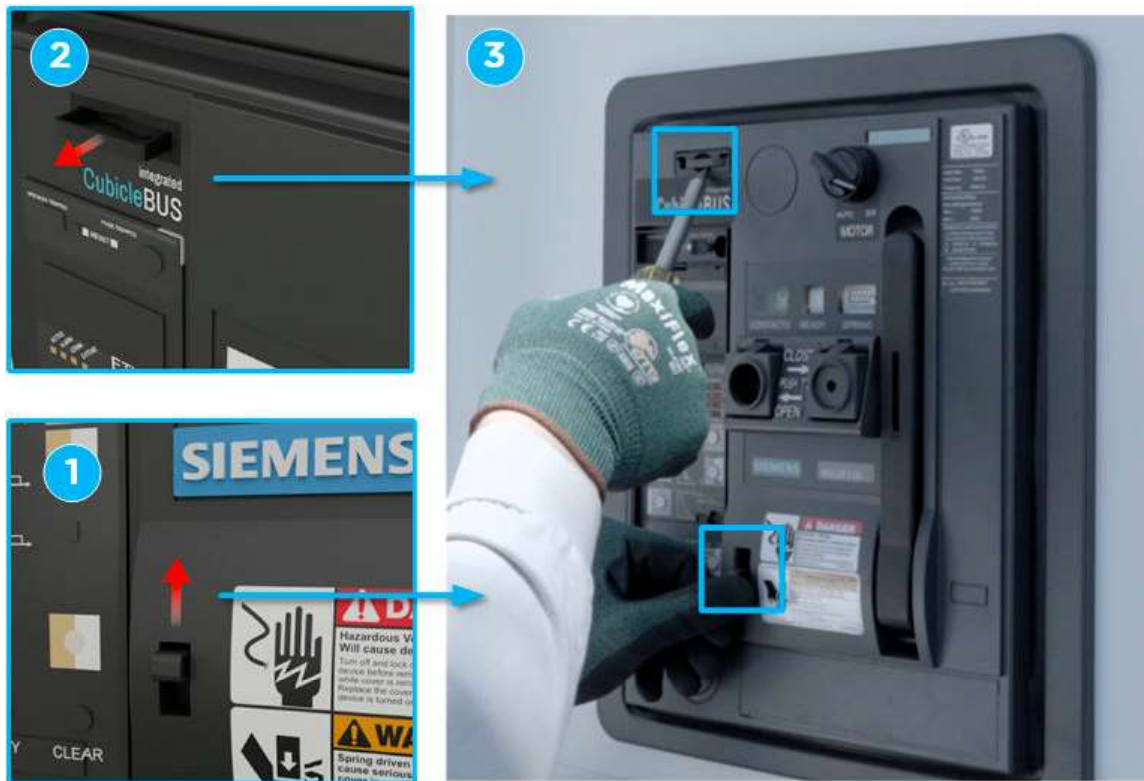
4. Open the breaker by pressing the red open button firmly until it clicks. When the breaker is open, the contacts window displays green and **OPEN**:



 **NOTE:** Pressing the button manually opens the breaker. You may use other methods to open the Megapack AC circuit breaker ([Controlling the Circuit Breaker on page 14](#)).

5. Push up on the spring-loaded lever (1) to unlock the lock ring (2), and use a flat-head screwdriver to pull out the lock ring: (3):





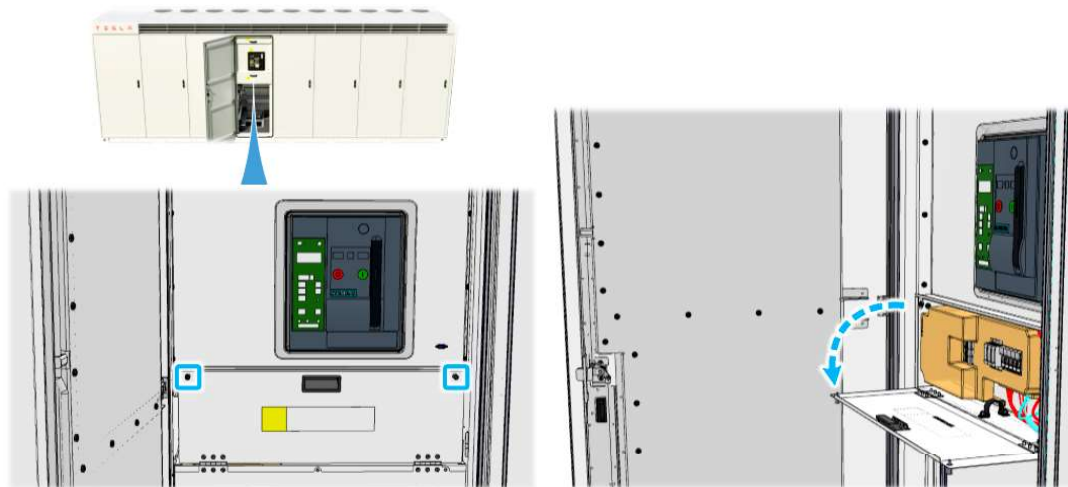
6. Insert the lock and lock it to secure the Megapack AC circuit breaker:



