Kitchen Waste Handling Solutions

Centralize & Point Source Interceptors

JASLYN ONG, BUSINESS DEVELOPMENT MANAGER

Automatic Grease Removal Devices

PUB legislations

Under the Sewerage and Drainage (Sanitary Works) Regulations,

all sullage water from food shops, restaurants and other eating establishments shall be discharged into the sewerage system via grease traps.

The Sewerage and Drainage (Trade Effluent) Regulations [SD(TE)R]

The SD(TE)R specifies the criteria for the discharge of trade effluent into the sewers. The key things you must do are:-

(a) Install a grease trap
Any person who discharges trade effluent into any sewerage system shall, in connection with the discharge, install a grease trap, as the Board may require. The person shall also ensure that the grease trap is maintained from time to time as the Board may, by notice in writing require.

(b) Monitor the concentrations of certain substances in your trade effluent.

You must ensure that the trade effluent discharged into a public sewer does not contain grease and oil (non-hydrocarbon) exceeding 100 mg/litres in concentration.

Source : PUB

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PUB legislations

Audits

PUB regularly conducts audits on grease traps in eating establishments.
The audits would include:-
a) Carry out a visible inspection;
b) Collect water sample for analysis to check for compliance with the SD(TE)R; and
c) Check documents such as:-
• Maintenance schedule for the grease trap; and
• Invoices issued by the licensed general waste collectors.

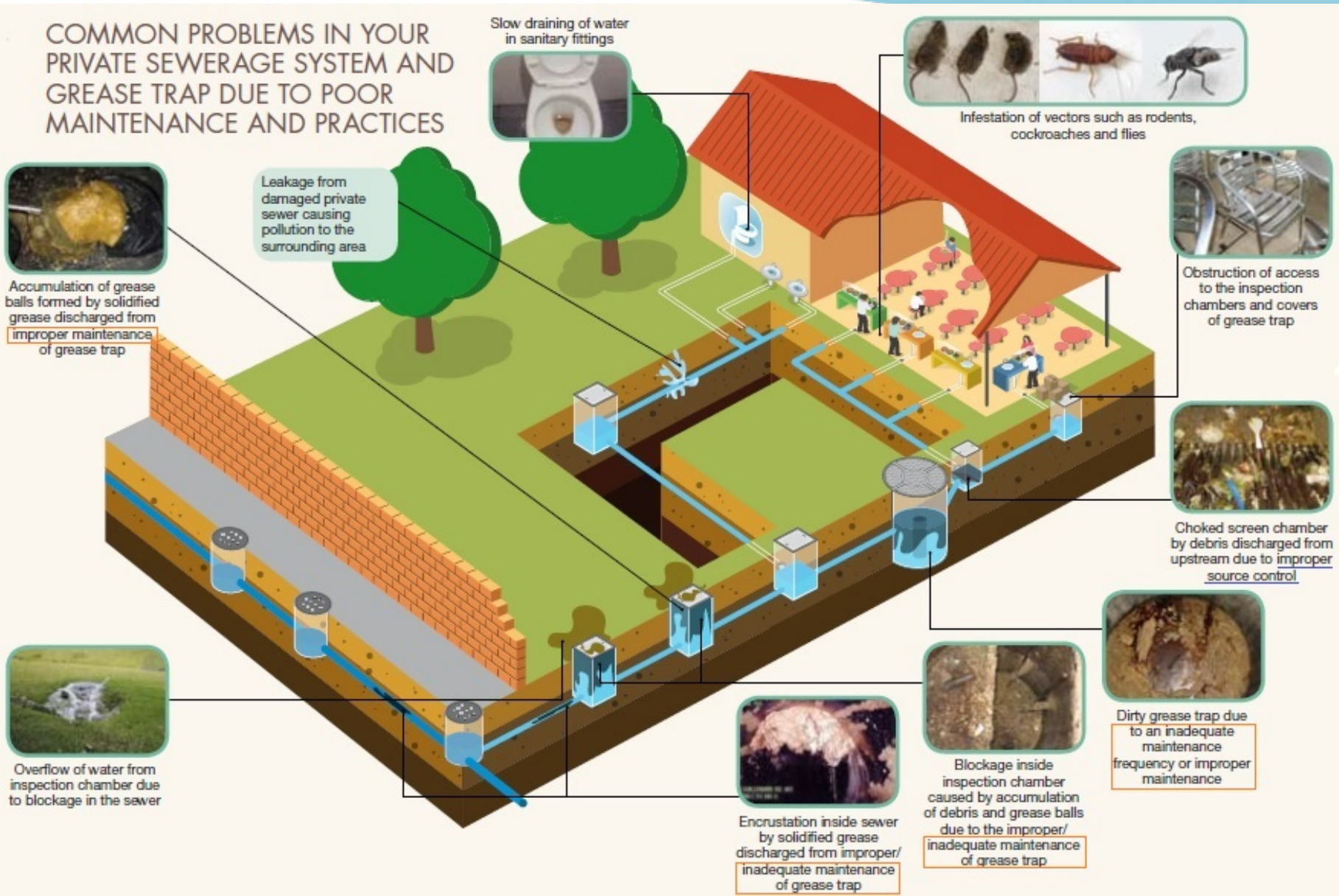
The penalty for an offence under the SD(SW)R or SD(TE)R is a maximum fine of $5,000.

S/N	Action	Offence Under	Penalty
i	Discharge of trade effluent that exceeds the discharge limit	SD(TE)R	Maximum fine of $5,000
ii	Failure to install a grease trap to pretreat the culinary water before its discharge into the sewer	SD(TE)R	Maximum fine of $5,000

Source : PUB

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Common problems in grease traps due to poor maintenance and practices



Improper source control

Before operation

Gully trap



Improper source control

During operation

What is the consequences ?



Consequences of improper source control



Consequences of improper source control

In field conditions



Consequences of improper source control

In field conditions



Consequences of improper source control



Dirty grease trap due to inadequate maintenance frequency and improper cleaning



Dirty grease trap due to inadequate maintenance frequency and improper cleaning



Inadequate maintenance leads to odor issues and inefficient grease separation



Tanker usually will not empty the grease trap

Grease overflow due to inadequate maintenance



Accumulation of grease balls when grease are mixed with solid debris



Inefficient grease separation causes ejector system to fail

Ejector tank filled with grease and solids waste



How you can slow down emulsion, the invisible grease thief?

While no grease removal system is 100% effective, a properly maintained, modern grease trap can still remove more than 99 percent of FOG found in kitchen effluent.

One of the Biggest Obstacles to grease removal is the invisible grease thief called emulsion

emul|sion

[ɪˈmʌlʃ(ə)n]

NOUN

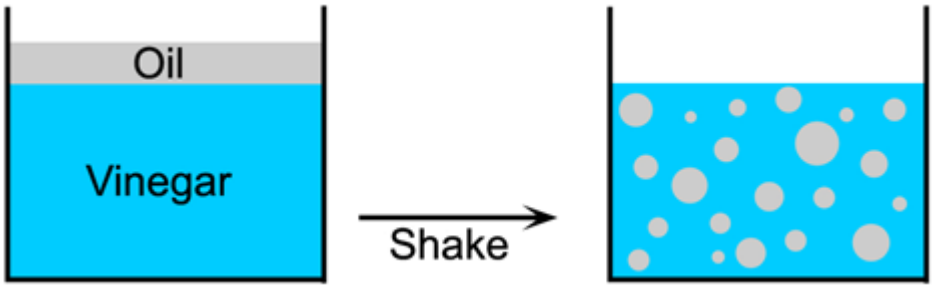
1. a fine dispersion of minute droplets of one liquid in another in which it is not soluble or miscible.
   "oil beaten to an emulsion with a half tablespoonful of vinegar"
   synonyms: lotion · salve · application · preparation · rinse · liquid · [more]

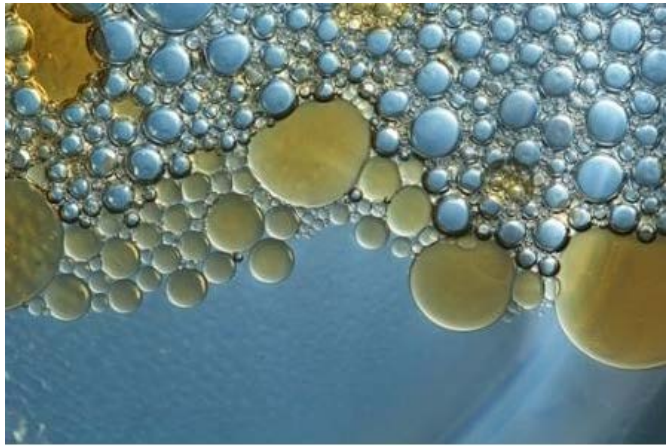
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How you can slow down emulsion, the invisible grease thief?

Physical emulsion

is what happens when you shake a bottle of Italian dressing. The old is blended with the water and vinegar and other ingredients. But, once the shaking is over, the oil soon separates out from the water, vinegar and spices.



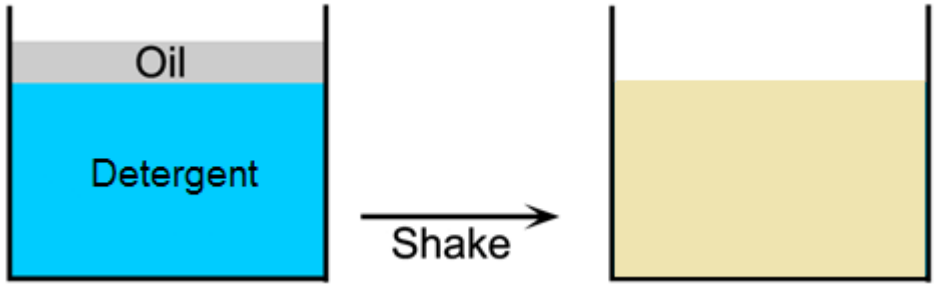


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How you can slow down emulsion, the invisible grease thief?

Chemical emulsion

is what happens when oil is mixed with water or other liquids through a chemical process. When you put detergent into a sink with greasy and oily water, the waste effluent is inevitably going to contain emulsified grease.





