

What is Gravity-Differential Separation?

30 min



Presented by:

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SYMPOSIUM ON GREASE REMOVAL * **DESIGN AND OPERATION OF GREASE INTERCEPTORS**

By F. M. DAWSON AND A. A. KALINSKE
Iowa Institute of Hydraulic Research

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Grease interceptors (or "grease traps" as they are sometimes called) have been used in plumbing drainage systems for many years. They are frequently required by plumbing regulations, especially for restaurants. In general, such interceptors have been used for one or for all of the following reasons: (1) To prevent clogging of waste lines with grease, (2) to prevent large quantities of grease from reaching the sewage disposal works, (3) to facilitate the reclaiming of grease because of its economic value. The latter reason is, of course, at present a very important one for intercepting all waste grease and fats. The separation of gasoline and oil from waste water is also accomplished by use of a similar type fixture installed in the plumbing system; however, this paper will be concerned primarily with grease interceptors.

The grease interceptors used at present are for the most part commercial products of various patented designs constructed of cast-iron (ceramic insides have been used during the war). If properly installed and serviced, they do a fair job of preventing fats and grease from getting into the sewerage system. However, proper installation and servicing is usually the exception. To perform its job properly an interceptor should be installed as close to the fixture discharging greasy wastes as possible, and should be so designed and installed as to be easily cleaned. The less mixing and emulsifying there is, the easier the grease will separate from the waste water. Also the possibility of clogging the drain lines between the fixtures and the interceptors will be prevented if the interceptor is installed near the fixture.

Up until a few years ago the use of grease interceptors, especially in domestic installations, has in general not been overly successful. The interceptors were too small to handle adequately the rate of flow, and the owners did not properly remove the grease which had been collected in the interceptor. If, however, it is desired to separate the grease from the waste water in as complete a manner as possible and also to have the grease in good condition, an interceptor of the proper size installed right at the fixture which discharges greasy waste water is the best solution to the whole problem of grease removal.

Domestic Fixtures

A great many types of commercial grease interceptors are and have been on the market and with these many "home made" designs. However, the basic principle of grease interception in all such designs is that

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Francis Murray Dawson, Dean of Engineering, Iowa Institute of Hydraulic Research, 1936-1944



Factors that effect gravity-differential separation:

- Size of grease bubble
- Specific gravity
- Temperature
- Velocity
- Emulsification



Density (S.G.) at Different Temperatures

Type of Media	Temperature	
	60 deg. F	160 deg. F
Corn Oil	0.924	0.88
Coconut Oil	0.924	0.879
Soybean Oil	0.919	0.879
Rapeseed Oil	0.92	0.869
Lard	0.915	0.875

Travel Time for 3" Distance at 68° F (hr:min:sec)	
Droplet Diameter (microns)	Oil (rise time) SG 0.90
300	0:00:15
150	0:01:03
50	0:09:18
15	1:43:22

