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Printed on 24/09/2012, at 14:52

Project reference : QT20230

Project description : Degreasing Tanks

Customer location : Romania

Customer name : Marvastan

Design reference : 001

Design description : Degreasing Bath No.1

Design date : 24/09/2012

Rectangular tank

Tank length	4,000 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	12,960 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	10,001 litres

Minimum ambient temperature -12.00 °C

Wall insulation 50 mm

Top surface 1BL

Make up 0.00 litre/min

Air velocity 0.00 m/s

Temp. in 5 °C

Throughput....

Product weight 3,000.00 kg/h Sp. Heat 0.12 Ms

Carrier weight 3,000.00 kg/h Sp. Heat 0.12 Ms

Material

Temp. in -12 °C

Temp. in -12 °C

Other loss....

Type - Other

Losses

Wall loss 7.7 kW

Top loss 30.2 kW

Make up loss 0.0 kW

Product loss 40.6 kW

Carrier loss 40.6 kW

Other loss 0.0 kW

Equilibrium -

(Gross CV @ 80%)

Net 119.1 kW

Gross 148.9 kW

Warm up loads -

(Gross CV @ 80%)

From cold 3,349,771 kJ

Net gas load 227.5 kW

Gross gas load 284.3 kW

Start temp 5 °C

Warm up time 4.7 h

No. of burners 1

Burner rating 290.0 kW

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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 001	Design description	: Degreasing Bath No.1
Design date	: 24/09/2012		

Rectangular tank

Tank length	4,000 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	12,960 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	10,001 litres

No. of burners	1	Model - TX40		Burner rating	290.0 kW
Nom. bore	4"	Pipe type	Sch. 10		
Outside dia.	114.30 mm	Inside dia.	108.20 mm	Thickness	3.05 mm

Exchanger data

Pass No.	Length	Bendtype	Pipe heat transfer		Bend heat transfer	
			(kW)	Eff. %	(kW)	Eff. %
1	3,650 mm	180° Long	91	31.3	111	38.2
2	2,900 mm	180° Long	153	52.9	165	57.0
3	2,900 mm	180° Long	191	65.8	198	68.3
4	2,900 mm	180° Long	214	73.7	218	75.3
5	2,900 mm	180° Long	228	78.7	231	79.8
6	3,650 mm	None	239	82.4	68	75.1
Total	21,294 mm	inc. bends				

Flue gas temperature	182 °C	
Anticipated efficiency	82.4%	
Average heat flux	31,265 W/m ²	
Maximum heat flux	122,252 W/m ²	@ 3,769.7 mm inc. bends
Max pipe temperature	132 °C	
Pressure drop	32.84 mbar	

Note: The first and last heat exchanger coil passes must be constructed to terminate in a BSP male threaded pipe connection 100 mm longer than shown above. This will extend outside the vessel walls and accomodate the burner head and exhaust damper threaded pipe connections.

All elbows are to be as shown above.

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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 002	Design description	: Degreasing Bath No.2
Design date	: 24/09/2012		

Rectangular tank

Tank length	4,000 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	12,960 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	10,001 litres

Minimum ambient temperature -12.00 °C

Wall insulation	50 mm
Top surface	1BL
Make up	0.00 litre/min

Throughput....

Product weight	3,000.00 kg/h	Sp. Heat	0.12 Ms
Carrier weight	3,000.00 kg/h	Sp. Heat	0.12 Ms

Other loss....

Type - Other

Material

Air velocity	0.00 m/s
Temp. in	5 °C

Temp. in	-12 °C
Temp. in	-12 °C

Losses

Wall loss	7.7 kW
Top loss	30.2 kW
Make up loss	0.0 kW
Product loss	40.6 kW
Carrier loss	40.6 kW
Other loss	0.0 kW

Equilibrium -

(Gross CV @ 80%)

Net	119.1 kW
Gross	148.9 kW

Warm up loads -

(Gross CV @ 80%)

Start temp	5 °C
Warm up time	4.7 h

From cold	3,349,771 kJ
Net gas load	227.5 kW
Gross gas load	284.3 kW

No. of burners 1

Burner rating 290.0 kW

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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 002	Design description	: Degreasing Bath No.2
Design date	: 24/09/2012		

Rectangular tank

Tank length	4,000 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	12,960 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	10,001 litres

No. of burners	1	Model - TX40	Burner rating	290.0 kW	
Nom. bore	4"	Pipe type	Sch. 10		
Outside dia.	114.30 mm	Inside dia.	108.20 mm	Thickness	3.05 mm

Exchanger data

Pass No.	Length	Bendtype	Pipe heat transfer		Bend heat transfer	
			(kW)	Eff. %	(kW)	Eff. %
1	3,650 mm	180° Long	91	31.3	111	38.2
2	2,900 mm	180° Long	153	52.9	165	57.0
3	2,900 mm	180° Long	191	65.8	198	68.3
4	2,900 mm	180° Long	214	73.7	218	75.3
5	2,900 mm	180° Long	228	78.7	231	79.8
6	3,650 mm	None	239	82.4		
Total	21,294 mm	inc. bends				

Flue gas temperature	182 °C	
Anticipated efficiency	82.4%	
Average heat flux	31,265 W/m ²	
Maximum heat flux	122,252 W/m ²	@ 3,769.7 mm inc. bends
Max pipe temperature	132 °C	
	32.84 mbar	

Note: The first and last heat exchanger coil passes must be constructed to terminate in a BSP male threaded pipe connection 100 mm longer than shown above. This will extend outside the vessel walls and accomodate the burner head and exhaust damper threaded pipe connections.