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Centralized System
(2 stage separation)





Point Source Unit



Trapzilla®

BIG DIPPER®
A THERMACO® Technology

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Introduction to Trapzilla Models & Specifications

Trapzilla Grease Interceptors



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Introduction to Trapzilla Models & Specifications

TZ-1826



Specifications

- 100 gpm (6.31 l/s) tested flow rating
- 200 gpm (12.6 l/s) hydraulic flow rating
- 274 (1,037 liters) liquid gallon capacity
- 1,826 lbs. (828 Kg) /
  248.8 gallons (941 l) grease capacity
- 74 gallons (280 l) solids retention capacity
- 4” (101 mm) Inlet/Outlet size standard
- 6” (151 mm) option available

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Introduction to Trapzilla Models & Specifications

TZ-600



Specifications

- 75 gpm (4.73 l/s) tested flow rating
- 150 gpm (9.46 l/s) hydraulic flow rating
- 95 gallons (359.6 liters) liquid capacity
- 635 lbs. (288 Kg) /
  86.6 gallons (327.8 l) grease capacity
- 22.6 gallons (85.6 l) solids retention capacity
- 4” (101 mm) Inlet/Outlet size standard

• 6” (151 mm) option available

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Introduction to Trapzilla Models & Specifications

TZ-400



Specifications

- 75 gpm (4.73 l/s) tested/hydraulic flow rating

  70 gallons (265 liters) liquid capacity

  405 lbs. (183.7 Kg) / 55.6 gallons (210.5 l) grease capacity

  22.6 gallons (85.6 l) solids retention capacity

- 4” (101 mm) Inlet/Outlet size

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Introduction to Trapzilla Models & Specifications

TZ-160



Specifications

- 35 gpm (2.21 l/s) tested/ hydraulic flow rating
- 27 gallons (102 liters) liquid capacity
- 167 lbs. (75.7 Kg) / 23 gallons (87 l) grease capacity
- 8.3 gallons (31.4 l) solids retention capacity
- 3” (75 mm) Inlet/Outlet size

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Introduction to Trapzilla Models & Specifications

Trapzilla Solids Separators



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Introduction to Trapzilla Models & Specifications

TSS-95



Specifications

- 150 gpm (9.46 l/s) hydraulic flow rating
- 95 gallons (359.6 liters) solids retention capacity
- 4” (101 mm) Inlet/Outlet size standard

• 6” (151 mm) option available

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Introduction to Trapzilla Models & Specifications

TSS-70



Specifications

- 75 gpm (4.73 l/s) hydraulic flow rating
- 70 gallons solids retention capacity
- 4” (101 mm) Inlet/Outlet size

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Introduction to Trapzilla Models & Specifications

TZ-160



Specifications

- 35 gpm (2.21 l/s) hydraulic flow rating
- 27 gallons solids retention capacity
- 3” (75 mm) Inlet/Outlet size

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Introduction to Trapzilla Models & Specifications

TZ-1826

All 274 gallon (1,037 L) models have dual 0-18” (0-45.7 cm) Adjustable Extension Collars



TZ-1826-SSA

Includes Extension Collars, Steel Girdle (not pictured), and Support Stand for Above-Ground Installation



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Introduction to Trapzilla Models & Specifications

TZ-600
Standard Adapter Ring and 22” Cover



TZ-600-SSA
Basic Model with Support Stand for Above-Ground Installation



TZ-600-ECA
Extension Collar Adapter Ring with 0-18” (0-45.7 cm) Adjustable Extension Collar for In-Ground Installation



*Same model extensions apply to TZ-400

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How Trapzilla Grease Interceptors Operate

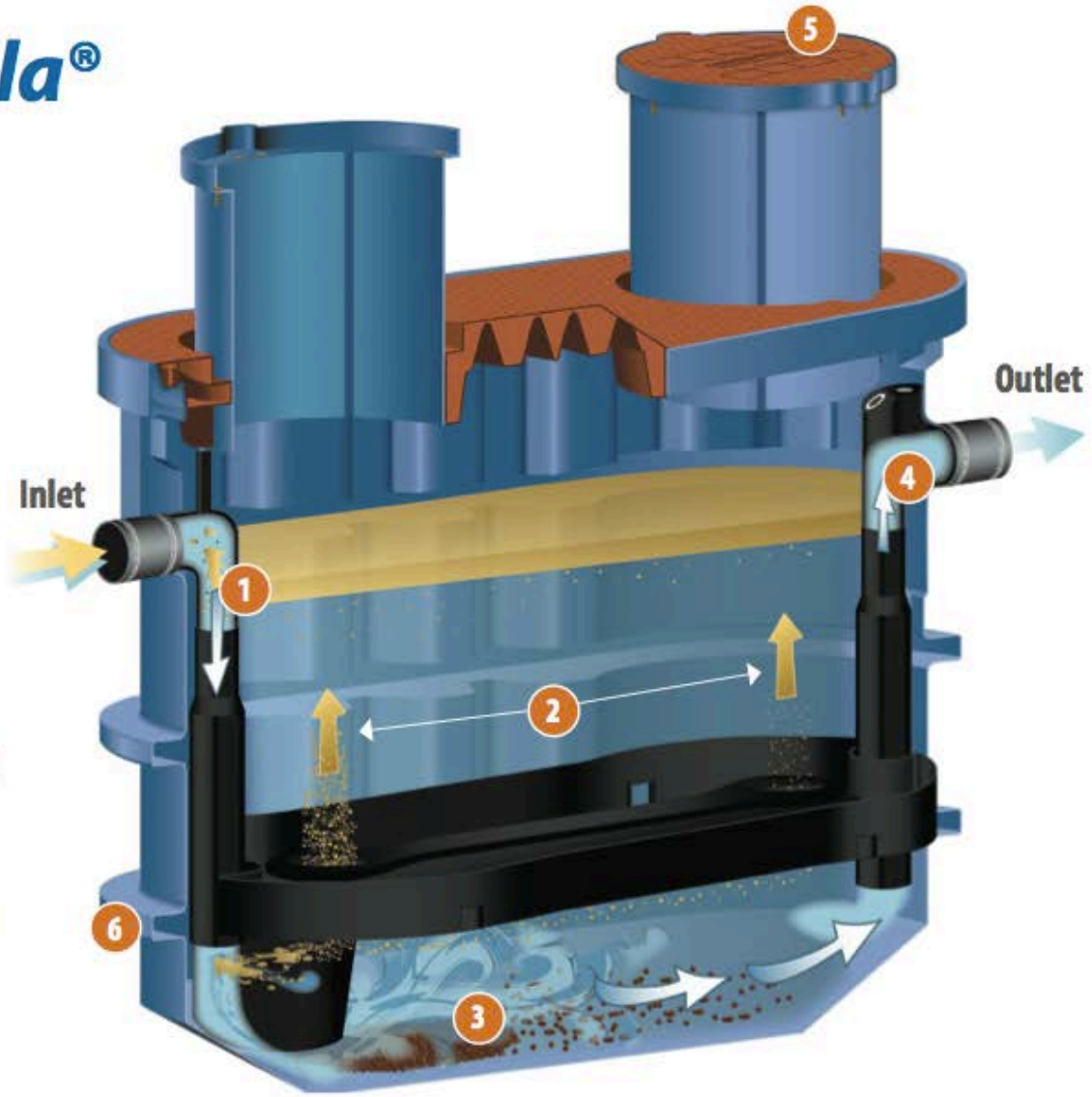


Trapzilla®
A THERMACO® Technology

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How does a Trapzilla® TZ-1826 work?

1. Drain water from source enters through Inlet Baffle
2. Grease rises to top of inner storage tank through access holes in horizontal baffle
3. Solids fall to bottom of tank
4. Clean water exits through Outlet
5. Easy to remove cover offers quick access to unit for pumping
6. Anchor Rings for In-Ground Installation (bury in concrete)