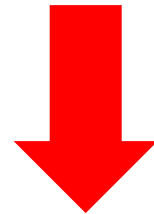
150 microns = .15 mm

50 microns = .05 mm

Temperature

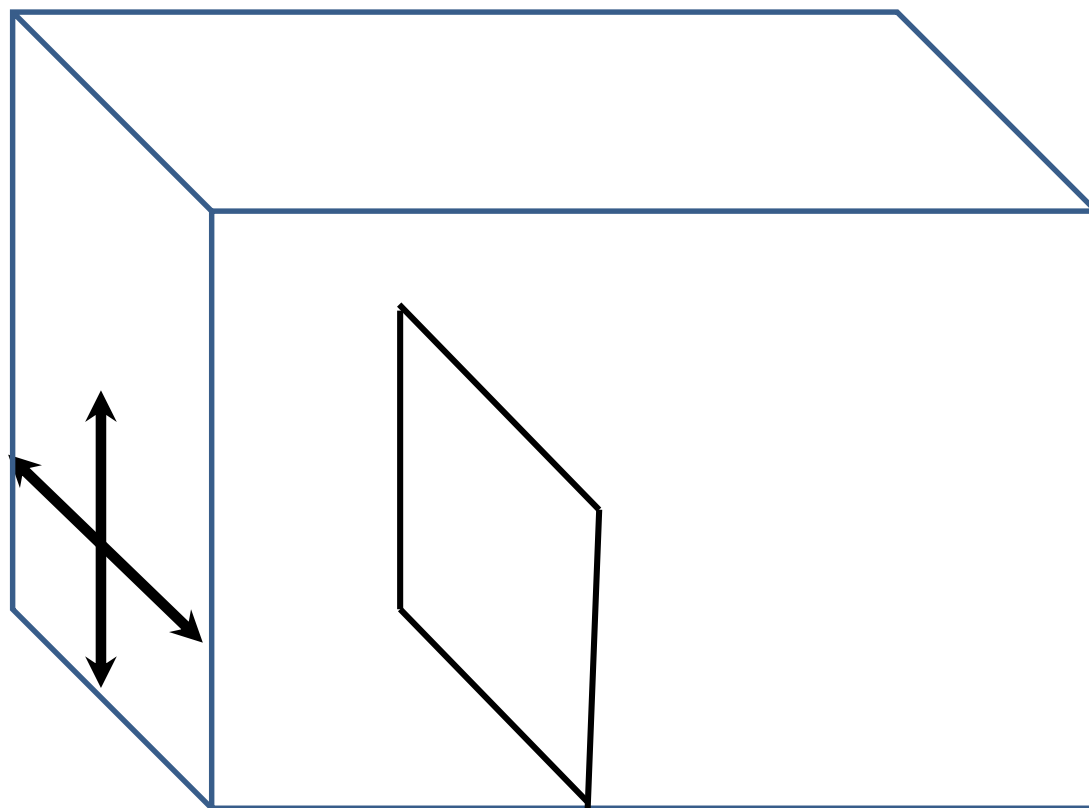


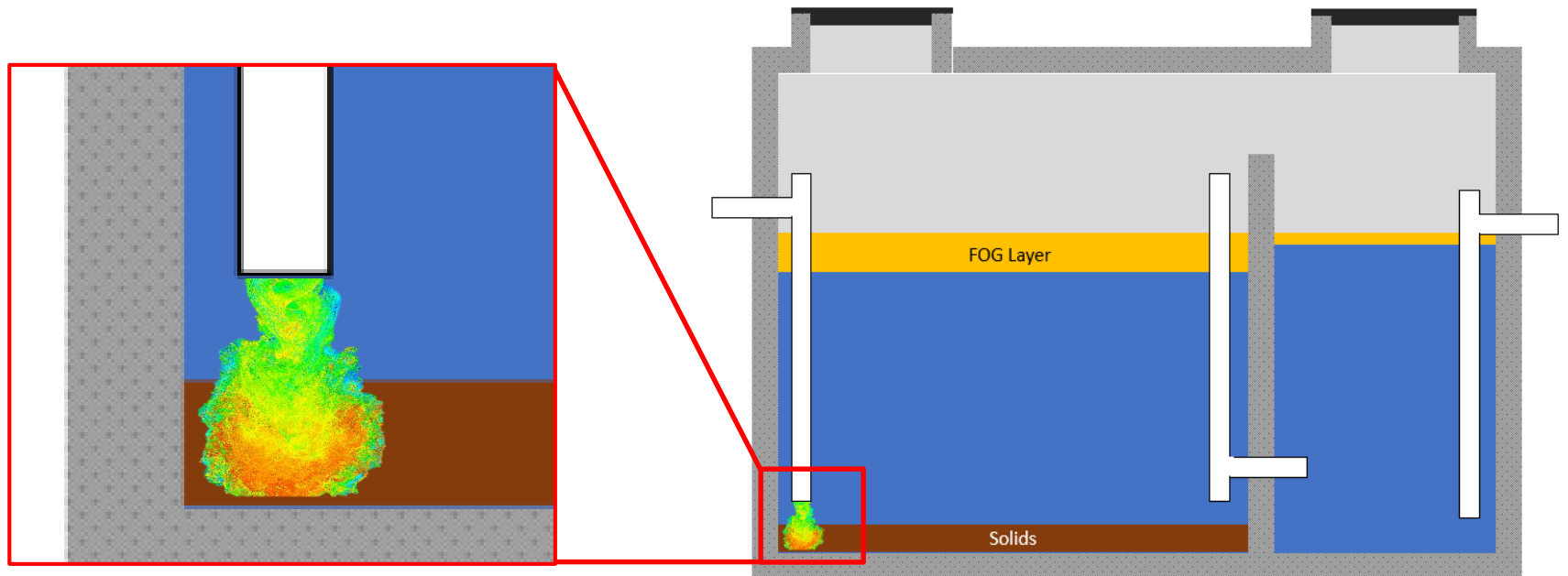
