White Paper: Data Center Design Trends and Server Vaulting
The Role of the SAVE Module

Our dependence on IT operations to keep businesses running and profitable has never been greater. To prevent costly downtime, and perhaps even save the enterprise entirely, all threats to the data center must be addressed. One threat that immediately comes to mind for data center planners is a catastrophic fire, which is why fire suppression systems are ubiquitous in mission critical server rooms. These fire suppression systems are effective for extinguishing fires that start inside of a server room, but are useless when the fire burns its way in from anywhere else in the facility. In fact, the heat of catastrophic fire will destroy equipment, and the data on that equipment, long before the fire penetrates a typical wall structure. To truly protect IT infrastructure and information assets a data vault must prevent flames, smoke and **heat** from penetrating the structure. That is why Firelock Data Protection Systems has seen increased demand for the server vault application of its fireproof modular data vaults in the past few years.

While the concept of a Data Center in a Box seems to appeal to some in the IT World, the concept loses focus when exposed to the real worldview of Legal Compliance, Risk Management and Records and Information Management. FIRELOCK brings this focus to this product design. Server Vaulting has been popular on the world stage and is only gaining popularity here in the United States in the last decade. FIRELOCK understands this progression as we developed the first real server vault for the U.S. Air Force and Ford Aerospace over two decades ago. We ha ve long worked with client s that see the need to protect a data center for the information protection rather than just having the equipment survive.

The following is a mix of what the IT industry addresses versus the added scope provided with FIRELOCK solutions:

Expanded Capacity – FIRELOCK has always provided modular expansion. The Container is really a constrained approach to this.

Density – Our view is that density is the least important element in a modular data center. Density is of no value if it increases downtime due to tight working conditions The compaction of wiring, difficulty in modification at future upgrades and stresses placed on wiring rigs are misguided. Flexibility of design is of greater value. Who cares if the container is 20' or 40' as the price differential is miniscule for the container.

Flexibility - Transportable and able to redeploy in a disaster recovery situation. The container with vaulting as part of the design is safer during transport. Clients must consider what next? Are we safe during an additional implementation?

Green Value – Sophisticated server cooling allows greater cooling capability with modular redundant design while reducing the carbon footprint on a part of our economy that is rapidly gobbling up power resources. (2% and growing.) Vette units are energy

efficient in a significant way but add the value of being modular themselves. Each unit can stand alone providing a compartmentation of cooling capacity.

Availability – While having a data center ready on demand, the lack of being vendor neutral can be a constraint with units built by specific hardware vendors. The FIRELOCK SAVE module is designed to be vendor neutral. The Module can be on site very quickly but at a much lower cost per cubic foot. This also eliminates the possibility of damage to equipment or wiring harnesses in route to the site.

Security, the missing element

 Mantrap to access unit and maintain integrity for personnel and protection from
 outside elements
 Secure Mechanical Room capable of moving with unit and eliminating outside
 risks of tampering or weather exposure

Fire Protection and Disaster Protection Monolithic in Design – No other system addresses this issue. The SAVE unit is in fact, a Class 125 Data Safe Vault with proven reliability. Over 1,500 FIRELOCK Vaults have been deployed around the world over a twenty-five year span with exposure to hurricanes, earthquakes and catastrophic fire with fail-safe performance.

Plug in network location as part of the design – THE FAN Network Sites

 What good is the unit if the power and communication feed it is plugged into is
 destroyed. A back up network solves this dilemma. FIRELOCK has a network of
 sites in 65 markets that can serve as a remote location. Each with connectivity,
 on-site secure vaulting and UPS capability.

Truly vendor neutral

 Any vendors equipment can be used
 The interior will allow change out to new equipment and upgrades over time

Firelock has been building data-rated fireproof vaults for over 20 years, with Fortune 500 companies, government agencies, and offsite storage firms among its clients. Utilizing a modular panel system with a core of ceramic fiber (a high temperature industrial insulating material), double door assemblies, insulated penetrations for cables and coolant lines, and insulated air duct dampers, Firelock builds data vaults with a minimum Class 125-Two Hour rating. Depending upon the size of the vault, a Class 125-Four Hour rating can be achieved. This means the temperature inside the vault remains below 125$^{\text{o}}$ F. for the specified period of time with temperatures over 2,000$^{\text{o}}$ F. outside the vault. Here is a table with the ratings for corresponding vault sizes:

Vault Rating	Vault Size
Class 125-2 Hour	9' x 9' or larger in either or both dimensions
Class 125-3 Hour	18' x 18' or larger in either or both dimensions
Class 125-4 Hour	28' x 28' or larger in either or both dimensions

Traditionally these Class 125 vaults have been utilized to safeguard magnetic media, such as computer backup tapes. Countless organizations safeguard their mission critical backup data in Firelock vaults, either in their own facilities or with an offsite storage service provider. Recent trends in data center design are making Firelock's server vaults a more and more attractive option for protecting mission critical IT infrastructure.