Trapzilla Performance Benefits

3 Main Performance Criteria

1. Grease Separation

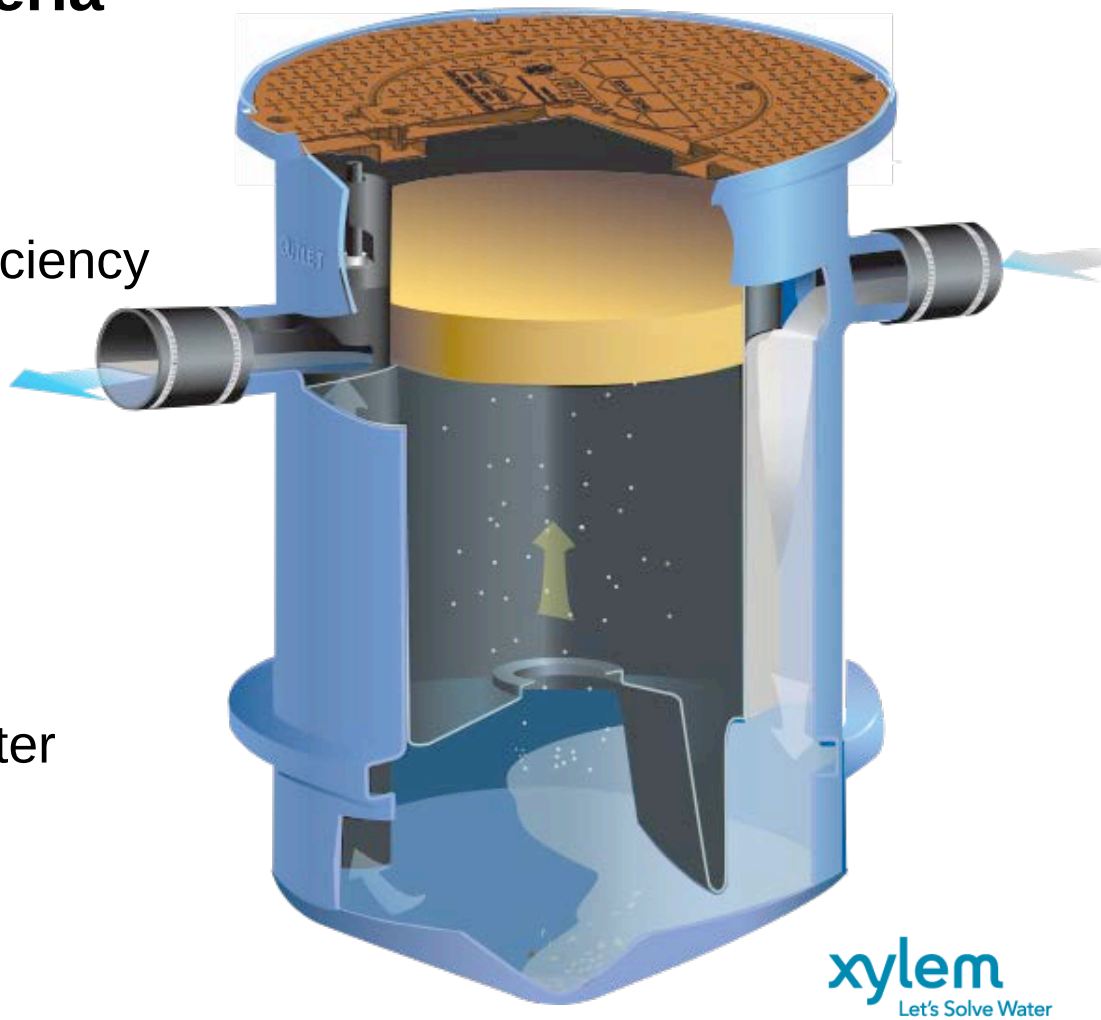
- TZ-1826 98.5% separation efficiency

2. Grease Retention

- Flat separation curve

3. Capacity

- Highest capacity per cubic meter in industry



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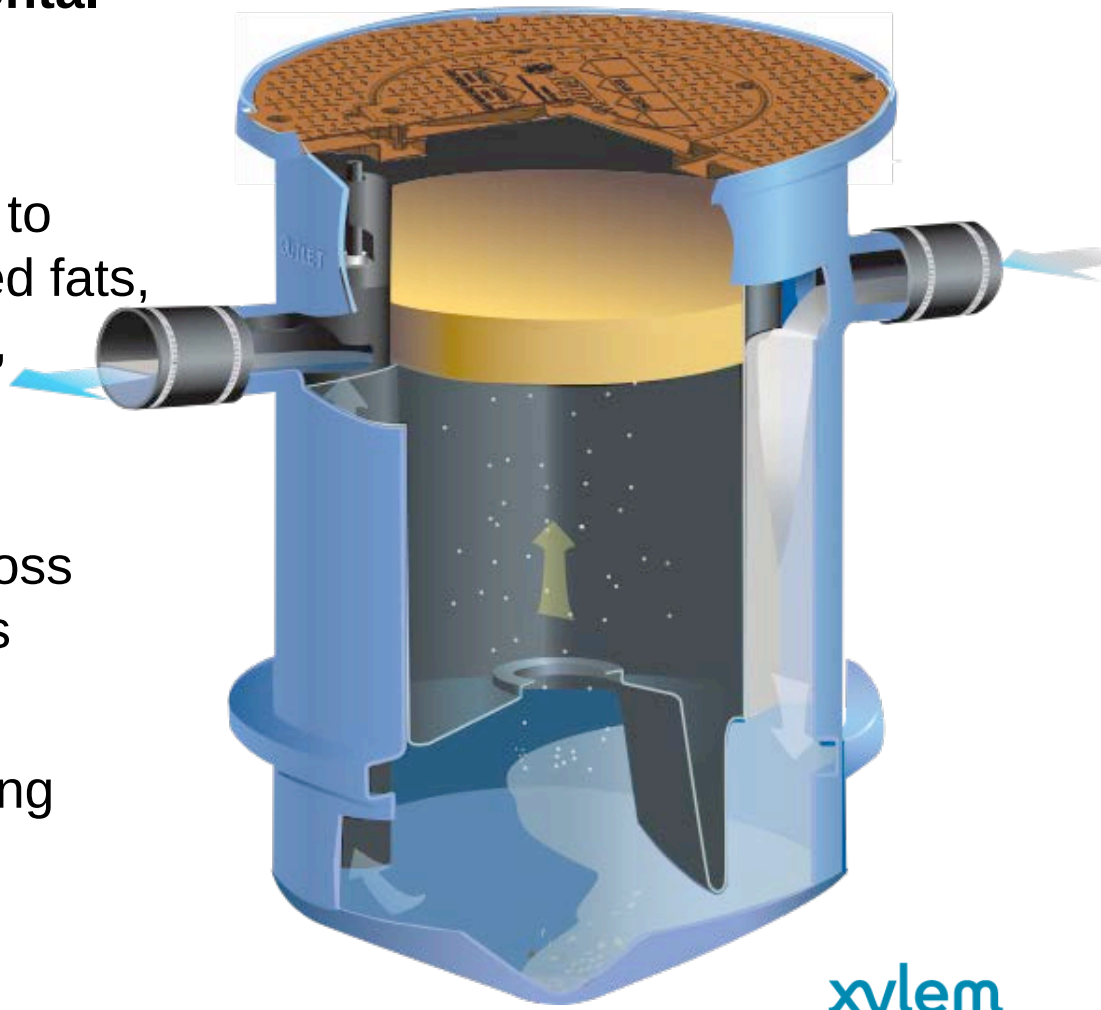
How Trapzillas Work

Additional Benefits of Horizontal Baffle

Higher retention efficiency due to isolation of previously separated fats, oils, and grease from turbulent, soapy water flows

Less grease mat degradation/loss from hydrolysis and surfactants

Purer form of fats make recycling easier to achieve



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Grease Separator Standards

American Society of Mechanical Engineers (ASME A112.14.3)
Third party tested
Performance standard created specifically for grease interceptors
Non-continous, batch flow testing procedure

European Conformance (EN1825)
Primarily a *design* standard
Performance standard created for oil/water separators
Continuous flow testing procedure

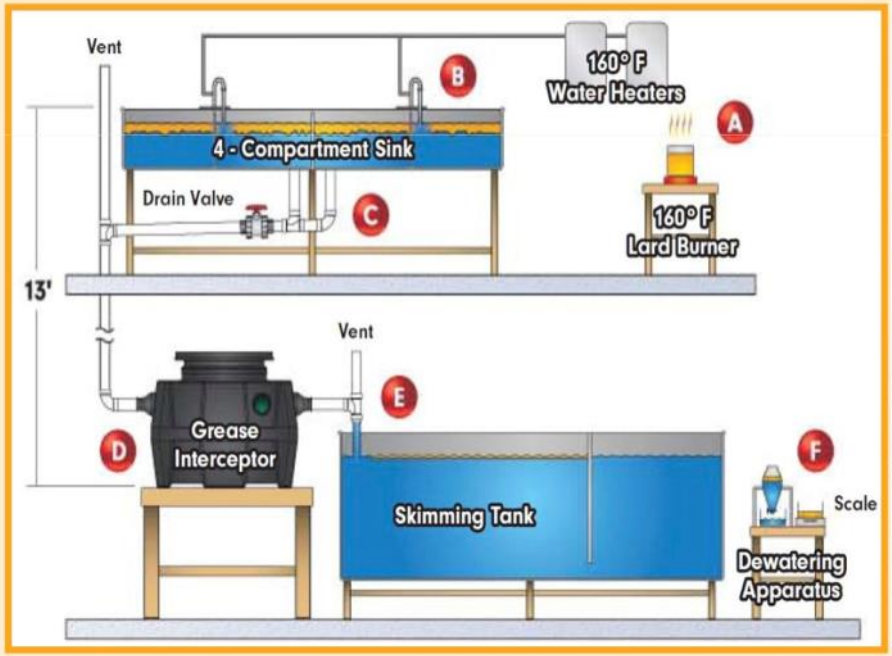
ASME Standard better mimics actual restaurant conditions as most fill up sinks to wash dishes and discharge entire sink at one time.

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Grease Separator Standards

ASME A112.14.3-2000 TEST

- The ASME test replicates kitchen operation
- Uses 65-71 ºC hot water
- Uses animal lard with SG of 0.88 at 65 ºC





Trapzilla Value Propositions

Feature	Audience	Value
Higher Separation Efficiency 95-99%	Customers, Engineers, Regulators	More assured compliance, lower risk to building and municipal infrastructure
Higher Capacity	Customers Engineers & Regulators	Lower pumping frequency More buffer time if maintenance not performed
More Compact Dimensions	Customers Engineers & Regulators	Space Savings Can help more application types
Materials	Customers, Engineers, Regulators	Sustainable, No replacement cost, Easier to clean/maintain over time
Large Volume of Accessories	Customers, Engineers, Regulators	Adaptability to site specific needs

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Trapzilla Sizing Example

Trapzilla Grease Interceptors, and Solids Separators are sized based on two criteria:

1. Maximum Potential Flow Rate
2. Desired Grease/Oil/Solids Capacity

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Determining Potential Flow Rate

Flows come in two forms:

1. “Low Flow” Discharge from unstopped sinks and drains
2. Impounded Flows where sinks are filled with water and then released all at once
    - Impounded flows create the highest potential flow rate and what should be used to determine maximum flow to unit

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Determining Potential Flow Rate

2. Compare to the flow rates of Trapzilla Models and choose the next highest rated interceptor compared to your calculated flow rate (4.41 l/s). Higher flow rates may be attained by installing units in parallel using a Thermaco Molded Flow Splitter.

Model	Flow Rate
TZ-160	2.21 l/s
TZ-400	**4.73 l/s**
TZ-600	4.73 l/s
TZ-1826	6.31 l/s

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Desired Grease Capacity

To increase capacity, a larger Trapzilla may be installed. In our example earlier, the flow rate dictated that at least a TZ-400 be installed. However, a TZ-600 or TZ-1826 may be installed to increase retention capacity.