Viscosity



**As viscosity decreases
rise rate increases**





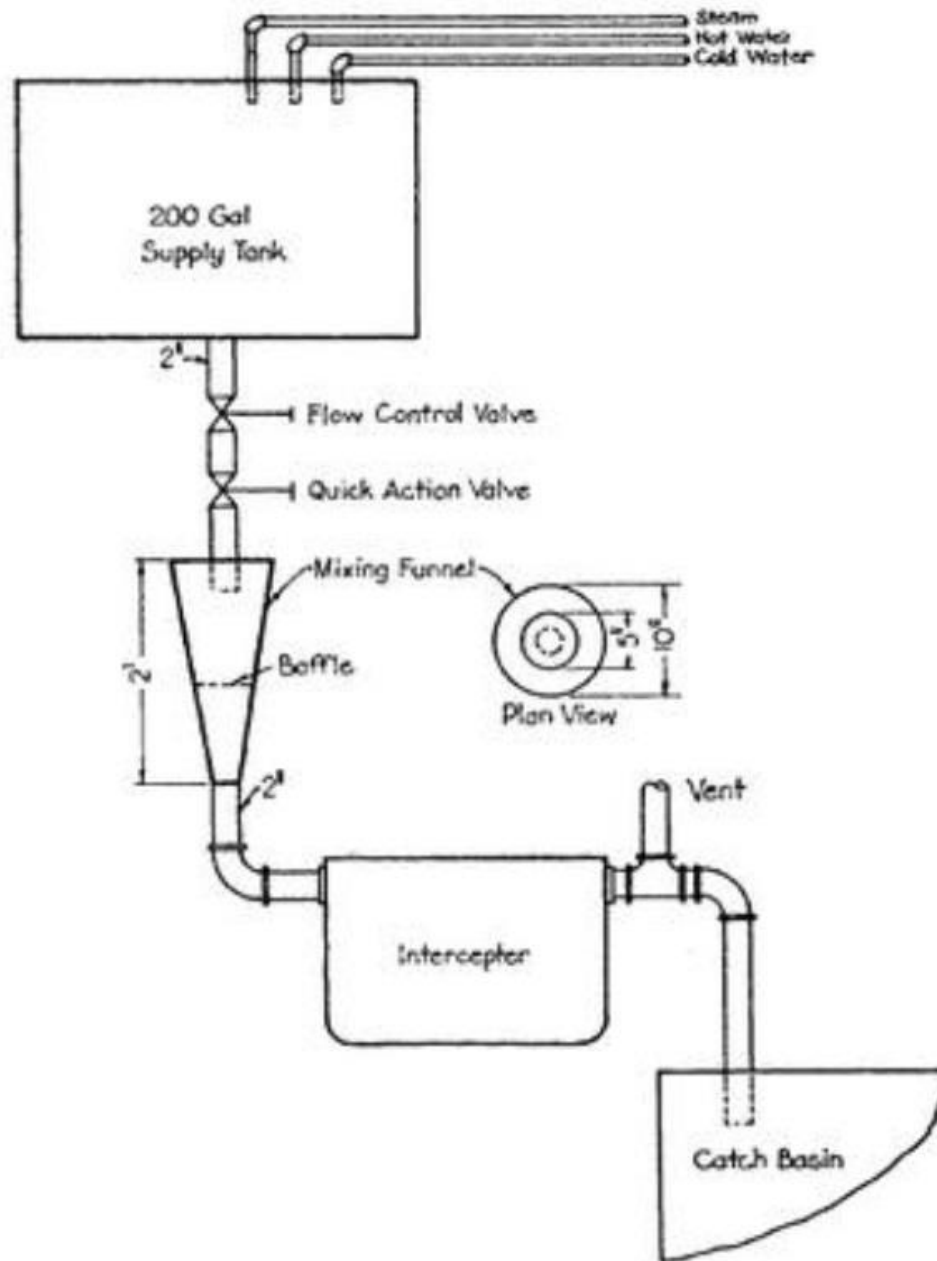


How does this design distribute the velocity?



