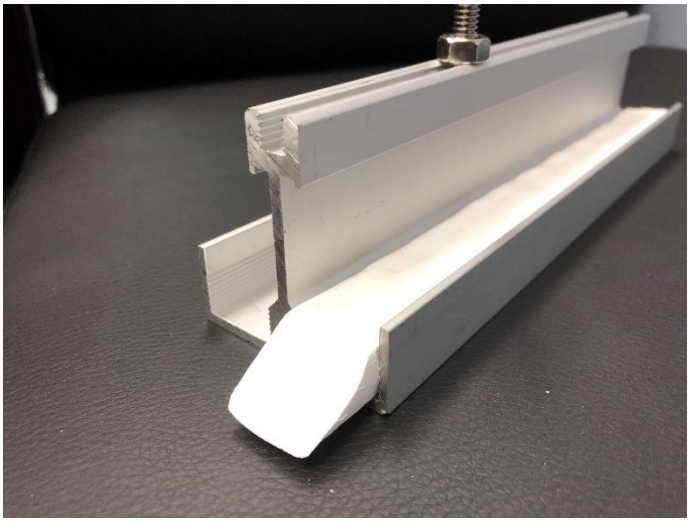

ThreeSquared Solutions, LLC

Why use the CULD System?

The Application

The CULD product is custom formed to fit your cleanroom gel / gasket track with little effort.

Two methods are used to install filters in a cleanroom grid system. Installations from the plenum interstitial side of the grid are referred to as “top Load”. Filters installed from the clean space side are “bottom load”. The introduction of CULD gives either system a distinct advantage over current sealing methods, but they have different installation requirements.

Top Load Filter Installation

When a top load filter is installed from the plenum side of the grid (see fig 1.), gravity exerts a force on the knife edge to penetrate the CULD. 4’ x 4’ filter bodies typically would install the same or like standard gel track installations however, depending on filter type and weight of the filter module an additional external force might need to be applied to form a sustainable seal. The filter must be centered on the CULD, and if required a Tensioning kit is then installed on each end of the filter, usually across the longitudinal axis. The Tensioning kit consists of springs on each side of the filter body, connected by a cable. The other end of the spring is attached to the grid system by a specifically designed anchor.

If required the installation of the tension kit is as follows, for a typical 2 X 4 Hepa / ulpa setup. The four spring anchors are attached to the filter grid, approximately 10” from the end of the filter. Opposing springs are attached to the anchors and tension applied by a custom spring tensioning device. When the

springs are extended, a cable is installed between them, and the tension is released. The spring tension is transferred to the filter body via the cable, and a seal is formed. This is a clean and quick installation.

Components of the Tensioning System Kit.

(A) Grid anchoring hardware for the springs

The variable in the installation of the Tension Kit is the method of attaching the springs to the filter grid. Because of the wide variety of cleanroom filter grids, each anchoring method must be custom designed.

The anchor must meet the following criteria

(1) Must be made of cleanroom compatible materials
(2) Attaching the anchor to the grid should be a simple and quick, using a minimum of tools.
(3) Must be able to withstand the spring tension for the life of the installation.
(4) Must be constructed so that the spring can be easily attached to the anchor once installed.

(B) Springs

There are two springs in the kit, placed on each side of the filter body. (See Diagram 1)

The springs must meet the following criteria

(1) Must be made of stainless steel, or other cleanroom class compatible material.
(2) Must have hooks on each end that have the following criteria
    (a) Constructed in such a manner that allows rapid installation of one end of the spring to the grid anchor.
    (b) The opposite end of the spring must be able to accommodate the tensioning device hook, and a cable end loop. When tension is released from the spring, the tensioning hook must be simple to remove.

(3) The two springs working in tandem under tension must provide enough downward force to for a sustainable seal
(4) The springs must be capable of maintaining sufficient tension over the life of the installation.
(5) The length of the spring and its potential tension is determined by the factory on a per installation basis.
(6) There are grid systems that do not employ a knife edge to form a seal. These systems use two flat surfaces with the CULD placed in between them. The springs must develop enough force to form a seal.

(C) Cables

There is one cable in a tension kit, that is used to connect the two springs, and apply force to the filter body. The cable should meet the following criteria:

(1) Must be made of cleanroom compatible materials
(2) Must be at least 1/16” in diameter.

(3) The end of each cable must be formed into a loop, not to exceed 1/2” in diameter. Loop must be formed by mechanical clamping
(4) The total length of the cable under full tension is a function of filter height / width, and spring length.
(5) The cable must be constructed in such a fashion that its design length is maintained over the life of the installation.

Bottom Load Filters

As the name implies, these filters are installed from the clean side of the grid. As in the Top Load filter, the gel / gasket track is replaced with CULD. In a typical design, a threaded stud is welded near each corner of the plenum opening. The filter is held in place by a metal tab placed over the stud, and bolted down. CULD requires a constant pressure in order for it to form a sustainable seal. The stock factory tab is replaced by a specially designed bracket that is application specific. It fits over the existing stud, and has room for a spring to be placed on the stud, and a nut applied. As the nut is turned, the spring is compressed, forcing the bracket downward. This applies force to the filter, to form a seal.

The bracket is custom designed for each installation and must be capable of maintaining compression for the life of the installation. Springs are specified on a basis of this design. All components of the system are composed of cleanroom compatible materials. After compression is applied, there will be sufficient thread remaining on the stud to install a protective cover if needed.

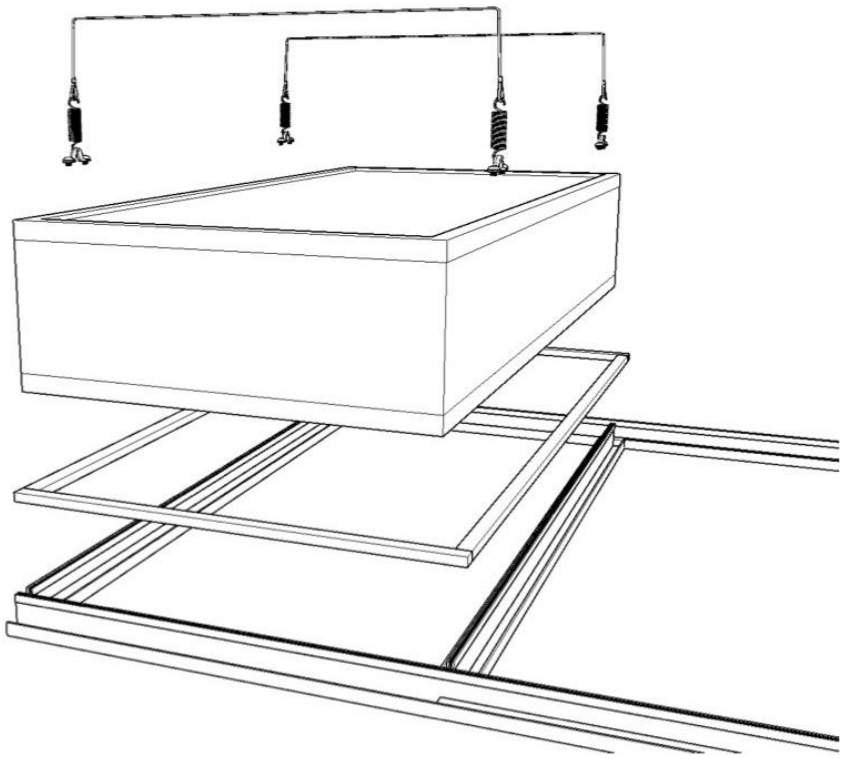

Fig 1.