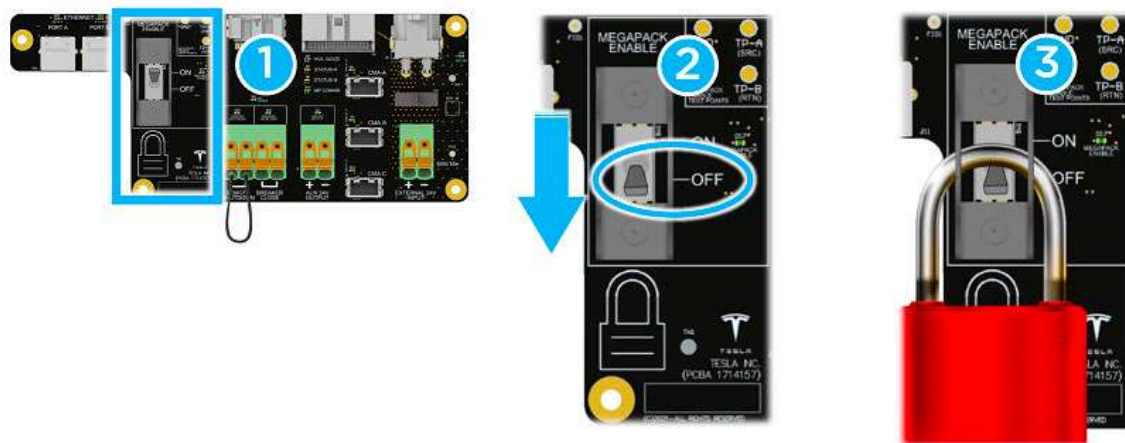
7. If isolation is required per [Isolating Megapack from Upstream AC Sources on page 42](#) and more than one Megapack is connected to the same circuit or transformer, repeat this procedure for each Megapack.

### 6.2.2.3 Turning the Enable Switch Off

1. Use a T30 Torx bit to remove the 2 screws securing the customer I/O area cover to the enclosure. Grab the handle and pull outward, then downward to expose the customer I/O area:



2. The Megapack enable switch is located on the customer interface board (1). Press **down** to turn the enable switch to the **off** position (2), and apply a lock (3):

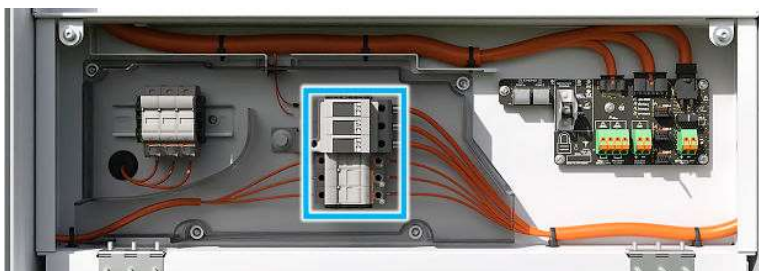


**CAUTION:** If active work needs to pause for 1 hour or longer, remove the lock and turn the switch back on until active work resumes.

### 6.2.2.4 Verifying Load-Side De-Energization

**NOTE:** This check for dead should only take place after all previous steps were successfully completed.

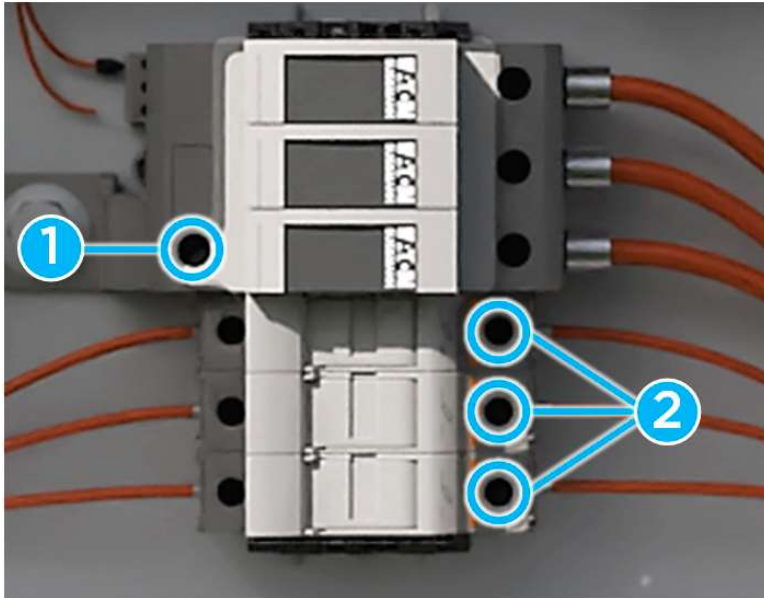
Check the load-side (inverter-side) voltage in the customer I/O area at the terminals indicated below:



1. Using a CAT IV voltmeter rated for 1000 V AC, first verify the voltmeter on a known live source.



2. Measure AC phase-to-phase and phase-to-ground voltage at the load-side test points as shown below:



1 - Ground. 2 - Phase test points.