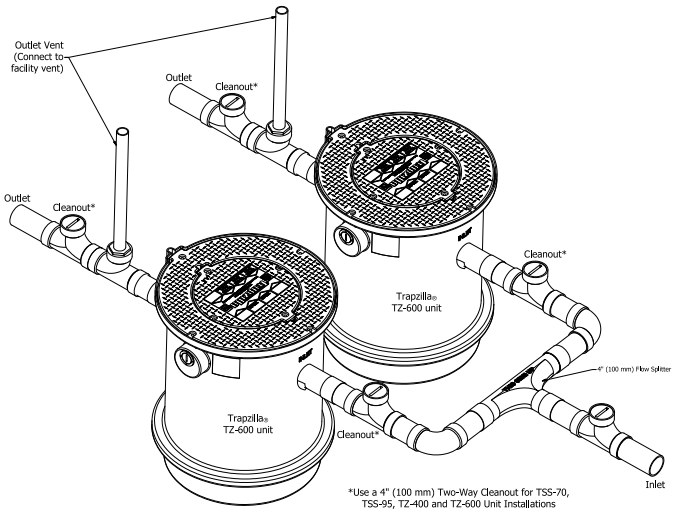
Model	**Retention**
TZ-400	183.7 Kg
TZ-600	288 Kg
TZ-1826	828 Kg



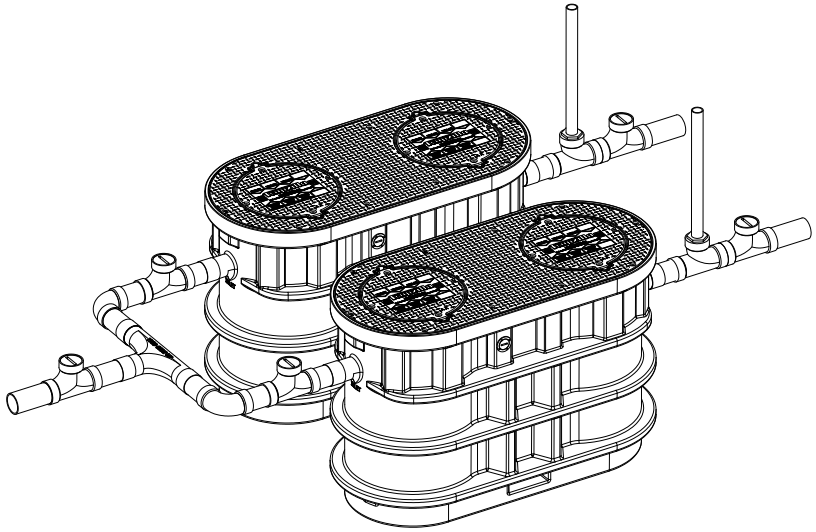
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Desired Grease Capacity

Another way to increase capacity is to install multiple units in parallel.



Two TZ-600's offer 1,270 lbs. (576 Kg) retention capacity



Two TZ-1826's offer 3,652 lbs. (576 Kg) retention capacity

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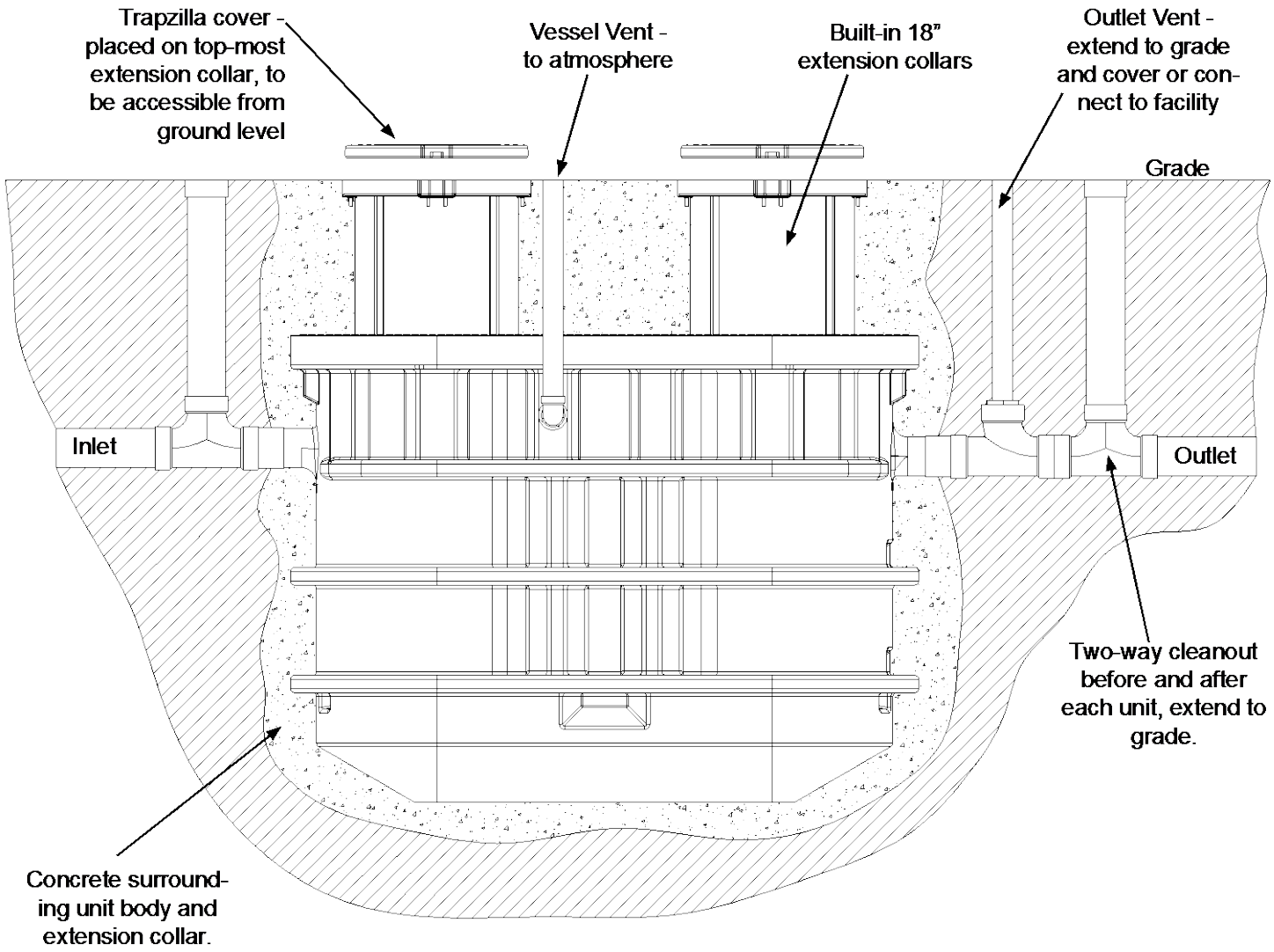
Solids Separator Considerations

Trapzilla Solids Separators installed in front of Grease Interceptors retain the bulk of the solids, allowing the grease interceptor to operate at peak efficiency



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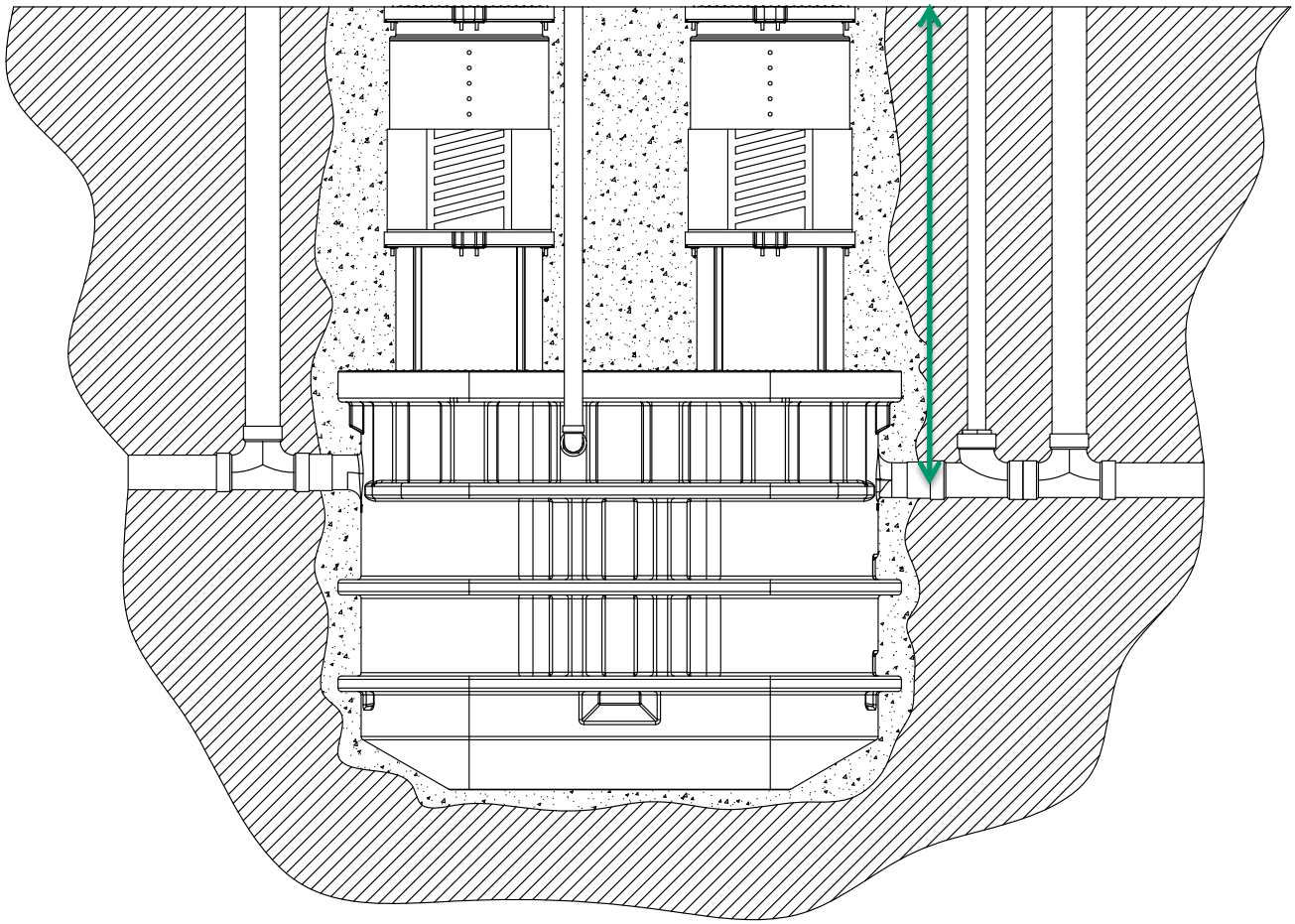
Below-Ground Installation