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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 003	Design description	: Degreasing Washing Tank
Design date	: 24/09/2012		

Rectangular tank

Tank length	2,400 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	7,776 litres
Liquid temperature	50 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	6,000 litres

Minimum ambient temperature -12.00 °C

Wall insulation	None
Top surface	1BL
Make up	0.00 litre/min

Throughput....

Product weight	3,000.00 kg/h	Sp. Heat	0.12 Ms	Temp. in	-12 °C
Carrier weight	3,000.00 kg/h	Sp. Heat	0.12 Ms	Temp. in	-12 °C

Other loss....

Type - Other

Losses

Wall loss	14.7 kW
Top loss	3.8 kW
Make up loss	0.0 kW
Product loss	26.0 kW
Carrier loss	26.0 kW
Other loss	0.0 kW

Equilibrium -

(Gross CV @ 80%)

Net	70.5 kW
Gross	88.1 kW

Warm up loads -

(Gross CV @ 80%)

From cold	1,130,548 kJ
Net gas load	160.0 kW
Gross gas load	200.0 kW

Start temp	5 °C
Warm up time	2.2 h

No. of burners 1

Burner rating 200.0 kW

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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 003	Design description	: Degreasing Washing Tank
Design date	: 24/09/2012		

Rectangular tank

Tank length	2,400 mm	Tank width	2,700 mm	Tank depth	1,200 mm	Tank volume	7,776 litres
Liquid temperature	50 °C	Solution	1.00	Liquid depth	926 mm	Liquid volume	6,000 litres

No. of burners	1	Model - TX30	Burner rating	200.0 kW	
Nom. bore	3"	Pipe type	Sch. 10		
Outside dia.	88.90 mm	Inside dia.	82.80 mm	Thickness	3.05 mm

Exchanger data

Pass No.	Length	Bendtype	Pipe heat transfer		Bend heat transfer	
			(kW)	Eff. %	(kW)	Eff. %
1	2,140 mm	180° Long	49	24.7	65	32.6
2	1,940 mm	180° Long	96	47.8	106	52.8
3	1,940 mm	180° Long	125	62.3	131	65.5
4	1,940 mm	180° Long	143	71.6	147	73.7
5	1,940 mm	180° Long	155	77.6	158	79.0
6	2,140 mm	None	164	81.9		
Total	13,835 mm	inc. bends				

Flue gas temperature	191 °C	
Anticipated efficiency	81.9%	
Average heat flux	42,401 W/m ²	
Maximum heat flux	164,928 W/m ²	@ 2,229.8 mm inc. bends
Max pipe temperature	114 °C	
	48.00 mbar	

Note: The first and last heat exchanger coil passes must be constructed to terminate in a BSP male threaded pipe connection 75 mm longer than shown above. This will extend outside the vessel walls and accommodate the burner head and exhaust damper threaded pipe connections.

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Project reference : QT20230

Project description : Degreasing Tanks

Customer location : Romania

Customer name : Marvastan

Design reference : 004

Design description : Pickling Tank

Design date : 24/09/2012

Rectangular tank

Tank length 5,000 mm Tank width 2,700 mm Tank depth 1,100 mm Tank volume 14,850 litres

Liquid temperature 60 °C Solution 1.00 Liquid depth 805 mm Liquid volume 10,867 litres

Minimum ambient temperature -12.00 °C

Wall insulation None

Top surface Air

Make up 0.00 litre/min

Air velocity 0.00 m/s

Temp. in 5 °C

Throughput....**Material**

Product weight 3,000.00 kg/h Sp. Heat 0.12 Ms

Temp. in -12 °C

Carrier weight 3,000.00 kg/h Sp. Heat 0.12 Ms

Temp. in -12 °C

Other loss....

Type - Other

Losses

Wall loss 29.2 kW

Top loss 40.3 kW

Make up loss 0.0 kW

Product loss 30.1 kW

Carrier loss 30.1 kW

Other loss 0.0 kW

Equilibrium -

(Gross CV @ 80%)

Net 129.8 kW

Gross 162.2 kW

Warm up loads -

(Gross CV @ 80%)

From cold 2,502,550 kJ

Net gas load 256.0 kW

Gross gas load 320.0 kW

Start temp 5 °C

Warm up time 3.5 h

No. of burners 1

Burner rating 320.0 kW

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Project reference : QT20230
 Customer location : Romania
 Design reference : 004
 Design date : 24/09/2012

Project description : Degreasing Tanks
 Customer name : Marvastan
 Design description : Pickling Tank

