FREQUENLY ASKED QUESTIONS

3/29/2019

Pricing Information

How much does a full immersion system cost?

- The cost for a full immersion system will vary significantly depending on your specific configuration, as plumbing and other component or material needs will likely differ on a case by case basis. While our systems are modular and usually consist of the same general layout, each miner's facility is different, and those variances are taken into consideration during our preparation of the estimate.
- For example, if your mine consisted of all Whatsminer M10 machines (55 TH @ 3600 watts), the price per miner would increase, as they produce 3x the BTU's when compared to an S9. Assuch, that setup would have greater cooling requirements and may require additional cooling capacity. This would result in the need for the system to be designed with a lower miner-to-dry cooler ratio so that the heat dissipation requirements can be met.
- In order to provide you with an accurate quote, please contact us at sales@immersionsystems.io so that we may schedule a call with you to discuss the variables specific to your implementation.

I want to test immersion myself, do you sell 1 or 2 tank systems?

- While we understand the appeal of testing new technology prior to implementing a full-scale rollout, we like to caution our potential future customers against it for reasons of cost-efficiency. To further explain; as a general rule-of-thumb, we say that 1 dry cooler can handle 4-5 tanks full of equipment. If you wanted to test 1-2 tanks, you will still need to either buy a full-size dry cooler (and it will be way over-powered for the 1-2 tank test setup), or you will need a smaller dry cooler for testing that you will later likely want to get rid of once the testing proves that the solutions works. As such, there is a possibility that you would have "sunk" cost on the smaller dry cooler as well as the plumbing, pump, and other components necessary to complete the smaller test system.
- That said, we do offer smaller systems in the 30-60 miner range, however, the price per miner is relatively high when compared to a full-size immersion setup which has been optimized for maximum cost efficiency.

General Information

What all is included in your immersion system?

- **Our standard setup includes:**
  - Immersion Tanks
  - Dry coolers
  - BitCool BC-888 dielectric fluid
  - Pumps
  - Filter system
  - Associated plumbing
  - BitCool BC-888 dielectric fluid
  - Filter system
  - Associated plumbing
  - Automated controller for monitoring & controlling pumps, dry coolers, temperature, pressure, etc.
  - Standard pallet rack system for housing the tanks

- **Not included:**
  - Miners / PSUs
  - Electrical / PDUs
  - Networking
  - Installation
  - Job management

Why are the Antminer S9 tanks sized at 42 miners? Why not more?

- This may be the #1 most-frequently asked question that we get on a regular basis. In short, it is to keep the overall price down as well as to maximize cost efficiency for our customers.
- To further explain; all materials come in sheets, whether it be steel, aluminum, or even drywall for that matter. A 42-miner tank is the absolute largest we could make it without having to buy a whole second sheet of materials to make the tank. For example, if we increased the size of the tank by 2 miners to make it a 44-miner tank, the materials cost would double due to the need to buy 2 sheets of material instead of 1. If we reduced the size of the tank by 2 to make a 40-miner tank, we wouldn't be utilizing 100% of the material that was purchased in order to make the tank.
- The same goes for the Antminer S15 and S17 tanks. They hold 34 miners and are designed to maximize cost efficiency for our customers.

My mine is in a humid climate, how can immersion help me?

- Unlike an air-cooled mine, immersion mines are not affected by humidity whatsoever.
- In fact, if you are planning to operate a mine in a humid climate, we *highly recommend* the use of immersion cooling in lieu of air-cooling, as in an air-cooled mine, humidity will cause serious

adverse effects to your hardware in the forms of corrosion, short circuits, and component failures.

Can you make a system for me that includes space for cooling the PSU's?

- In short, yes, we are capable of designing a custom system for you that includes space to cool the PSU's. However, we feel it is our responsibility to inform our potential future customers that in our experience, immersing the PSU's is not cost-efficient.
- To further explain; the PSU's are anywhere from 93-97% efficient, meaning that most of their load is converted into electricity for the miners and is not off-gassed into the facility in the form of heat dissipating from the PSU itself.
- Miners off-gas 100% of their load into the facility (or fluid, in the case of immersion) in the form of heat.
- Therefore, every cubic inch of space utilized by a miner is 100% effective, and every cubic inch of space utilized by a PSU is 7-3% effective.
- Since dielectric fluid is the typically second highest line item in an immersion cooling system, keeping the density of miners (and therefore BTU's) per cubic inch of tank-space is imperative to maximizing cost-efficiency.
- That said, each mine is different and there may be special circumstances involved leading you decide that immersing the PSU's makes sense in your case. In those cases, we will design a custom tank for you that includes space for the PSU's.