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Below-Ground Installation

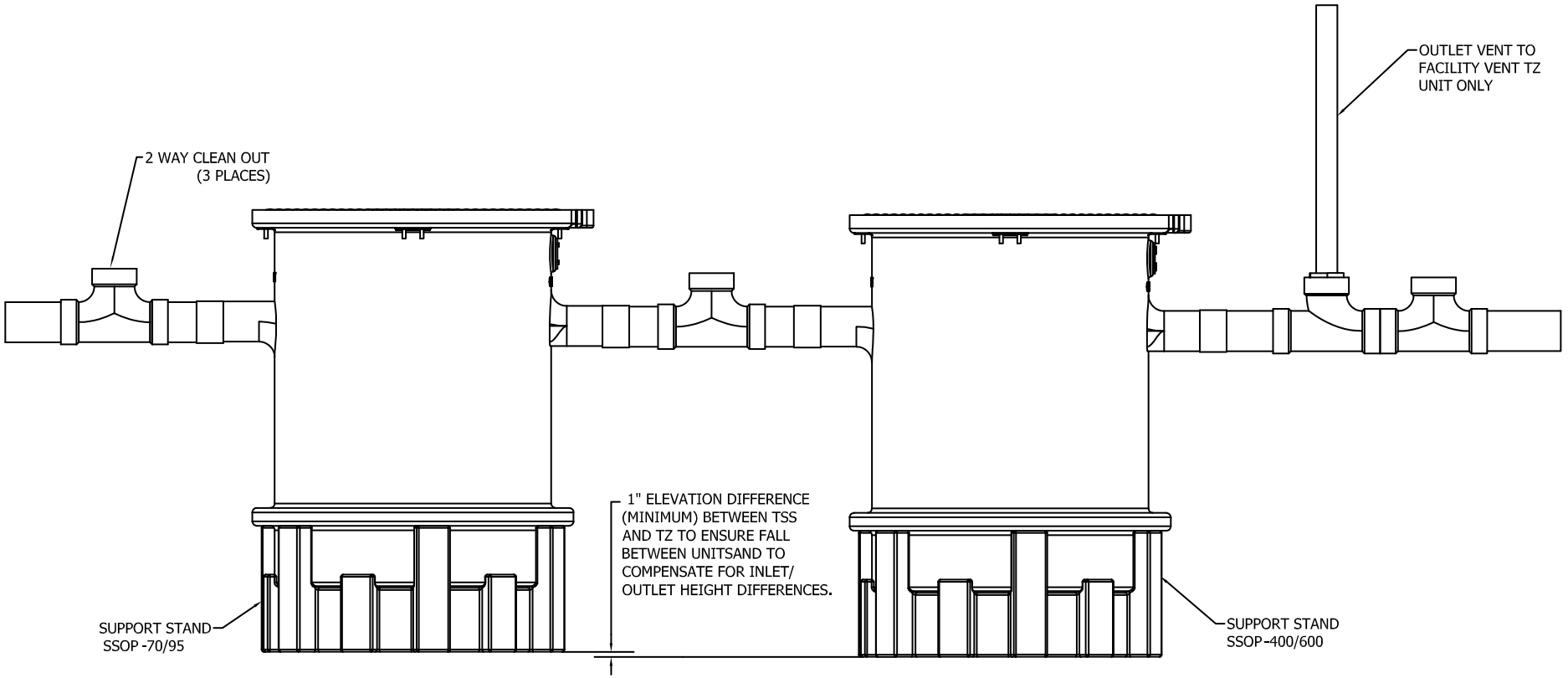
Maximum Installation Depth = 60”
(152cm) to center of outlet pipe



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Above-Ground Installation

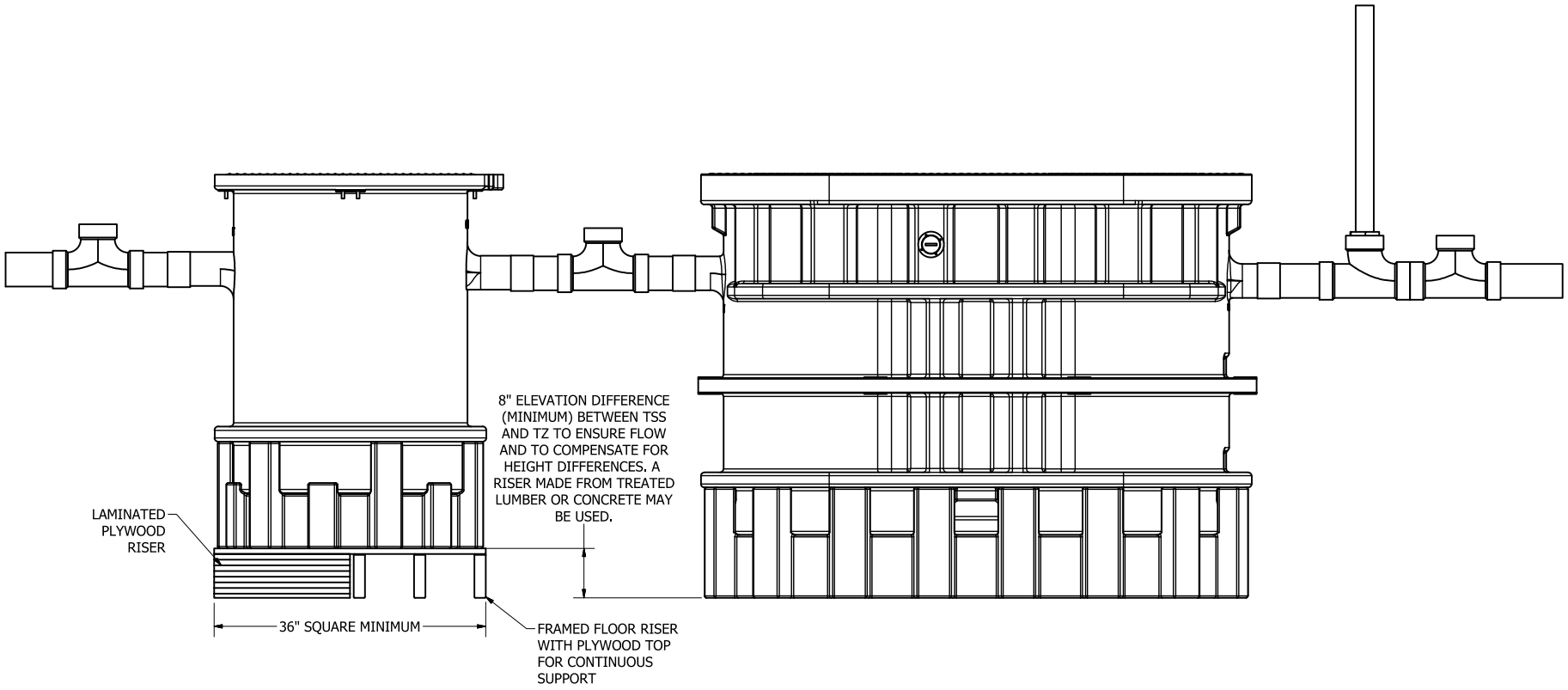
Two like-sized interceptors (TSS-95/TZ-600, TZ-600/TZ-600) in series



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Above-Ground Installation

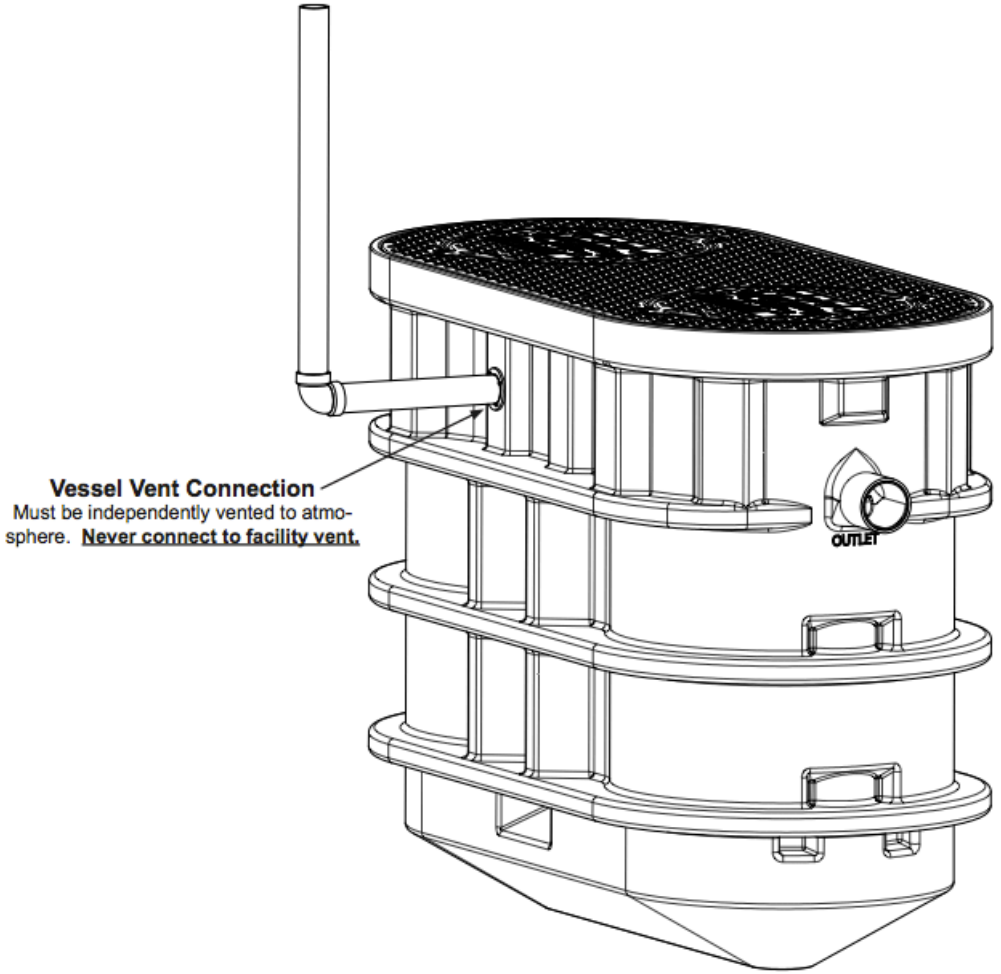
Riser Construction (for use of TSS-95 with TZ-1826)