How about a
demonstration

1942 Test Apparatus at IIHR Lab



Grease Interceptor Performance Requirements:

- Average efficiency, 90% minimum
- Capacity, 2 lbs grease for each 1 gpm



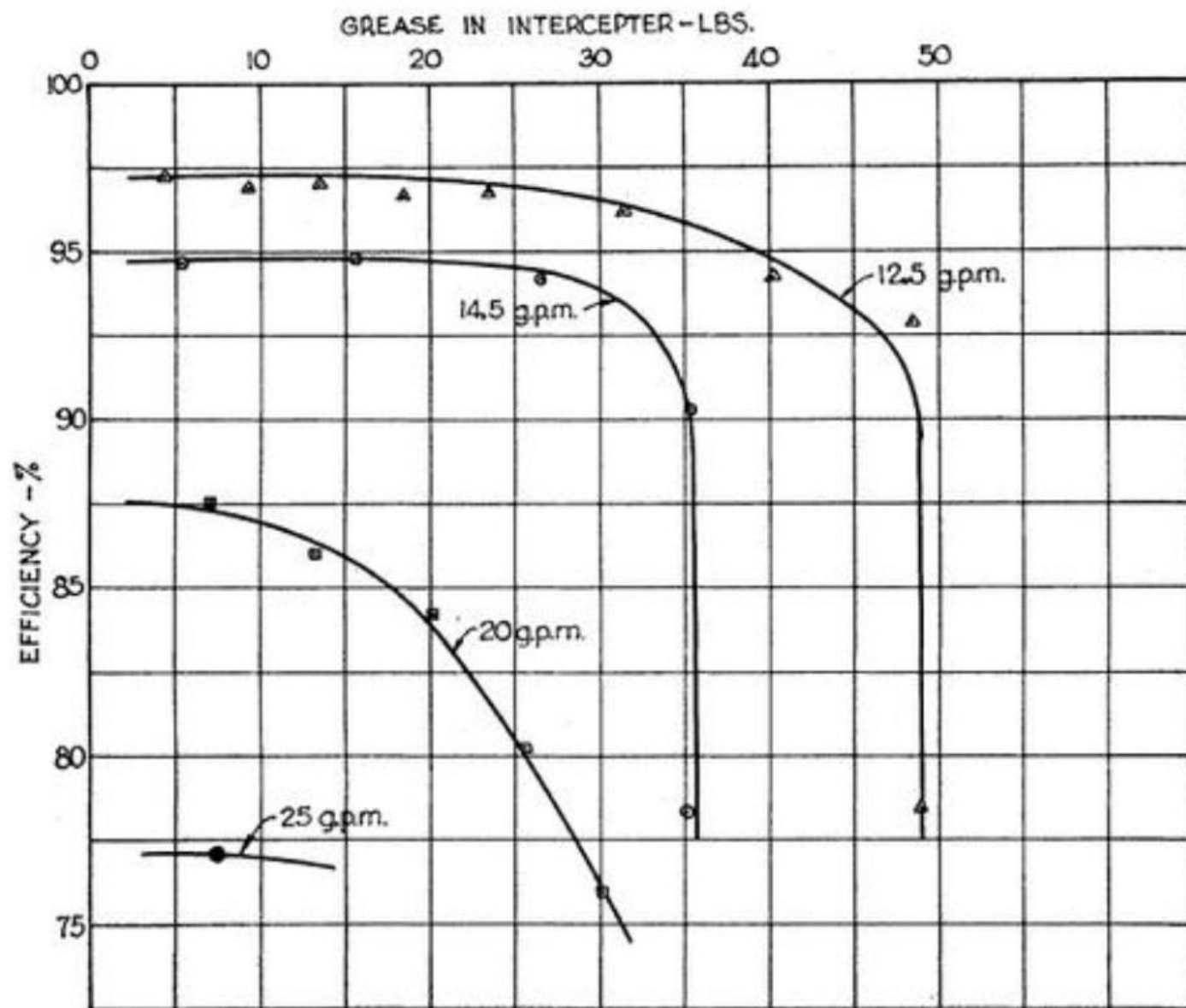