We have different models of ASICs, and some have power supplies directly attached. Will that be a problem?

- No. However, depending on the size / shape differences, you may want to consider having different models of tanks in your immersion system design in order to maximize cost-efficiency.
- We currently have designs that work for the Antminer S9, L3, A3, D3, Z9, S15, S17 Dragonmint T1, Whatsminer M10, Innosilicon T3, Obelisk SC1 Immersion and Obelisk SC1 / DCR1. If you have another model of miner not listed above, please reach out to us!
- Connected PSU's won't be a problem.

Do you realize a decrease in power utilization when using immersion cooling due to chip efficiency?

- Yes. On a per miner level, immersion saves anywhere from 18-25%. On the overall facility, immersion saves roughly 50% on electricity. We've seen numbers as high as 80%, but it's rather hard to pin down, as almost everyone immediately starts to fill that unused power with more miners. A lot of it depends on geolocation. In Texas, we have high numbers because of the climate being on the hotter side. If a mine were in Canada, their gains from immersion cooling would be lower.
- Not only do you gain efficiency in electricity, you also gain efficiency in labor cost / time. Immersion requires very little maintenance. No cleaning of miners ever needed, no changing / cleaning of air filters. The mine can be completely sealed, so dust intrusion becomes a non-factor. Noise is reduced significantly; to the extent that you can have an easy conversation standing in the middle of the mine. There are a lot of benefits outside the immediate operational cost savings that make immersion cooling a no-brainer.

- For example, if we were still using air-cooling in our mine at our electricity rates with our current equipment, it would not be possible to turn a profit with a BTC price below $5,000. That said, our equipment is old, (mostly Antminer S9 13.5's) and not nearly as efficient as the new generations of hardware that are proliferating in the market these days. However, because we are using our immersion cooling system, we are saving enormous amounts of not only electricity but also our own personal time when compared to similarly-sized mines that are utilizing air-cooling. At the time of this writing, we have not been to our mine in two weeks, and then probably a month before that. Air mines, as you may be aware, require much more babysitting.
- Additionally, equipment running in an immersion system has a longer life span. If you think about the effects of heat / cool on our roads, you know that the constant heating and cooling of the highways and streets eventually leads to cracks, potholes, etc. This is also magnified by water freezing and expanding, but we'll ignore that for the sake of this argument. If you now apply that same principle of thermodynamics to the silicon chips inside of miners, you can understand how hardware slowly degrades over time. It's almost always because of the hot/cool cycles. Tiny micro-fractures begin to appear in the silicon, circuit pathways, etc. With immersion, these cycles are nullified, as the fluid within the tanks always runs at a consistent temperature throughout the tank. Not only that, but the fluid is 1,400x more effective at removing heat than air, meaning that there are fewer "hotspots" on the boards themselves. Couple that with the fact that the fluid lubricates/insulates/blocks all forms of corrosion and it is easy to understand why immersion cooling creates the perfect environment for your equipment, resulting in a much longer lifespan than equipment that is air-cooled.
- Please click the link below to view an Excel spreadsheet that shows information gathered over the past few years at our own mine. Various frequencies, voltages, firmwares, etc. are all listed out in the document. You can even customize the sheet to fit your mine's individual characteristics.

Miner-Efficiency-Testing-V2

Do you have a shipping container solution?

- Yes! We have designs for 20' and 40' containers.

Can I come visit your immersion mine?

- Yes, provided you are able to sign our NDA, Non-Compete, and Non-Circumvention agreements prior to your visit.

Do you have a financing option?

- Unfortunately, no.
- We are essentially a "job shop," and have very thin margins on sales, meaning that we do not typically maintain a running inventory. All purchases are made to order.

How long will it take for my order to arrive if I place it today?

- Depending on order size, the order will arrive in approximately 6-7 weeks as most components are custom built / fabricated for every order.
- For orders greater than 20 tanks, it is pertinent to understand that our current production capacity is 20 tanks per week and includes the associated hardware necessary to setup an immersion mine. If this time-frame does is not suitable for your needs, contact us directly to inquire about other options.