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Indoor Installations

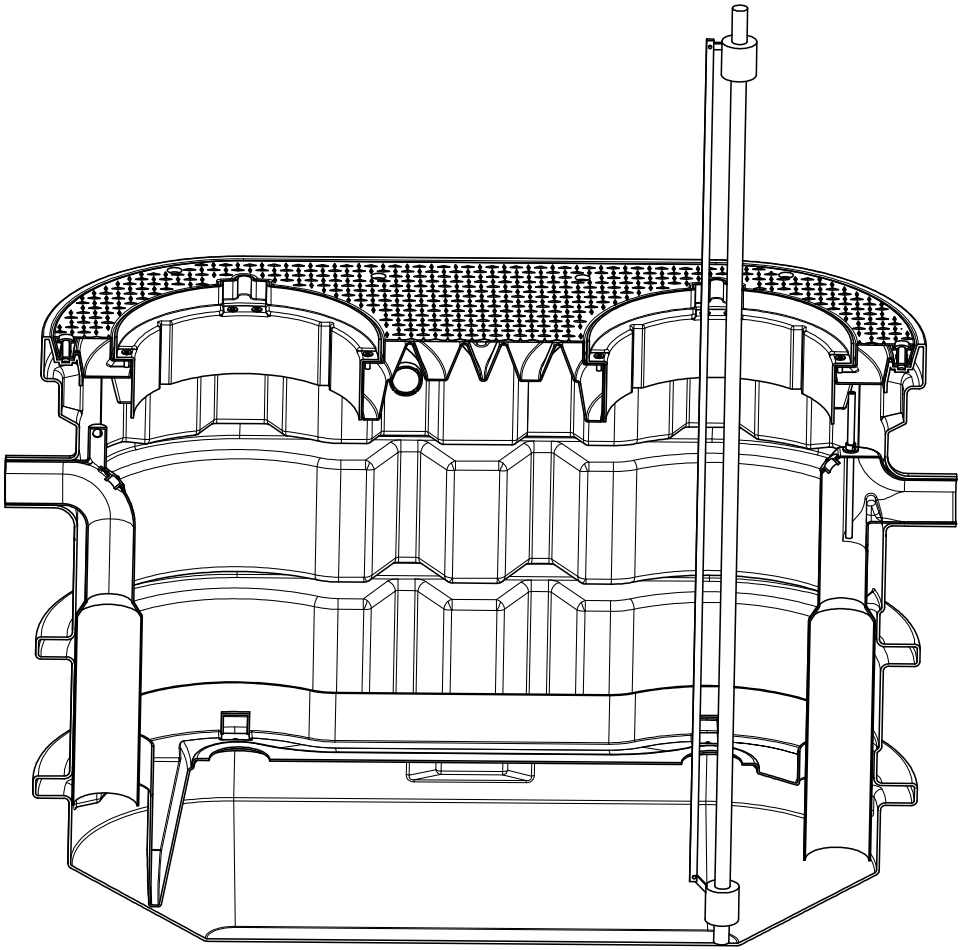
Use vessel vent connection for indoor installations



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Maintenance & Servicing

Determining Pumping Frequency



1. After installing, measure grease and solids levels in Trapzilla periodically.

Take grease measurement from top of liquid level downward and compare to chart above.

Take solids/sludge measurement from bottom of unit upward and compare to chart above.

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Maintenance & Servicing

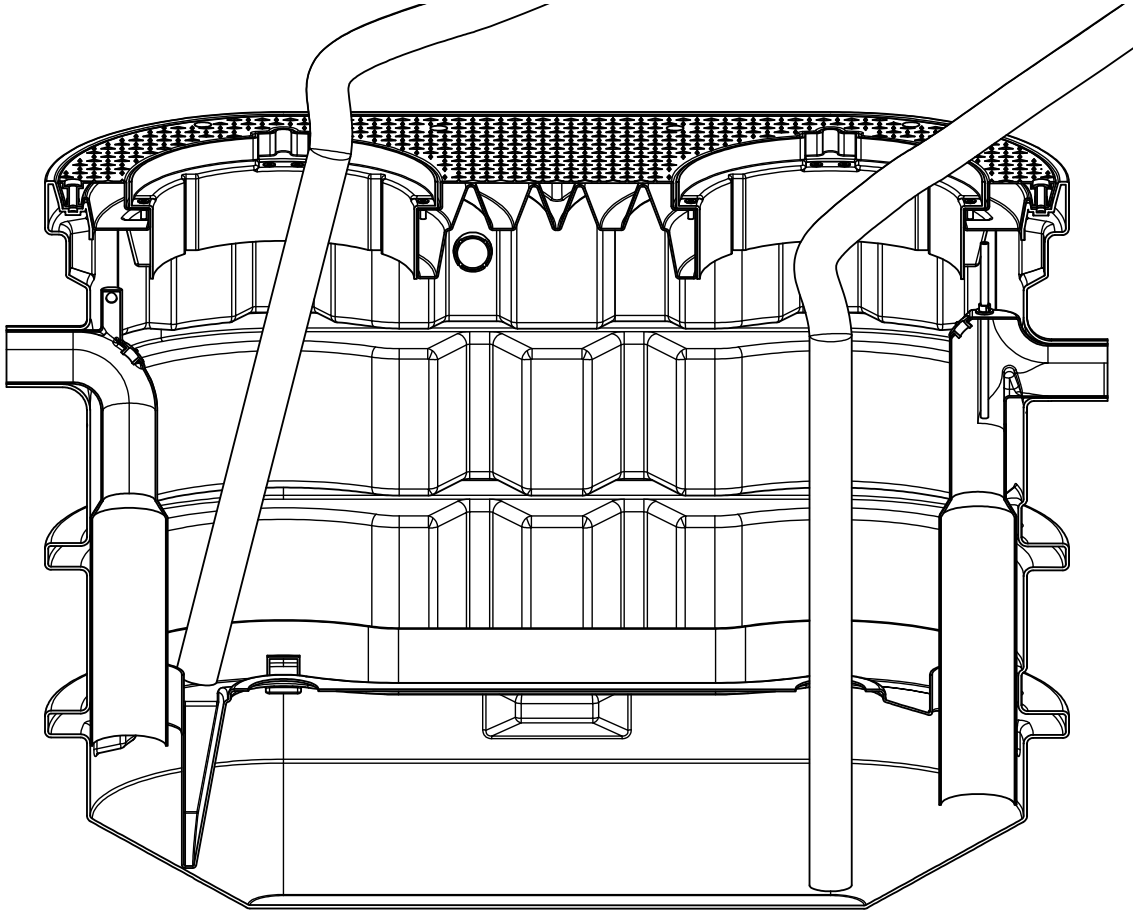
Determining Pumping Frequency

2. Compare measurements to table below. Pump out when either grease or solids is near 80% capacity (see “Ready to pump at” figures).
3. After two or three cleanings, set a regular interval with sufficient margin for error.

	Grease		Solids	
	Total Capacity (depth in cm):	**Ready to pump at (depth in cm):**	**Total Capacity (height in cm):**	**Ready to pump at (height in cm):**
TZ-1826	63.5	50.8	34.3	27.3
TZ-600	43.2	34.9	35.6	34.5
TZ-400	23.8	19.0	35.6	34.5
TZ-160	33.0	26.7	25.4	20.3

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How to Pump Trapzilla



1. Pump out upper chamber first
2. Lower hose through hole(s) in horizontal baffle to pump out lower chamber
3. Run water into system to flush solids sediment towards outlet end of unit
4. Pump out remaining contents

Thermaco TRAPZILLA Grease & Solids Separator
Projects Reference List
(As at Sept 2012)

1.	Dragon Gate Restaurant – HarbourFront	Converted existing SMC grease tank to Trapzilla System 1x TZ-600 module (completed in 2008)
2.	LOT 1 Shopping Centre – CapitaLand	Converted existing SMC grease tank to Trapzilla System 2x TZ-600 modules (completed in 2009)
3.	Cine Leisure Complex – Cathay	Converted existing SMC grease tank to Trapzilla System 2x TZ-600 modules (completed in 2009)
4.	Millennium Walk – Marina Properties (In-ground installation)	New Trapzilla System *In-ground installation* 2x TZ-600 modules (completed in 2009)
5.	Oasia Hotel (next to Novena Square & TTSH)	New Trapzilla System 2x TZ-600 modules (completed in 2010)
6.	Resort World Sentosa – RWS	New Trapzilla System 2x TZ-600 only c/w Flygt Micro 7+7 pump station (completed in 2010)
7.	Tampines 1 Shopping Mall – AsiaMalls (2 Floor installation)	Replaced conventional single stage grease trap with Trapzilla System 2x TZ-600 modules (completed in 2010)
8.	Clementi Mall Part I / Bus Interchange – NTUC	New 1x Trapzilla TZ-400 module (completed in 2010)
9.	NEX Serangoon Shopping Mall – AsiaMalls	New Trapzilla 10x TZ-600 modules (completed in 2010)
10.	Quayside Hotel @ Sentosa Cove – City Development Ltd	New Trapzilla 2x TZ-600 modules (completed in 2011)
11.	White Sands Shopping Mall – AsiaMalls	New Trapzilla 2x TZ-600 modules (completed in 2010)
12.	Raffles City Shopping Centre – CapitaLand (phase 1)	New Trapzilla 3x TZ-600 modules (completed in 2010)
13.	Century Square Shopping Mall – AsiaMalls	New Trapzilla 2x TZ-600 modules (completed in 2010)
14.	Northpoint Shopping Mall – Frasers Centrepoint	New Trapzilla 2x TZ-600 modules (completed in 2010)
15.	Kopitiam @ Liang Court (1 Floor installation)	New Trapzilla 1x TZ-600 module (completed in 2010)
16.	New F&B outlet @ Singapore Zoo	New Trapzilla 1x TZ-400 only (completed in 2010)

STARHUB 10:18 PM 100%

Thermaco TRAPZILLA Grease & Solids Separator
Projects Reference List
(As at Sept 2012)