3. Confirm that the voltage is 0 V AC.

**WARNING:** You may initially measure greater than 0 V AC due to residual capacitive energy. Stop and wait five minutes before testing again. **Do not proceed unless you have measured 0 V AC.**

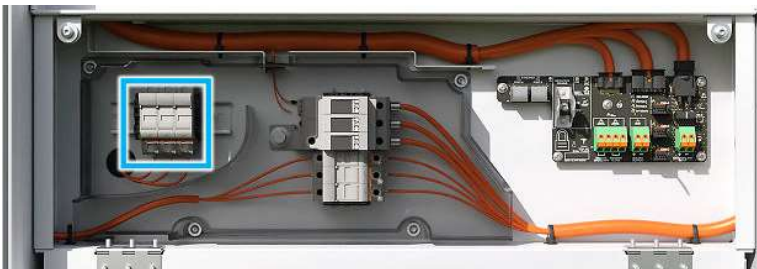
4. Re-verify the voltmeter on known live source.
5. Repeat the above, now measuring DC voltage.

**NOTE:** You will measure a voltage of up to 50 V DC. This is normal and expected. If voltage above 50 V DC is detected, stop and contact Tesla.

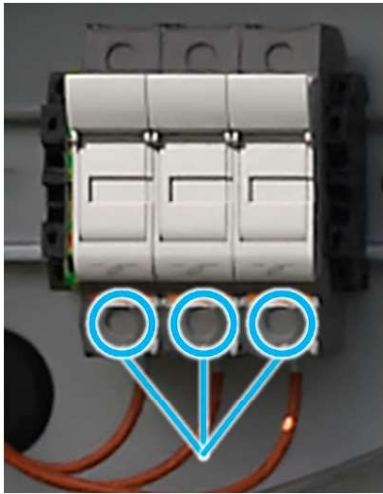
### 6.2.2.5 Verifying Line-Side De-Energization

**NOTE:** This check for dead should only take place after all previous steps were successfully completed.

If isolation is required per [Isolating Megapack from Upstream AC Sources on page 42](#), check the line-side (grid-side) voltage at the line-side tap in the customer I/O area:



1. Open the fuse holder for the line-side tap.
2. Using CAT IV voltmeter rated for 1000 V AC, first verify the voltmeter on a known live source.
3. Measure AC phase-to-phase and phase-to-ground voltage at the line-side test points as shown below:



4. Confirm that the voltage is 0 V AC.



**WARNING:** You may initially measure greater than 0 V AC due to residual capacitive energy. Stop and wait five minutes before testing again. **Do not proceed unless you have measured 0 V AC.**



**NOTE:** If upstream isolation was **not** required per [Isolating Megapack from Upstream AC Sources on page 42](#), you may measure a nominal voltage.

5. Re-verify the voltmeter on known live source.

### 6.2.3 Megapack Door Security

All Megapack doors have the provisions for the use of a padlock. The Customer Interface Bay ([Customer Interface Bay on page 10](#)), as the primary customer interface for Megapack, is recommended to be locked. The other doors do not need regular access and should remain closed and locked.



**NOTE:** Access to the Customer Interface Bay may be subject to local codes and regulations.

#### About the Locks

Combination locks are shipped with Megapack, either pre-installed on Megapack doors or delivered in the accessory kit. Install these locks to ensure doors are not left open unnecessarily:

- **Set combination to 4585** for coordinated access with Service Providers. Tesla must have ability to unlock doors. If you choose a different combination, advise your Tesla contact in writing.
- If Tesla field service personnel arrives on site and observes locks are not installed on all doors except the Customer Interface Bay door, they will communicate the requirement with on-site personnel.
- For keyed locks, a double hasp is required to allow Tesla access by unlocking Tesla's lock.

## 6.3 Energizing, Site Isolation, and Storage

### 6.3.1 Energizing the Megapack

After Tesla has completed the commissioning and initial start-up of Megapack, the system is ready for operation. You should not need to perform extra steps to start the system.

If a Service Provider gives the direction to re-energize a Megapack during installation or after upstream maintenance or short-term storage, the steps below must generally be performed to energize the Megapack.



**WARNING:** Notify operations and on-site personnel and clear working areas as necessary before re-energizing.

**NOTE:** These are general steps. The procedure may vary during specific installation or operational phases or at specific sites.

**NOTE:** Refer to [AC Disconnect Responsibilities on page 41](#) for information about whether operators or Tesla must perform certain steps.

1. Verify that the equipment and area, including the inside of the Customer Interface Bay and AC bus bar area, is clear of tools, materials, workers, equipment, and debris.
2. Secure the bus bar access panel to the AC bus bar area, if it has been removed.
3. Reinstall the remote shutdown contact on the customer interface board, if it had been removed.
4. Turn the enable switch ON on the customer interface board (removing the lock if necessary) and close and secure the customer I/O area cover.
5. Remove the lock on the Megapack AC circuit breaker, if needed.
6. If present, turn the Megapack AC circuit breaker motor switch from OFF to AUTO.
7. Close the Megapack AC circuit breaker ([Controlling the Circuit Breaker on page 14](#)).
8. Close the Customer Interface Bay door.
9. Close any upstream external circuit breakers that had been opened.