Facility Layout

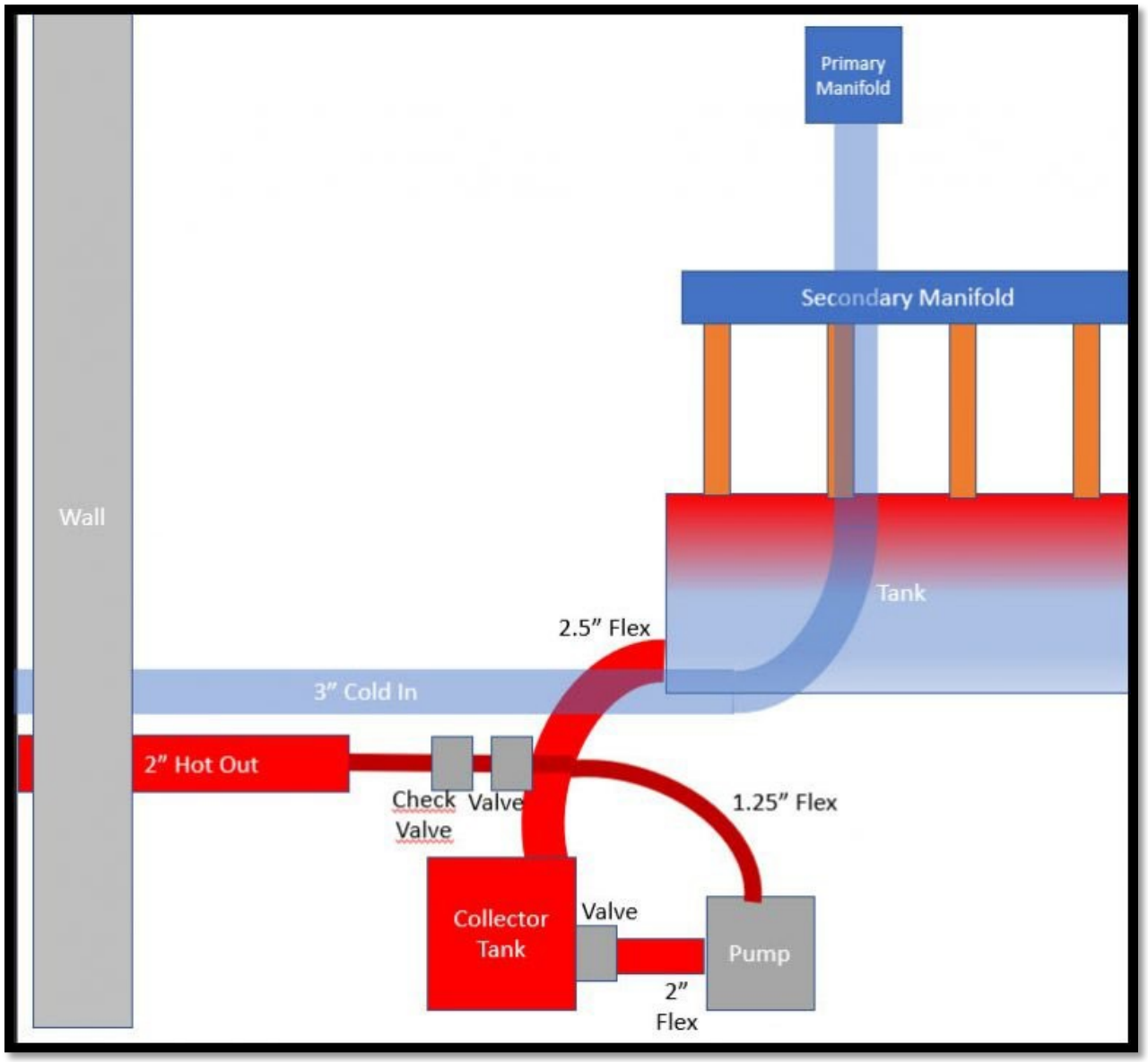
What are the dimensions of the tanks, dry coolers, etc.?