One such trend is the decreased physical size of data centers. The performance capabilities of servers have improved exponentially over the past ten years, so the volume of data processed and stored by server units is much greater. Server racks are also filled closer to capacity in modern data center designs. These factors combine to result in much smaller data centers than in the past. It is becoming increasingly rare to see football field-sized data centers, as was the norm for large organizations. This means it is much more practical and economical to protect critical data center equipment in a data vault. The value of the equipment and information within this smaller space also demands more protection.

Another trend that is driving the market toward installing fireproof vaults is the migration of backup data away from tapes and toward disk storage systems. Backup tapes are still the most economical way to store archival data, so it is likely that this method will continue on for some time into the future. However, disk-to-disk systems have become much cheaper, and the need for instant access to backup data has resulted in some protocols where the most recent backup data does not routinely go offsite on tape. This means the servers must be protected to preserve the data itself. Needless to say, loss of data can be catastrophic in many ways.

A third trend that is driving organizations to protect their server rooms with Firelock vaults is stricter enforcement of data protection legislation. Sarbanes-Oxley and HIPAA have been on the books for several years now, and most large organizations have to comply with them one way or another. Preservation of information is at the core of both of these mandates. The new Federal Rules of Civil Procedure, specifically Rule 26, codifies the requirements for producing information in the discovery process for civil litigation. Failure to provide information within the specified time limits can result in a summary judgment against the non-compliant party. Enforcement of these mandates and the inevitable introduction of new legislation in the future will continue to penalize those who do not protect their information assets.

Some may ask, "Why do server rooms need fire protection?" According to current statistics from the National Fire Protection Association, over 64% of fires in commercial buildings were caused by two things a data center cannot do without: power and HVAC systems. High voltage transformers and UPS systems that are often near server rooms are a common cause of fire, as are hard-working cooling systems. Fire suppression systems are rarely installed in areas that house this equipment, which means a sprinkler system may be the only means of extinguishing the fire. With over 111,500 commercial building fires per year resulting in over $2.6 Billion in damages, it seems sprinkler

systems a far from fail-safe. As noted earlier, once a fire burns its way into the server room from the outside, a fire suppression system can't protect IT equipment from the extreme heat of a major fire.

Of course there is always a cost analysis involved when making decisions regarding how much protection to build into a data center. Is the cost of protecting data higher than the cost of replacing lost data, the downtime it could create, and/or the penalties that could result from equipment and data loss? When comparing the cost of installing a Firelock server vault to the cost of building with conventional materials, there is not a significant difference. Taken into scope of the entire cost of building and equipping a mid-sized data center (around 600 sq.ft. of floor space) the difference in cost is usually around 1-2% of the total investment.

Aside from protecting IT infrastructure a server vault should add functionality to the data center. Firelock's installers can weld Unistrut to the roof panels to facilitate mounting overhead cable management systems. This Unimount ceiling grid makes it easy to route cables neatly and efficiently throughout the server vault. There is a great deal of flexibility in locating the insulated penetration assemblies, so cables and coolant lines can be brought into the vault in the most logical and convenient locations. Insulated damper assemblies can also be installed over hot aisles to maximize airflow efficiency. Physical security is augmented by the double door assembly, which can be equipped with biometric sensors or other identification technologies to aid in access control. The modular panel system allows expansion of the server vault as needed, and the vault can even be relocated if required.

In conclusion, the decrease in physical size of data centers coupled with the increased density of equipment and information within modern data centers makes server vaults more feasible and more important than ever before. Data centers are especially vulnerable to the threat of fire, and fire suppression systems only address fires that start inside the data center. The astronomical cost of downtime, data loss and replacing mission critical equipment more than justifies the small additional cost of installing a data-rated vault. The loss of some data can even result in harsh penalties for executives responsible for safeguarding those information assets. Fortunately, Firelock's server vaults are a cost-effective way to provide fire protection and improve climate control efficiency, cable management, and physical security. These factors are likely to continue to increase the demand for Firelock's server vaults in the future.

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