

Engineering Advisory

8023

Product: Remedial Systems, Inc. Oil/Water Separator

Product Description

Remedial Systems, Inc. is a major manufacturer of oil/water separators. This company regularly competes on projects which specify gravity type inclined plate oil/water separators which are sized according to the principles of Stoke's law and laminar flow. These principles require that the total of the projected plate area be determined in order to size for the treatment capacity (see Figure 1).

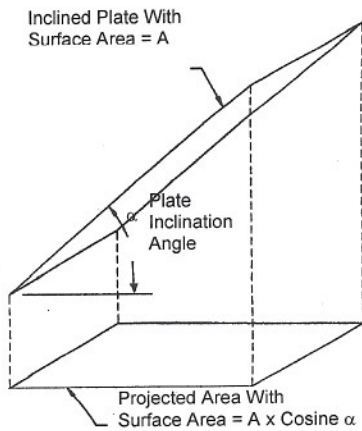


Figure 1

Some state agencies also spell out how the effective separation area is determined. As an example, pages III-7-5 and III-7-6 of the Washington State Department of Ecology Stormwater Management Manual For the Puget Sound Basin are attached. See Figure III-7.4

The Remedial Systems product is shown in Figure 2.

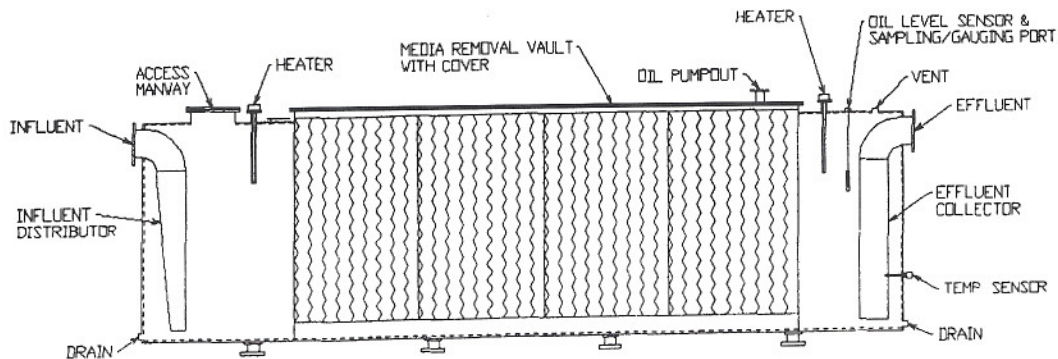
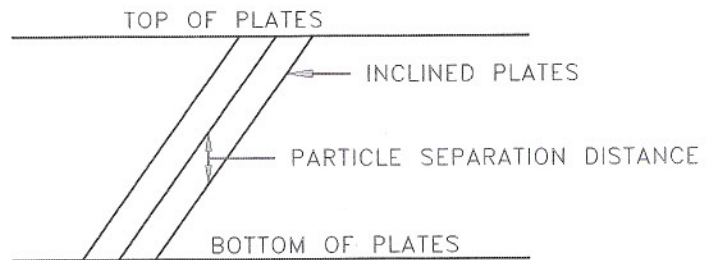


Figure 2

Although the product is routinely quoted on projects that specify inclined plate oil/water separators, it is fraudulently misrepresented in two significant ways:

1. The product uses **vertical** rather than inclined plates. An inclined plate separator reduces the distance a particle must traverse before reaching a surface (called a boundary layer). This is illustrated in Figure 3.



Inclined Plates Side Elevation View

Figure 3

By comparison, a vertical plate separator does not reduce the particle separation distance. This is illustrated in Figure 4.