17.	Restaurant @ 14 Purvis Street (1 In-ground installation)	New Trapzilla 1x TZ-600 module (Completed in 2012)
18.	Tampines Mall - CapitaLand (4 Floor installation)	New Trapzilla 4x TZ-600 modules (Completed in 2011)
19.	Woodlands Waterfront Jetty (Rasa Istimewa Restaurant)	New Trapzilla 1x TZ-600 only c/w Flygt Micro 6+6 pump station (completing by 2012)
20.	Connexion @ Farrer Park MRT Station (2 Floor installation)	New Trapzilla 2x TZ-600 modules (completing in 2012)
21.	Kallang Bahru Complex - A&A (2 In-ground & 1 Floor installation)	New Trapzilla 3x TZ-400 modules (completing in 2012)
22.	Commercial Building @ Ocean Way, Sentosa Cove (City Development Ltd) (2 In-ground & 1 Floor installation)	New Trapzilla 3x TZ-600 modules (completed in 2012)
23.	Singapore Post Limited (2 Floor installation)	Replaced existing SMC grease tank to Trapzilla System 2x TZ-600 module (completed in 2012)
24.	Paragon II @ Lobby CP2 (2 Floor installation)	Replaced existing SMC grease tank to Trapzilla System 2x TZ-600 module (completed in 2012)
25.	Orchard Towers @ Claymore Road (1 Floor installation)	New Trapzilla 1x TZ-400 module (completed in 2012)
26.	Plaza Singapura Shopping Centre – CapitaLand	New Trapzilla 4x TZ-600 modules (completing in 2012)
27.	Raffles City Shopping Centre – CapitaLand (phase 2)	New Trapzilla 7x TZ-600 modules (completing in 2012)
28.	Resort World Sentosa – Grease Plant Room No.9 @ B2	Replaced single-stage grease trap with Trapzilla 1x TZ-600 module (completing in 2012)
29.	Riverside Village – Far East Organization	Replaced SMC grease tank with Trapzilla 1x TZ-600 module (completing in 2012)

SINGAPORE GREEN BUILDING PRODUCT
Singapore Green Building Council Certification

Vivocity





Millenia Walk

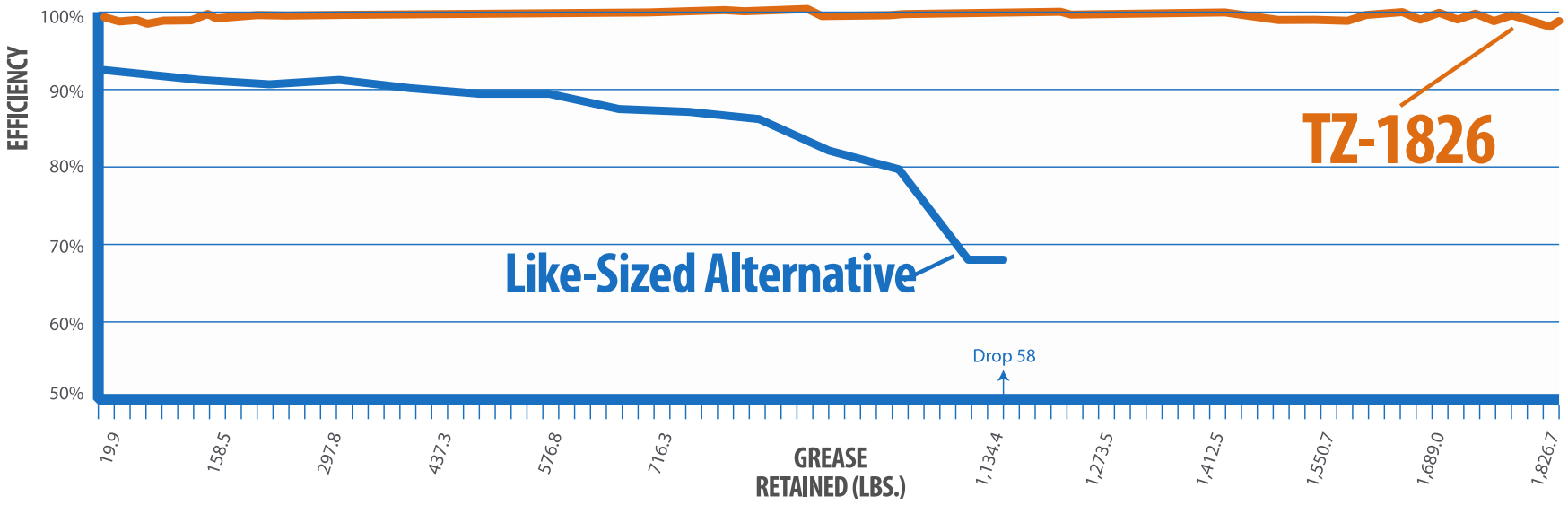




Clementi Mall

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What Sets Trapzilla Apart?



Best in Class Separation & Retention Efficiency

On Drop 92, the Trapzilla retained a total of 1,826 lbs. In comparison,
a like-sized alternative failed after drop 58 with just 1,106 lbs retained (Tested to ASME A112.14.3)
See the test in action at www.thermaco.com/about-trapzilla/bigtz

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SGBP Green Ticks



SINGAPORE GREEN BUILDING COUNCIL

SINGAPORE GREEN BUILDING PRODUCT CERTIFICATE

AWARDED TO

Xylem Water Solutions Singapore Pte Ltd
6 Wan Lee Road
Singapore 657937

FOR THE PRODUCT

Grease Trap

PRODUCT BRAND

Trapzilla

PRODUCT MODEL

TZ-160, TZ-400, TZ-600, TZ-1826

THE PRODUCT HAS BEEN ASSESSED ACCORDING TO THE ASSESSMENT CRITERIA OF THE SINGAPORE GREEN BUILDING PRODUCT CERTIFICATION SCHEME. IT HAS BEEN AWARDED THE RATING :

SINGAPORE GREEN BUILDING PRODUCT SGBC ✓✓✓✓ LEADER

Director
SGBC Pte Ltd

Certificate Number	Original Issue Date	Last Revision Date	Valid Till
SGBP 2017-003	25th January 2017	19th July 2017	24th January 2019

✓ Good ✓✓ Very Good ✓✓✓ Excellent ✓✓✓✓ Leader

The use and reliance on this certificate is subject to the terms and conditions of the Singapore Green Building Product Certification Scheme. Revised certificates may also be issued at the discretion of the Council. The certification status may be verified at the Singapore Green Building Council website (www.sgbc.sg).

1st in Singapore to obtain 4 Green ticks under grease separator category

SINGAPORE GREEN BUILDING PRODUCT SGBC ✓✓✓✓ LEADER

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BCA GREEN MARK FOR BUILDINGS AWARD

★ Platinum



Millenia Walk

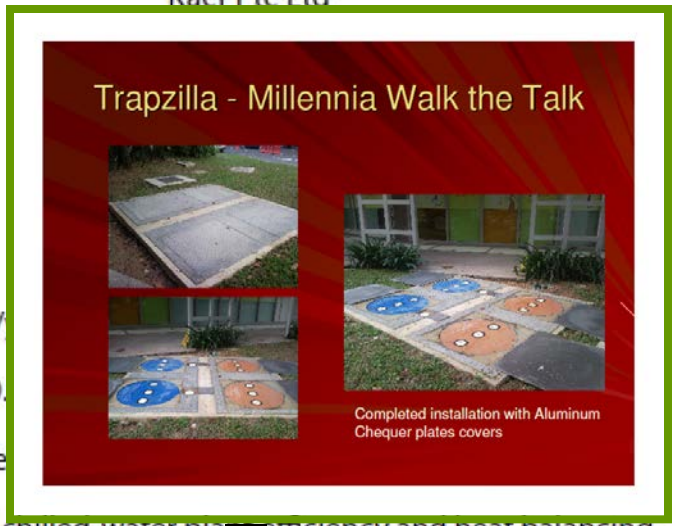
(Existing Non-Residential Buildings)

Building Owner
Millenia Private Limited

Building Management
Marina Properties Pte Ltd /
Pontiac Land Group

ESCO
Johnson Controls (S) Pte Ltd

ESD Consultant
Kaer Pte Ltd



Key Features

- Estimated energy savings: 2,660,421 kWh/yr; Estimated water savings: 1,074 m³/
- New chillers and pumps in district cooling plant. The efficiency of the system is 0.
- Auto condenser tube cleaning system for the chillers in the District Cooling Syste
- Permanent measurement and verification instrumentation for the monitoring of chilled-water pla efficiency and heat balancing. These instruments are linked to the Building Maintenance System (BMS).
- Extensive use of LED lighting throughout carpark and common areas and use of T5 fluorescent lig ng in staircases.
- Installation of motion sensors to control operation of escalators.
- Condenser auto tube cleaning system used for new chillers in the DCS plant.
- Grease and cooking oil are collected in the Grease Interceptor System and recycled by a service provider and made into bio fuels.
- 15 pyramidal roof top design structures to bring in natural daylight into the main shopping walkways.

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Performance Based Product

310 L of FOG captured

Not subject to "The 25% Pump-Out Rule" & Not affected by "Thermal Inversion" Effect

Less than 31L (10%) FOG is lost for every 310L of FOG captured.



ASME standard 2-Stage Grease Separator

47

98-90 % separation efficiency



Live video at NEX shopping mall

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Kitchen Effluent before grease interceptor

Sampling Location

[redacted] grease tank discharge at basement 2 (near travellator) - fencing ejector (blue & yellow)

Sampling Date & Time

25 June 2015 / 1030 Hrs

Sampling Officer & Type of Sampling

Chew Chong Tim & Ong Yew Cheng / Grab Sampling

Location of Test

249 Jalan Boon Lay

Test Result

Test Parameter	Content (mg/L)	Maximum Limitation# (mg/L)	Method of Test
Oil & Grease (Hydrocarbon)	5900*	60	APHA 5520-12
Oil & Grease (Non-Hydrocarbon)	3300*	100	

#Sewerage and Drainage (Trade Effluent) (Amendment) Regulations 2013 [Second Schedule]

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Kitchen Effluent after grease interceptor

Sampling Location
One water treatment sample collected at [redacted] Basement 2 in Bishan and identified as follows:-
Tank 4 Discharge

Sampling Date & Time
23 June 2016 / 1630 Hrs

Sampling Officer & Type of Sampling
Chua Kok Leong / Grab Sample using APHA 1060

Location of Test
249 Jalan Boon Lay

Test Result

Test Parameter	Content (mg/L)	Maximum Limitation# (mg/L)	Method of Test
Oil & Grease (Hydrocarbon)	16	60	APHA 5520-12
Oil & Grease (Non-Hydrocarbon)	77	100	

#Sewerage and Drainage (Trade Effluent) (Amendment) Regulations 2013 [Second Schedule]

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Portable Grease Interceptor for single F&B





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Introduction to the new Big Dipper 51K



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Models Available

Models	Flow Rate	Pipe Connection	Certifications
W-200-IS	20 gpm (1.26 l/s)	2" (50mm)	ASME, PDI, CE Pending
W-250-IS	25 gpm (1.58 l/s)	2" (50mm)	ASME, PDI, CE Pending
W-350-IS	35 gpm (2.21 l/s)	3" (75mm)	ASME, PDI, CE Pending
W-500-IS	50 gpm (3.15 l/s)	3" (75mm)	ASME, CE Pending
W-750-IS	75 gpm (4.73 l/s)	4" (100mm)	ASME
W-1000-IS	100 gpm (6.30 l/s)*	4" (100mm)	ASME