## 6.3.2 Isolating the Site from Megapack

Follow the isolation procedures below to prevent Megapack(s) from providing energy to other components at the site.

### 6.3.2.1 Isolating a Single-Megapack System

Perform this procedure at sites with a single Megapack:

1. Command an off state using the Tesla System Controller or other SCADA equipment. If the site operator or system owner does not have the means to send commands, contact Tesla ([Contact Information on page 22](#)).
2. Isolate the Megapack from upstream AC if required ([Isolating Megapack from Upstream AC Sources on page 42](#)).
3. Open and lock the Megapack AC circuit breaker ([Opening and Locking the Megapack AC Circuit Breaker on page 43](#)).

### 6.3.2.2 Isolating a Multiple-Megapack System

Perform this procedure at sites with multiple Megapacks:


1. Determine whether all Megapacks should be isolated or only one Megapack:
  - If isolating all Megapacks, send the appropriate command using the Tesla System Controller or other SCADA equipment. The appropriate command varies depending on whether this is an on-grid or a microgrid site. If the site operator or system owner does not have the means to send commands, contact Tesla ([Contact Information on page 22](#)).
  - If isolating only one Megapack, the power commands do not require a change (but a change is permitted if desired).
2. Isolate AC power at the appropriate circuit breaker:



- If isolating all Megapacks, open the site-wide external circuit breaker or disconnect to remove grid power.
- If isolating only one Megapack, open the upstream AC disconnect.

### 6.3.3 Configuring for Short-Term Storage

This procedure is only to be performed when a Megapack needs to be shut down and removed from grid power **for more than 24 hours and up to 14 days**.

 **NOTE:** Contact Tesla for assistance with configuring Megapack for storage periods of longer than 14 days.

 **WARNING:** Active work cannot be performed inside Megapack while it is in storage. If active work is required, ensure the Megapack is de-energized per [Performing Lockout/Tagout on page 42](#).

1. Ensure that conditions, including duration and temperature range, will abide by the requirements in the *Megapack 2 XL Transportation and Storage Guidelines* for the duration of storage.
2. Charge Megapack to at least 50% state of energy.
3. Open a ticket using Tesla's online support portal ([Contact Information on page 22](#)) and note the following in the ticket:
  - a. Inform that the system will be shut down soon.
  - b. State the amount of the time the system is expected to be idle.
4. Command to off state using the Tesla System Controller or other SCADA equipment. If the site operator or system owner does not have the means to send commands, contact Tesla ([Contact Information on page 22](#)).
5. Open the site or external circuit breaker or disconnect (if one is present).
6. Assess the steps in [Critical Door-Opening Considerations on page 41](#) and open the Customer Interface Bay door if conditions allow.
7. Turn the enable switch off ([Turning the Enable Switch Off on page 45](#)).
8. Wait five minutes.
9. Open and lock the Megapack AC circuit breaker ([Opening and Locking the Megapack AC Circuit Breaker on page 43](#)).
10. **Turn the enable switch back on.**
11. Close and secure the customer I/O area cover, and close the Customer Interface Bay Door.
12. Up to 14 days later, proceed with re-energization ([Energizing the Megapack on page 48](#)).

 **CAUTION:** The enable switch must remain on during storage.



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## 7 System Augmentation

Tesla provides guidance at the time of purchase for augmentation of energy storage. If the plans to augment the site have been made, you must also plan for and accommodate the activities surrounding augmentation and maintenance of these additional energy storage units, including site access. Refer to [Maintaining Access, Routes, and Zones on page 35](#).


For more information on system augmentation and its site layout, refer to *Application Note: Megapack Capacity Augmentation*.



## 8 Decommissioning and Disposal

### 8.1 Purpose

This section provides details about decommissioning Megapack Systems that are no longer functional, including how to return Megapacks to either Tesla or another facility for recycling.

 **NOTE:** To ensure compliant decommissioning, always refer to local regulations as applicable.

### 8.2 Safety

Refer to the *Industrial Lithium-Ion Battery Emergency Response Guide* (ERG) on the Tesla First Responders Information Page at <https://www.tesla.com/firstresponders> for detailed hazard information specific to Megapack's lithium-ion batteries. The *Transportation* section of the ERG provides guidance and cites example regulations for shipment of dangerous goods. All logistics and transportation companies in the supply chain are responsible for knowing and following all applicable regulations pertaining to the storage, handling, and transportation of dangerous goods. The ERG is periodically updated. Download the latest revision of the ERG from <https://www.tesla.com/firstresponders>.

Tesla recommends that a physical copy of the ERG is transported along with Megapack, and subsequently remains on site and accessible at all times, for the life of the product.

Safety Data Sheets (SDS) are available for materials in Tesla Energy products. Refer to the Tesla Partner Portal for more information.

### 8.3 Decommissioning

This section outlines the considerations necessary to decommission a Megapack System.