Rectangular tank

Tank length 5,000 mm Tank width 2,700 mm Tank depth 1,100 mm Tank volume 14,850 litres
 Liquid temperature 60 °C Solution 1.00 Liquid depth 805 mm Liquid volume 10,867 litres

No. of burners 1 Model - TX40 Burner rating **320.0 kW**
 Nom. bore 4" Pipe type Sch. 10
 Outside dia. 114.30 mm Inside dia. 108.20 mm Thickness 3.05 mm

Exchanger data

Pass No.	Length	Bendtype	Pipe heat transfer		Bend heat transfer	
			(kW)	Eff. %	(kW)	Eff. %
1	4,670 mm	180° Long	121	37.9	141	44.0
2	4,400 mm	180° Long	198	62.0	208	65.1
3	4,400 mm	180° Long	238	74.3	243	76.0
4	4,670 mm	None	260	81.2	147	73.7
Total	19,576 mm	inc. bends				

Flue gas temperature	202 °C
Anticipated efficiency	81.2%
Average heat flux	36,967 W/m ²
Maximum heat flux	118,690 W/m ² @ 4,789.7 mm inc. bends
Max pipe temperature	106 °C
	33.12 mbar

Note: The first and last heat exchanger coil passes must be constructed to terminate in a BSP male threaded pipe connection 100 mm longer than shown above. This will extend outside the vessel walls and accommodate the burner head and exhaust damper threaded pipe connections.
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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 005	Design description	: Degreasing Immersion (Dip) Tank
Design date	: 24/09/2012		

Rectangular tank

Tank length	1,200 mm	Tank width	800 mm	Tank depth	800 mm	Tank volume	768 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	650 mm	Liquid volume	624 litres

Minimum ambient temperature -12.00 °C

Wall insulation None
 Top surface 1BL
 Make up 0.00 litre/min

Throughput....

Product weight	1,000.00 kg/h	Sp. Heat	0.12 Ms	Temp. in	-12 °C
Carrier weight	1,000.00 kg/h	Sp. Heat	0.12 Ms	Temp. in	-12 °C

Other loss....

Type - Other

Losses

Wall loss	5.9 kW
Top loss	2.7 kW
Make up loss	0.0 kW
Product loss	13.5 kW
Carrier loss	13.5 kW
Other loss	0.0 kW

Equilibrium -

(Gross CV @ 80%)

Net	35.7 kW
Gross	44.6 kW

Warm up loads -

(Gross CV @ 80%)

From cold	209,009 kJ
Net gas load	65.0 kW
Gross gas load	81.2 kW

Start temp 5 °C
 Warm up time 1.0 h

No. of burners 1

Burner rating	90.0 kW
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Project reference	: QT20230	Project description	: Degreasing Tanks
Customer location	: Romania	Customer name	: Marvastan
Design reference	: 005	Design description	: Degreasing Immersion (Dip) Tank
Design date	: 24/09/2012		

Rectangular tank

Tank length	1,200 mm	Tank width	800 mm	Tank depth	800 mm	Tank volume	768 litres
Liquid temperature	85 °C	Solution	1.00	Liquid depth	650 mm	Liquid volume	624 litres

No. of burners	1	Model - TX25	Burner rating	90.0 kW	
Nom. bore	2.5"	Pipe type	Sch. 10		
Outside dia.	73.02 mm	Inside dia.	66.93 mm	Thickness	3.05 mm

Exchanger data

Pass No.	Length	Bendtype	Pipe heat transfer		Bend heat transfer	
			(kW)	Eff. %	(kW)	Eff. %
1	970 mm	180° Long	14	15.6	23	25.9
2	790 mm	180° Short	33	36.4	39	43.1
3	790 mm	180° Long	46	50.7	50	55.7
4	790 mm	180° Short	55	60.8	58	64.2
5	790 mm	180° Long	61	68.0	64	70.7
6	790 mm	180° Short	66	73.3	68	75.1
7	790 mm	180° Long	69	77.1	71	78.5
8	790 mm	180° Short	72	79.9	73	80.9
9	970 mm	None	74	82.2		
Total	9,465 mm	inc. bends				

Flue gas temperature	186 °C	
Anticipated efficiency	82.2%	
Average heat flux	34,088 W/m ²	
Maximum heat flux	143,557 W/m ²	@ 1,044.8 mm inc. bends
Max pipe temperature	141 °C	
	33.91 mbar	

Note: The first and last heat exchanger coil passes must be constructed to terminate in a BSP male threaded pipe connection 75 mm longer than shown above. This will extend outside the vessel walls and accommodate the burner head and exhaust damper threaded pipe connections.
All elbows are to be as shown above.

Project reference : QT20230

Project description : Degreasing Tanks

Customer location : Romania

Customer name : Marvastan

Burner and Fan details

Design Name	Burner No.	Burner Rating kW	Pressure drop mbar	Flue gas temp. °C	Fan group	Model	Power kW	Excess Press. mbar
002	1	290.0	32.8	182	A			
003	1	200.0	48.0	191	A			
004	1	320.0	33.1	202	A			
005	1	90.0	33.9	186	A			

Fan group	Heat Input kW	@FGT m³/h	@NTP m³/h
A	1,190.0	2558	1621