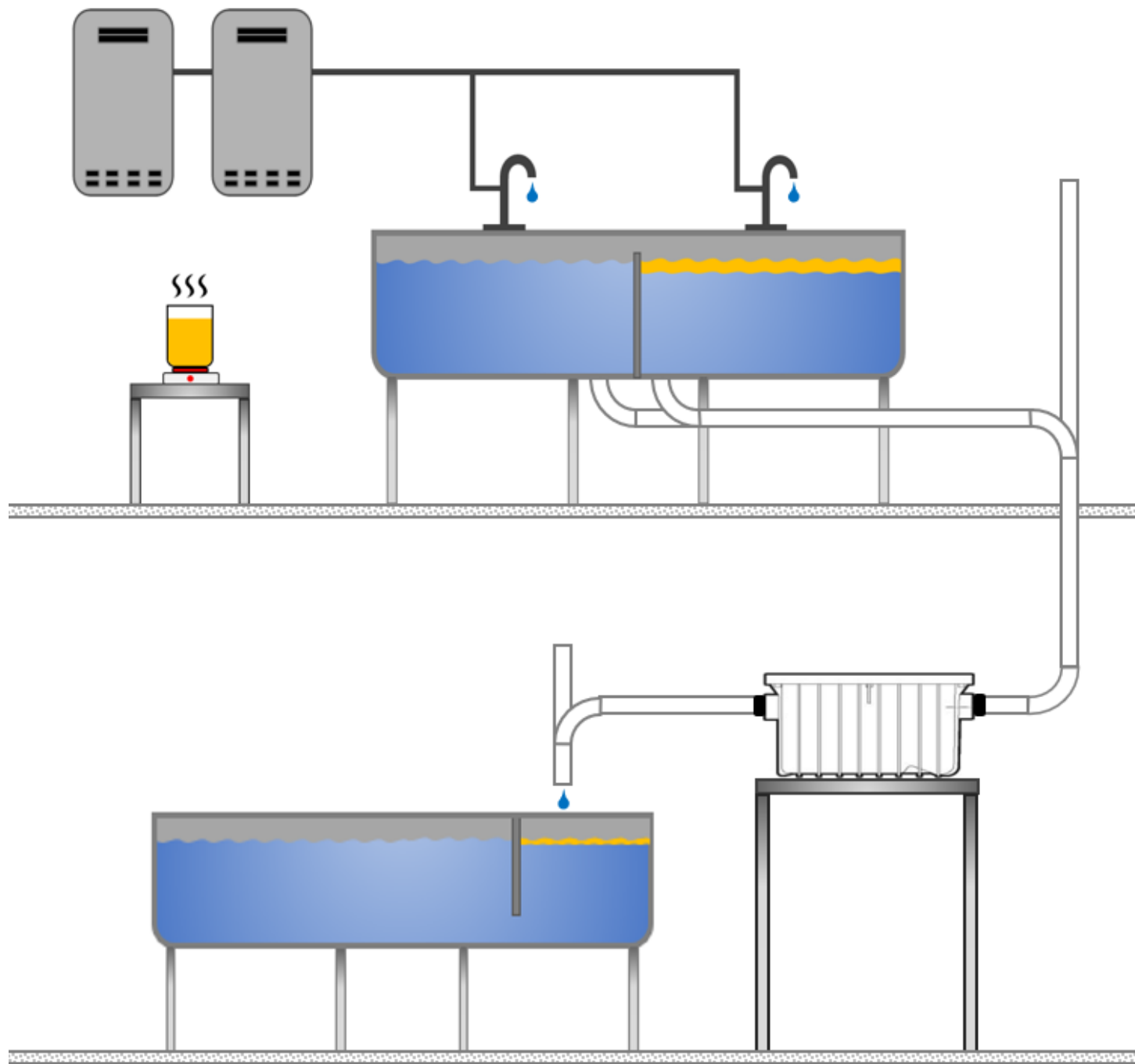


FIG. 2.—Typical laboratory test data for a commercial grease interceptor.



Gravity-differential Separation...

It's how ALL grease interceptors work!

Questions?



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