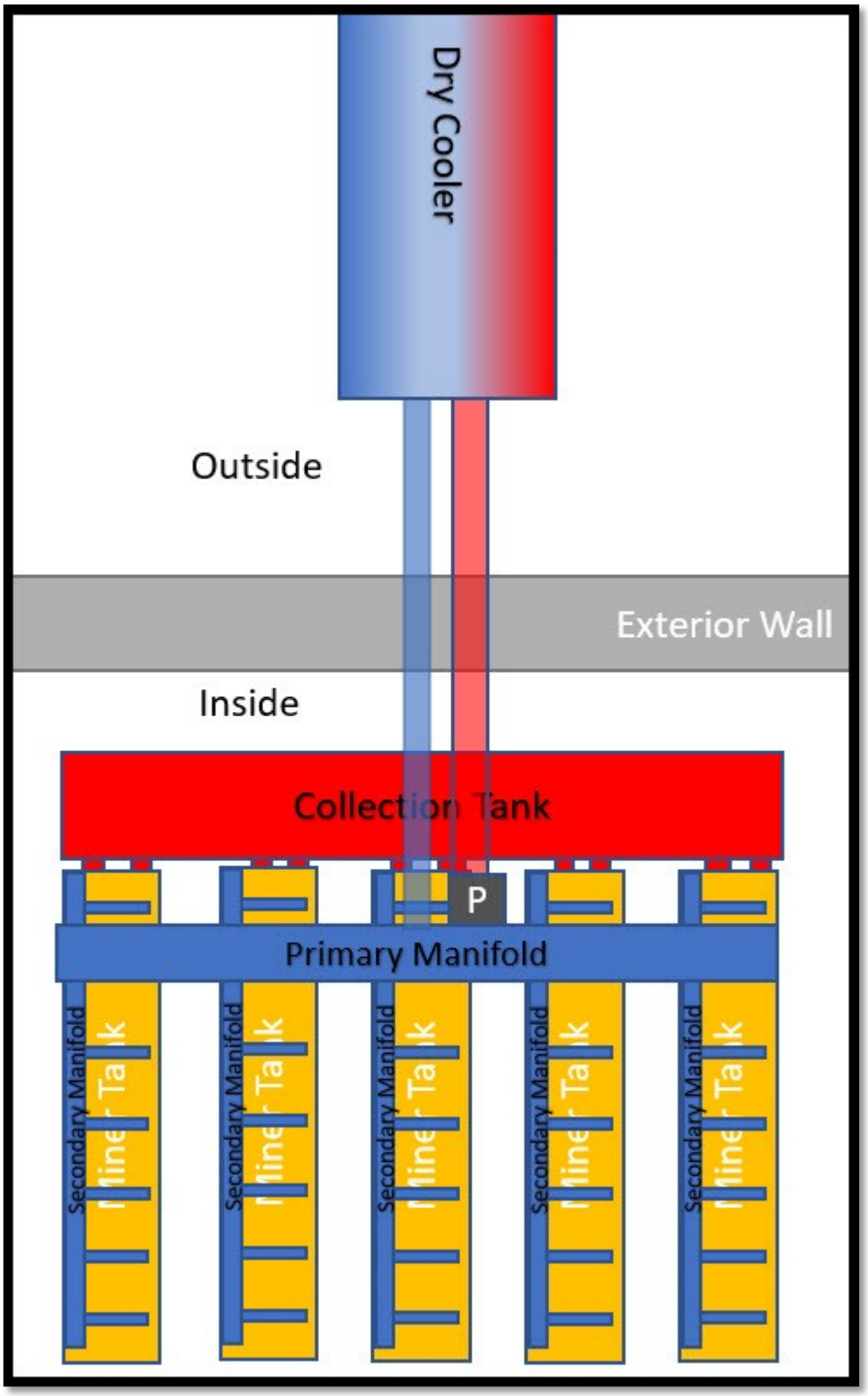
- The tanks are roughly 9’ L x 2.25’ W x 1.25’ H
- The dry coolers are roughly 20’ L x 4’ W x 4’ H
    - An interior immersion “set” is roughly 25’L x 15’ W x 8’ H
    - A “set” = 4 or 5 tanks, pallet racks, and pump *(basically everything except the dry cooler).*

Here’s a quick look at a generic layout

How much space does immersion take up?

- **Interior** *(for tanks, pumps, plumbing, etc.)*
  - Single stacked immersion system = 1,500 SqFt per 1 Megawatt
  - Double stacked immersion system = 750 SqFt per 1 Megawatt
- **Exterior** *(for dry coolers)*
  - 960 SqFt per 1 Megawatt
  - See below for generic layout information.


Primary Manifold
Secondary Manifold
Wall
Tank
2.5" Flex
3" Cold In
2" Hot Out
Check Valve
Valve
1.25" Flex
Collector Tank
Valve
Pump
2" Flex


Dry Cooler
Outside
Exterior Wall
Inside
Collection Tank
P
Primary Manifold
Secondary Manifold
Secondary Manifold
Secondary Manifold
Secondary Manifold
Secondary Manifold

Key Characteristics of BitCool Dielectric Coolant

Product ID	BC-888
Application	Single-phase, Liquid Immersion Cooling of ASIC-based Cryptocurrency Mining Devices
Key Characteristic	Compatibility with ASIC Mining Devices
Appearance	Light Green Tint
Pour Point (C)	< 0
Flash Point (C)	>130
Density, g/cc @ 16C	0.82
Coefficient of Thermal Expansion, volume/C	0.00068
Viscosity (cSt) @ 40C	10.03
Viscosity (cSt) @ 100C	4.00
Thermal Conductivity (W/m*K) 40C	0.1396
Thermal Conductivity (W/m*K) 100C	0.1373
Specific Heat (kJ/kg*C) @ 40C	2.0540
Specific Heat (kJ/kg*C) @ 100C	2.2032