 **NOTE:** Refer to [Decommissioning Damaged Equipment on page 54](#) for guidance if the system has sustained damages.

#### 8.3.1 Verifying Maximum State of Charge

When planning decommissioning, you must first clarify the maximum state of charge (SOC) at which the system must be returned. Prior to shutting down and decommissioning Megapack, discharge the system accordingly as required by applicable regulations.

 **NOTE:** If no regulations apply, Tesla recommends discharging the system below 30% SOC for transportation.

#### 8.3.2 De-Energizing and Disconnecting the Equipment

After the system has been safely shut down and de-energized, take these steps to disconnect the equipment:

1. Follow the procedures in [Performing Lockout/Tagout on page 42](#) to de-energize the system.
2. Disconnect wires, referring to the appropriate procedure in the [Disconnecting AC Conductors on page 53](#) or reaching out to Tesla for more information.
3. Detach the foundation anchors as applicable. Reach out to Tesla for more information.





### 8.3.2.1 Disconnecting AC Conductors

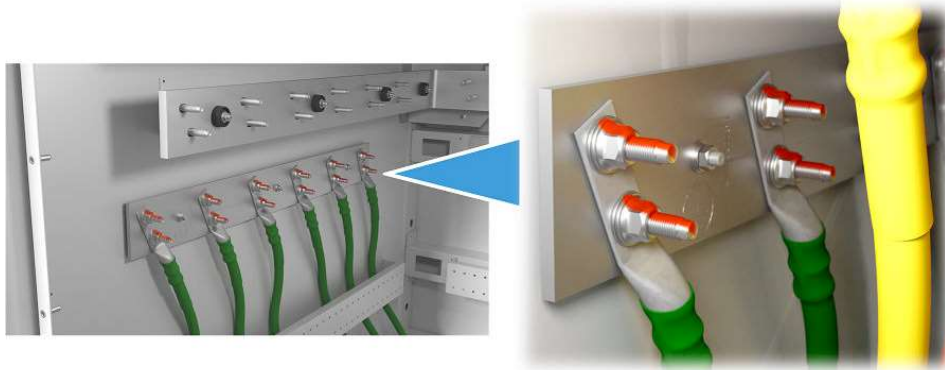


**DANGER:** Ensure that the appropriate measures have first been taken to remove electrical hazards.

To disconnect the AC conductors:

1. Loosen all AC conductor lugs.
2. Disconnect all AC conductors from the Megapack bus bars using an approved disconnection method.

Figure 23. Unfastening the AC Conductors



3. Pull the conductors out of Megapack through the wireway openings.

### 8.3.3 Returning Equipment

Tesla energy products contain recyclable materials. Tesla recommends recycling our energy products by returning them to Tesla or to an alternate facility as described in the sections below.



**CAUTION:** Always refer to the latest applicable *Transportation and Storage Guidelines* for details about handling, lifting, and transportation of Megapack.

#### 8.3.3.1 Returning to a Tesla Recycling Facility

Tesla strongly encourages recycling and recommends that when a Tesla energy product must be decommissioned, it be returned to a Tesla facility for disassembly and further processing. However, the customer may elect to send the equipment to an alternate recycling facility ([Returning to an Alternate Recycling Facility on page 53](#)).

Contact Tesla to confirm the facility to which Megapack should be returned.

#### 8.3.3.2 Returning to an Alternate Recycling Facility

Tesla energy products should be disposed of or recycled in accordance with local, state, and federal regulations. Note that regulations regarding disposal of batteries vary by jurisdiction. As of December 2021, in the United States, batteries are classified as Universal Waste, and in addition, many individual states have specific regulations regarding disposal of battery packs. For example, in California, all batteries must be taken to a Universal Waste handler or authorized recycling facility.

If disposing without return to Tesla, consult with local, state, and/or federal authorities on the appropriate methods for disposal and recycling. If disassembly of the Megapack is necessary, contact Tesla for guidance.




## 8.4 Decommissioning Damaged Equipment

This section provides generic guidance around how to handle a damaged Megapack System after all immediate risks following an incident have been mitigated. Damages can be the result of, but not limited to:

- Severe physical impact
- Thermal runaway event
- Transportation accident

Tesla will establish incident-specific guidance on-site as described in this section.


 **CAUTION:** These instructions assume that any immediate risks to personal safety have been mitigated. If any signs of risk such as fire or smoke are still present, consult the *Industrial Lithium-Ion Battery Emergency Response Guide* and refer to contact information in [Contact Information on page 22](#).


### 8.4.1 Determining if Megapack is Safe to Approach

If not already present on site or contacted, contact technical support for guidance prior to any interaction with the Megapack ([Contact Information on page 22](#)).

Once all immediate risks have been mitigated, follow these steps to determine whether Megapack is safe to approach:

1. Isolate the Megapack as required per [Isolating Megapack from Upstream AC Sources on page 42](#).
2. Ensure that there have been no visible signs of risks (such as smoke, flames, suspicious odor) for 12 hours.
3. From a distance, use a thermal imaging camera to determine that the damaged Megapack's temperatures have decreased to safe enough levels to touch and that there is no evidence of cell vent gases.
4. From a safe distance, use a hydrogen meter to validate that no vented gases are present.