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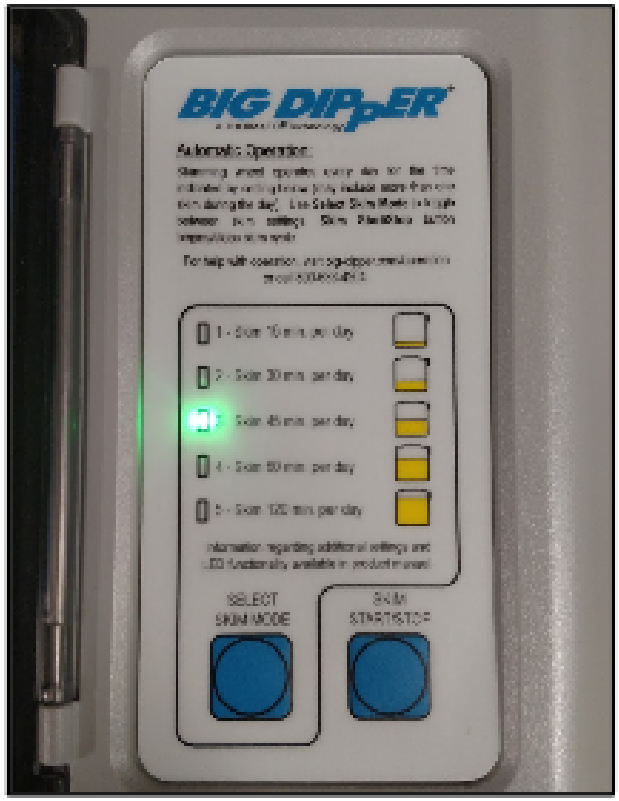
- The grease collector now fits onto a more durable, circular grease trough with a gasket to prevent any odors from leaking.

- To remove the grease collector, users will need to rotate slightly counterclockwise and then pull the grease collector off the unit.



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Timing / operation



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The user interface for control settings has been updated and now features five settings in default mode:

1 - 15 minutes per day
2 - 30 minutes per day
3 - 45 minutes per day
4 - 60 minutes per day
5 - 120 minutes per day
(runs 60 minutes every 12 hours)

Toggle through settings using 'Select Skim Mode' button.

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Wheel Wiper Assembly

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The Wheel Wiper Assembly has been updated to accommodate the new sealed flip door.

It is designed to fit snuggly around the skimming wheel and installed correctly, allows the flip door to close and seal.

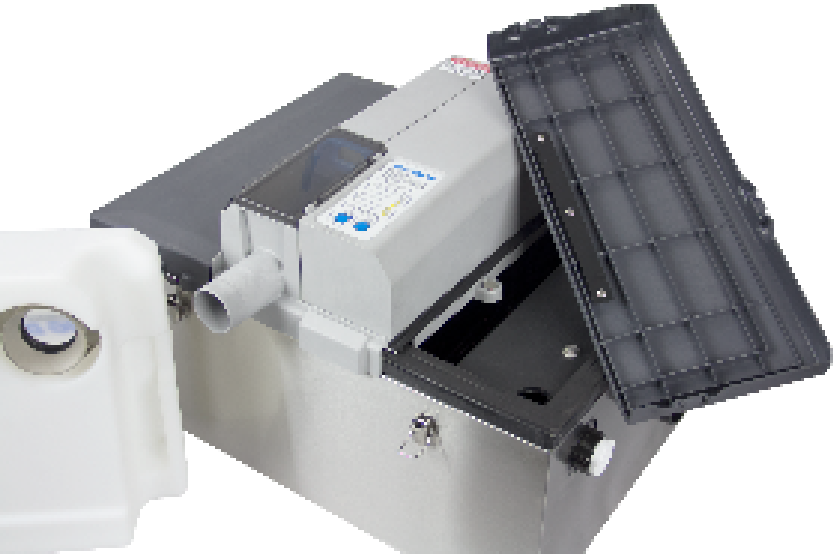
It also has a higher angle to allow fats, oil, and grease to flow more quickly into the grease trough and minimize buildup.

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Advance Odor Protection

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All of these updated design elements result in a new patent pending benefit for users, Advanced Odor Protection. Odors in the tank caused by solids and grease are sealed inside the tank and kept out of the kitchen.



- New lids with ribbing designed to mate with gasketing and create optimal seal.
- Tighter component fit prevents leaks.
- Magnetic contacts on Electrical Assembly and Skimming Wheel Flip door maintain constant pressure.
- Screws for access moved to underside of Electrical Assembly to prevent moisture getting to electrical components during washdown.
- Redesigned electrical assembly prevents air from entering electrical assembly through the tank.

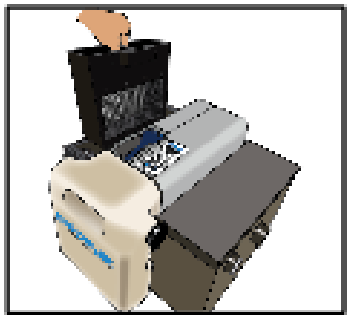
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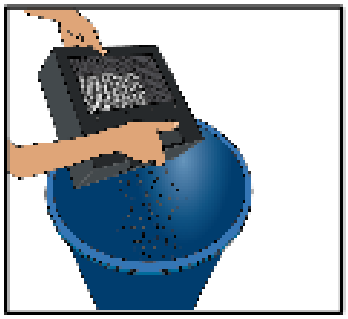
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1 Daily Maintenance

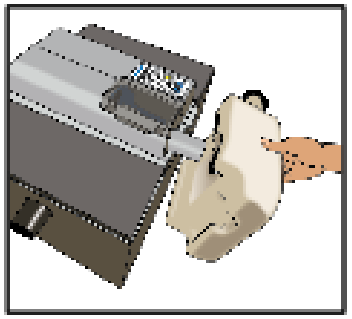
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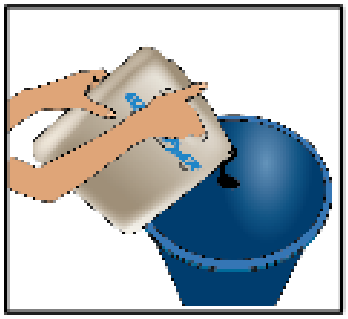
1. Empty strainer basket

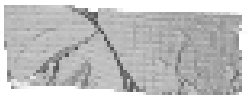




2. Check grease collector and empty if needed







Pro Tip

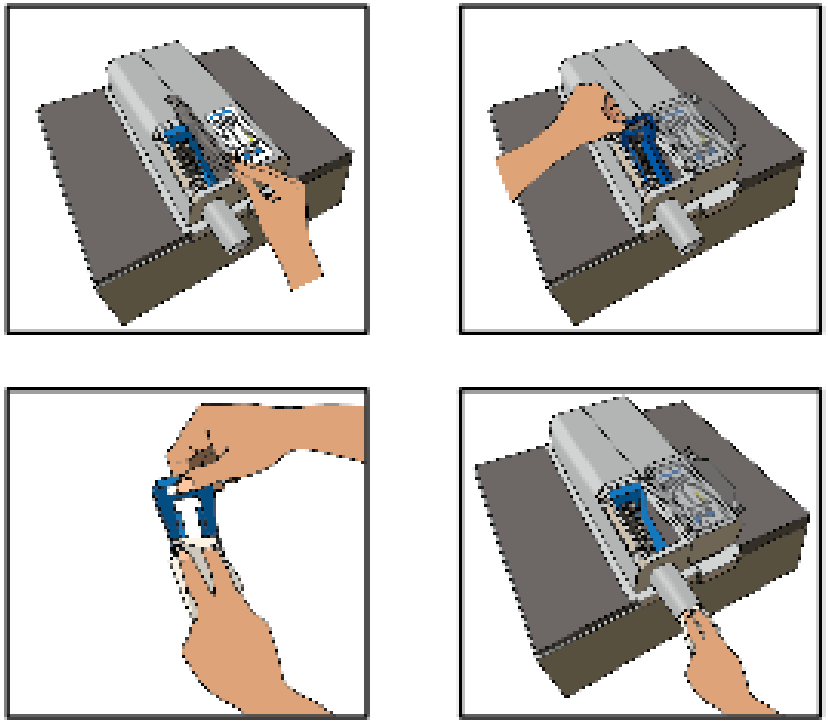
If you don't have a rendering barrel for grease, pour into a 5-gallon bucket with a trash bag, allow the grease to solidify, and the throw into trash with other food waste.

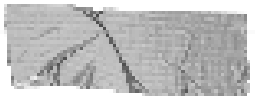
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❷ Weekly Maintenance

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1. Clean Wiper Blade Assembly and Grease Trough





Pro Tip

Do not throw away your wiper blade assembly.

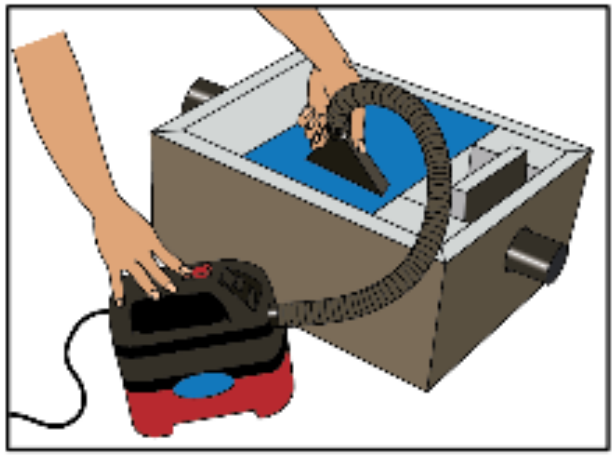
After cleaning it, place it back in the grease trough, fitting snugly around the skimming wheel.

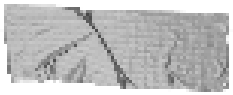
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3 Quarterly/Semi-Annual Maintenance

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1. Vacuum out contents of tank, making sure to remove fine sediment at bottom. Wipe off heater assembly.





Pro Tip

Fill the tank with water before powering the electrical assembly.

Failure to do so could be harmful to internal components.

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Thank you



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