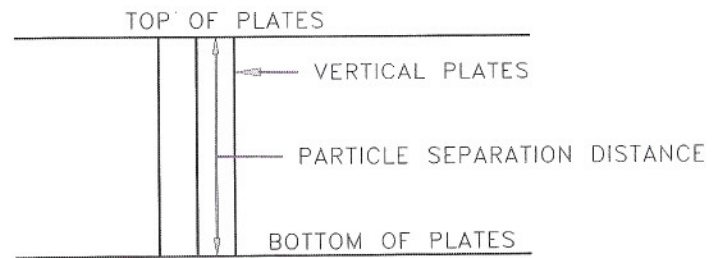


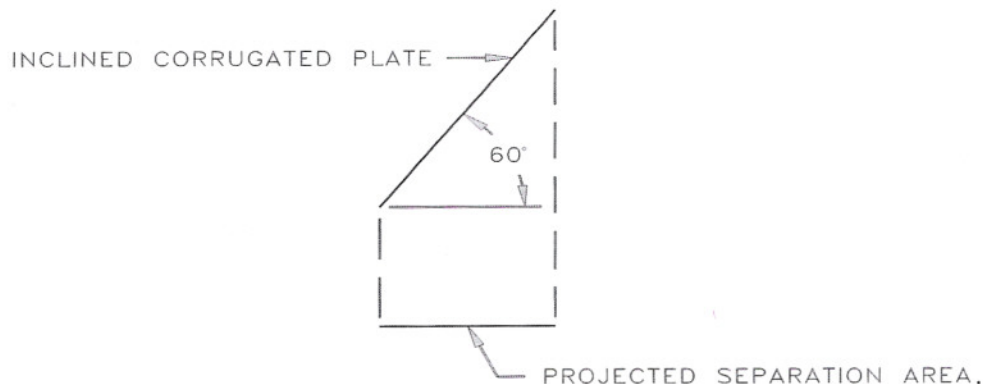
Figure 4

The fact that the particles traverse from corrugation to corrugation in the Remedial Systems design does not decrease the total distance the particle must traverse. Remedial Systems incorporates inclined corrugations in the vertical plates to create the illusion of an inclined plate separator, however, this is not to be confused with a true inclined plate separator because of gross difference in particle separation distance.

- Oil/Water separator manufacturers frequently arrive at the total projected plate area requirements by claiming a specific amount of square feet per cubic foot of media and then multiplying this figure by the total cubic feet proposed. It is relatively easy for the reviewer to determine the cubic feet of media (L x W x H) but virtually impossible to figure out the square feet of projected area per cubic foot because of the insufficiency of detail provided with the submittal. It is therefore tempting for the manufacturer to overstate this figure. The Remedial designs are:

Characteristics	Model		
	MED-00025	MED-00050	MED-00075
Plate Spacing (in inches)	1/4	1/2	3/4
Surface Area (ft ² /ft ³)	115	68	42
Plates Per 12"	44	26	16
Plate Angle of Inclination	60°	60°	60°
Plate Material of Construction	PVC	PVC	PVC

The maximum sq. ft./cu. ft. possible when using 3/4" plate spacing at a 60° angle of inclination is 8.0. This figure is arrived at as follows:

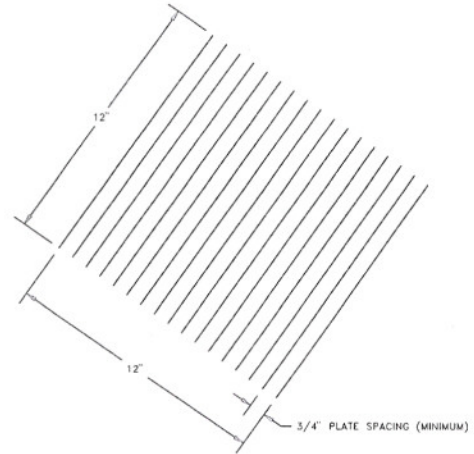


Elevation View
Figure 5

A single plate inclined at 60° is shown below if the actual area of the plate is one square foot, its projected area is found by multiplying the cosine of the angle of inclination or:

$$1 \text{ sq. ft. actual} \times \cosine 60^\circ = 0.50 \text{ sq. ft. of projected area}$$

A cubic foot of media is shown as follows:



Elevation View
Figure 6

Above figure shows 17 plates, 16 of which project area (plate thickness has not been taken into account). Each cubic foot of media therefore contains a maximum of 16 x 0.50 or 8 sq. ft. The Remedial claim of 42 (3/4" spacing) sq. ft./cu. ft. is therefore **5.25 times greater** than theoretically possible and therefore fraudulent.

Even if the Remedial product were correctly represented, vertical plates with inclined corrugations cannot possibly achieve a performance equal to a true inclined plate separator. In a true inclined plate separator the separated particles slide up (oil) and down (solids) the plate corrugations as shown in Figure 7. Note that the plates and the corrugations are both inclined. Also note that the oil and solids migrate to their respective destinations on **opposite** sides of the plate thereby minimizing the opportunity for forming neutral gravity particles. Neutral gravity particles can form whenever an oil particle attaches to a solids particle.

In the Remedial Systems oil/water separator the corrugations are inclined but the plates are vertical. The separated oil and solids must traverse the entire distance on the same sides of the plates in order to eventually separate out. The Remedial design is further discussed on pages 34 and 35 of PII Publication 394, attached.

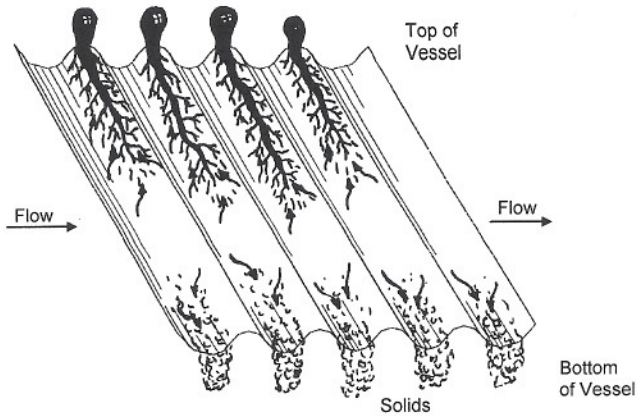


Figure 7

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