 **WARNING:** Avoid contact with vented gases. Upon exit from a cell, their temperatures can exceed 600°C (1110°F).

 **DANGER:** Do not make physical contact with a damaged Megapack unit until all the steps above have been completed. A damaged Megapack can present a hazardous situation which could result in severe injury or death.

### 8.4.2 Performing Diagnostics

Once Megapack is deemed safe to approach, Megapack diagnostics can begin.

 **WARNING:** Megapack diagnostics must be performed by Service Providers.

Diagnosing the Megapack aims at evaluating its status and determining how to handle the damaged unit until recycling, and as a result whether, for example, to disassemble and ship its sub-components to various recycling facilities, or not disassemble and ship to a single recycling facility.

This process generally begins with a visual inspection of the unit in order to establish an initial plan that may evolve during the inspection. Subsequent steps generally proceed as per below:

1. Once Megapack temperatures are deemed touch-safe and no hydrogen gas is detected, you may begin to physically interact with the system.



2. Take electrical measurements of the Megapack System to determine if any faults are present.
3. If faults are found to be present, these must be cleared before proceeding with decommissioning.

### **8.4.3 Preparing Damaged Equipment for Transport**

After performing diagnostics, Tesla will determine the best and safest way to handle the equipment and transport it to a recycling facility.

Refer to the local applicable transportation regulations for such equipment. Transportation regulations can vary by region. The shipper must always comply with the applicable regulations in the region in which Megapack will be transported.

Following Tesla's diagnostics, Tesla may establish that disassembly of battery modules is necessary in order to safely transport the equipment back to a recycling facility. Tesla may also determine that battery modules must be discharged for safe transportation. In this case, the following should be performed:

1. Identify whether energy is still stored in Megapack battery cells.
2. Discharge all detected energy per Tesla-approved methods.
3. Once all energy is removed from the Megapack System, disassembly and shipping can commence.

### **8.4.4 Returning Damaged Equipment to Tesla**

When a damaged Tesla product must be decommissioned, we request that it be returned to a Tesla facility for disassembly and further processing. Contact Tesla with any questions regarding recycling of damaged equipment.

### **8.4.5 Returning Damaged Equipment to an Alternate Recycling Facility**

If disposing without return to Tesla, please consult with local, state, and/or federal authorities on the appropriate methods for disposal and recycling. Contact Tesla with any questions regarding recycling of damaged equipment.



## Appendix A: Troubleshooting

Operators can use a SCADA interface to monitor a Megapack System during operations. In the event of an alert, you can use the table to troubleshoot the alert and determine a course of action. If you see an alert that requires additional support, refer to [Getting Support on page 21](#). For more information for accessing and viewing these alerts, refer to the Controls and Communications Manual associated with your specific site.

Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Loss of Site Meter Communication	The Tesla System Controller has lost communication with the site meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>1. Verify meter is powered on.</li> <li>2. Power cycle the meter.</li> <li>3. Inspect the physical network connection between the Tesla System Controller and the site meter.</li> <li>4. Verify meter settings.</li> <li>5. If additional support is needed, contact Tesla Industrial Storage Support.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Loss of Battery Meter Communication	The Tesla System Controller has lost communication with the battery meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>1. Verify meter is powered on.</li> <li>2. Power cycle the meter.</li> <li>3. Inspect the physical network connection between the Tesla System Controller and the battery meter.</li> <li>4. Verify meter settings.</li> <li>5. If additional support is needed, contact Tesla Industrial Storage Support.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Loss of Load Meter Communication	The Tesla System Controller has lost communication with the load meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>1. Verify meter is powered on.</li> <li>2. Power cycle the meter.</li> <li>3. Inspect the physical network connection between the Tesla System Controller and the load meter.</li> <li>4. Verify meter settings.</li> <li>5. If additional support is needed, contact Tesla Industrial Storage Support.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Loss of Solar Meter Communication	The Tesla System Controller has lost communication with the solar meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>1. Verify meter is powered on.</li> <li>2. Power cycle the meter.</li> <li>3. Inspect the physical network connection between the Tesla System Controller and the solar meter.</li> <li>4. Verify meter settings.</li> <li>5. Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Loss of Bus Meter Communication	The Tesla System Controller has lost communication with the bus meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>1. Verify meter is powered on.</li> <li>2. Power cycle the meter.</li> <li>3. Inspect the physical network connection between the Tesla System Controller and the bus meter.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Loss of Generator Meter Communication	The Tesla System Controller has lost communication with the generator meter.	P2	The battery system power output will be curtailed to zero if the meter is required for the control function in use. Meter readings are frozen at their last value.	<ol style="list-style-type: none"> <li>Verify meter settings.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Megapack Fault	One or more Megapacks is in a faulted state. The Megapack has stopped operating to protect itself, and will not charge or discharge.	P2	The Megapack will stop operating to protect itself and will not charge or discharge.	<ol style="list-style-type: none"> <li>No action required.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.
High Latency Megapack Communication	Tesla System Controller is experiencing high latency communication with one or more Megapacks.	P2	The inverter block(s) power output may be reduced intermittently.	<ol style="list-style-type: none"> <li>Inspect the physical network connections between the Tesla System Controller, the network switch, and the inverter block.</li> </ol>	Non-Critical	If issue persists, contact Tesla Industrial Storage Support if additional support is needed ( <a href="#">Getting Support on page 21</a> ).



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Direct Real Power Command Timeout	The Direct Real Power Command has not been re-written, or the Heartbeat has not been toggled, before the expiration of the Direct Real Power Command Timeout.	P2	The battery system power output will be curtailed to zero.	<ol style="list-style-type: none"> <li>Contact Tesla Industrial Storage Support if the issue persists.</li> <li>If the timeout was unintentional, verify direct commands are being properly sent to the Tesla System Controller within the calibrated command timeout. Refer to the <i>Tesla Energy Controls and Communications Manual</i> for more information.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Direct Reactive Power Command Timeout	The Direct Reactive Power Command has not been re-written, or the Heartbeat has not been toggled, before the expiration of the Direct Reactive Power Command Timeout.	P2	The battery system power output will be curtailed to zero.	<ol style="list-style-type: none"> <li>If the timeout was unintentional, verify direct commands are being properly sent to the Tesla System Controller within the calibrated command timeout. Refer to the <i>Tesla Energy Controls and Communications Manual</i> for more information.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Loss of Islanding Controller Communication	The Tesla System Controller has lost communication with the Islanding Controller.	P2	If communication with the Islanding Controller is lost while on-grid, the battery system will not transition to an off-grid state in the event of a	<ol style="list-style-type: none"> <li>Inspect the physical network connections between the Tesla System Controller LAN 1 and the Islanding Controller.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	If controller is a SEL-700G, a Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue cannot



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Loss of Megapack Communication	The Tesla System Controller has lost communication with the Megapack.	P2	grid issue or under command to intentionally island. The battery system can still continue to operate on-grid.  If communication with the Islanding Controller is lost while off-grid, the system will shut down until communication is restored.	<ol style="list-style-type: none"> <li>Verify that the Islanding Controller is powered on and power connections are secure.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>		be resolved remotely and the controller is within Tesla's scope of supply, a Field Service ticket will be created to execute any required corrective actions. If the controller is within the site's scope of supply, Tesla will alert site of the issue so that corrective action can be taken.
			Megapack power output will be curtailed to zero.	<ol style="list-style-type: none"> <li>Confirm that the enable switch on the customer interface board is in the "ON" position.</li> <li>Inspect the physical network connections between the Tesla System Controller, the network switch, and the Megapack.</li> <li>Verify that the Tesla System Controller LAN 2 lights are blinking.</li> <li>Verify that the network switch is powered.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Non-Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.





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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Megapack Isolation Failure	Megapack has reported an isolation measurement below its acceptable threshold.	P1	The impacted system will not operate, resulting in a potential decrease in available power. Impacted systems could range from individual battery modules to full Megapacks.	No action required.	Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.
Megapack Inverter Fault	All inverters in the Megapack are faulted.	P2	The inverter block(s) power output will be curtailed to zero.	No action required.	Non-Critical	A Field Service ticket will be created to schedule corrective actions.
Enable Circuit Open	The Megapack enable circuit is open. This can be caused by door switch, enable switch, or remote shutdown.	P2	The Megapack's power output will be curtailed to zero.	<ol style="list-style-type: none"> <li>1. Verify that all doors are closed.</li> <li>2. Verify that the bus bar access panel is installed.</li> <li>3. Verify that remote shutdown is not enabled.</li> <li>4. Inspect the CMA enable lines located on the customer interface board for signs of damage.</li> <li>5. Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Informational	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Enable Switch Off	Megapack enable switch is in the off position, preventing operation.	P3	The Megapack's power output will be curtailed to zero and will turn off within 500 ms of the alert triggering.	<ol style="list-style-type: none"> <li>1. Verify that the enable switch on the customer interface board is in the "ON" position.</li> </ol>	Informational	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Door Switch Open	One or more of the Megapack doors is open. Does not apply to the Customer Interface Bay door (bay 4).	P3	Megapack power output will be curtailed to zero and the enable circuit will break.	<ol style="list-style-type: none"> <li>Verify that door is closed.</li> <li>If door is closed, inspect door switch for signs of damage.</li> <li>Contact Tesla Industrial Storage Support if additional support is needed.</li> </ol>	Informational	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
AC Breaker Status	A value of 1 indicates that the Megapack AC circuit breaker is closed. A value of 0 indicates that the Megapack AC circuit breaker is open.	P2	If status changes to 0 while the system is operating, the bus controller cannot utilize AC and the Megapack's power output will be curtailed to zero.	<ol style="list-style-type: none"> <li>Visually confirm Megapack AC circuit breaker status.</li> <li>If breaker is open and this was not done intentionally, contact Tesla Industrial Storage Support.</li> </ol>	Informational	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Bus Controller Prolonged Fault	Megapack has experienced several consecutive faults and has entered a prolonged fault state, which will stop operation .	P2	The inverter block will be curtailed to 0 and will be unavailable for 1 hour.	No action required.	Non-Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Coolant Low	Coolant level is low as reported by the coolant sensor.	P1	The cooling system may not function properly, which may result in reduced Megapack power output.	Visually inspect exterior of Megapack and check for signs of coolant leakage. Communicate any notable findings to Tesla Industrial Storage Support.	Critical	A Field Service ticket will be created to schedule coolant refill and further investigation at site. If alert count is above a certain threshold, a Tesla alarm will be triggered for Tesla Industrial Storage Support to review.
Extreme Temperature Warning	The battery cells have reached a temperature above the cell temperature warning threshold.	P1	Megapack has reached critical temperatures and the equipment is at risk for thermal runaway.	Clear the area and notify Tesla Industrial Storage Support immediately.	Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. A Field Service ticket will be created to expedite visit to site if required.
Extreme Temperature Fault	The battery cells have reached a temperature above the cell temperature fault threshold.	P1	Megapack has reached critical temperatures and equipment is at risk for thermal runaway.	Clear the area and notify Tesla Industrial Storage Support immediately.	Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. A Field Service ticket will be created to expedite visit to site if required.
Low State of Energy	Megapack is at a very low state of energy and at least one battery module has entered the battery off state as a protection. Remaining at low state of energy can lead to cell damage.	P1	Remaining in this state could lead to permanent cell damage.	1. Attempt to execute a charge command on the system. 2. If unsuccessful, contact Tesla Industrial Storage Support.	Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.



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Alert	Description	Priority	Effect	Recommended Action/Next Steps: Customer	Tesla Path	Tesla Action
Breaker Irrational	The Megapack AC circuit breaker is reporting open and closed simultaneously.	P2	The inverter block(s) power output will be curtailed to zero.	Visually confirm breaker status and contact Tesla Industrial Storage Support with observations for additional support.	Non-Critical	Contact Tesla if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Megapack Disabled	The Megapack is disabled, meaning its battery modules and thermal system are commanded to the Off state . <b>Warning:</b> This does not replace the need for operators to follow proper de-energization procedures.	P2	The power command to the affected Megapack will be curtailed to 0 while under this condition.	1. Verify that the Shutdown Battery System command is not being sent. 2. Contact Tesla Industrial Storage Support if additional support is needed.	Non-Critical	Tesla Industrial Storage Support may be actively involved in evaluating this Megapack. Contact Tesla Industrial Storage Support if additional support is needed ( <a href="#">Getting Support on page 21</a> ).
Power Electronics Over Temperature	Over 25% of the Megapack power electronics are experiencing an overtemperature.	P2	Megapack power output may be reduced.	Contact Tesla Industrial Storage Support if fault persists.	Non-Critical	A Tesla alarm will be triggered for Tesla Industrial Storage Support to review. If issue is not able to be resolved remotely, a Field Service ticket will be created to execute any required corrective actions.



## Revision History

Revision	Date	Description
1.4	May 31, 2024	<ul style="list-style-type: none"> <li>• Provided exposure and fire clearance information and requirements (<a href="#">Maintaining Exposures and Fire Clearances on page 34</a>)</li> <li>• Added a topic describing routes and zones to clarify maintenance requirements (<a href="#">Routes and Zones on page 27</a>)</li> <li>• Updated vehicle dimensions and added Megapack delivery vehicle (<a href="#">Typical Vehicles on page 32</a>)</li> <li>• Removed inspection of drain valves from annual maintenance activities (<a href="#">Annual Maintenance on page 39</a>)</li> <li>• Provided reference to the <i>Application Note: Considerations for Hazardous Materials Business Plans (HMBP)</i> (<a href="#">Operations on page 26</a>)</li> </ul>
1.3	March 6, 2024	<ul style="list-style-type: none"> <li>• Added critical operational considerations (<a href="#">Critical Operational Considerations on page 26</a>)</li> <li>• Clarified previous updates to on-site maintenance infrastructure Levels 1-5 (<a href="#">On-Site Maintenance Infrastructure on page 36</a>)</li> </ul>
1.2	January 30, 2024	<ul style="list-style-type: none"> <li>• Updated on-site maintenance infrastructure levels (<a href="#">On-Site Maintenance Infrastructure Requirements Overview on page 36</a>)</li> <li>• Provided specifications for UL 1066 circuit breaker (<a href="#">Megapack AC Circuit Breaker on page 11</a>)</li> </ul>
1.1	November 8, 2023	<ul style="list-style-type: none"> <li>• Modified door-opening guidance and removed the requirement to contact Tesla before opening doors (<a href="#">Critical Door-Opening Considerations on page 41</a>)</li> <li>• Introduced the -D enclosure variant (<a href="#">Enclosure on page 14</a>)</li> <li>• Disambiguated safe work environment procedures including isolation and performing lockout/tagout (<a href="#">Providing a Safe Work Environment on page 41</a>)</li> <li>• Provided arc flash label information (<a href="#">Arc Flash Label on page 18</a>)</li> <li>• Updated Asia hotline information (<a href="#">Contact Information on page 22</a>)</li> </ul>
1.0	July 5, 2023	Initial Revision.

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