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Data Article

Data on the no-load performance analysis of a tomato postharvest storage system



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ABSTRACT

In this present investigation, an original and detailed empirical data on the transfer of heat in a tomato postharvest storage system was presented. No-load tests were performed for a period of 96 h. The heat distribution at different locations, namely the top, middle and bottom of the system was acquired, at a time interval of 30 min for the test period. The humidity inside the system was taken into consideration. Thus, No-load tests with or without introduction of humidity level, on temperature distribution were acquired. The temperatures at the external mechanical cooling components were acquired and could be used for showing the performance analysis of the storage system.

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Specifications Table

Subject areaMechanical EngineeringMore specificMachine design, heat transfer and thermo-fluid engineeringsubject areaType of dataType of dataTable, text file, Graph

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How data was acquired	The tomato postharvest storage system was designed and constructed using the principle of vapour compression refrigeration system. The external temperatures of the compressor, condenser, evaporator and expansion valve, and the internal temperature distribution of the system's chamber were measured with k-type thermocouples and a digital hygrometer was used to measure the humidity in the system. The refrigerant charge and discharge pressures were acquired by a Sigma [®] testing manifold
Data format	Raw, Analyzed
Data source location	Department of Mechanical Engineering, Covenant University, Ota Ogun State, Nigeria.
Experimental factors	The Walls of the storage system was wet with water to introduce humidity into the system before the No-load, humidity introduction test was performed.
Experimental features	No-load tests, were carried out on the designed tomato postharvest storage system for a test period of 96 h, at a 30 min interval. The tests were divided into No-load test with and without humidity introduction. The data acquired were compared to determine the effect on the temperature pull down time at different locations in the storage system, when humidity level is raised.
Data accessibility	Data are available within this article

Value of the data

- The given dataset should show researchers the correlation between the external temperatures of the mechanical components (compressor, evaporator, expansion valve and condenser) of the cooling system and this could be used in determining the coefficient of performance and exergy of the system.
- The dataset for the temperature distribution within the system's chamber can be employed to determine the air flow pattern, and also determine the impact the system has on the stored tomato. This could further aid in the computational fluid dynamics analysis of temperature distribution within the system's chamber.
- The data can be used to investigate the effect of relative humidity on the pull-down time at different locations in the storage system.
- The dataset could be used in investigating the effect of the evaporator position on the warm and cold zone in a system that uses natural convection method of heat transfer.

1. Data

The temperatures at the compressor, evaporator, expansion valve and condenser were collected and a set of experimental data was generated. Temperature interaction between the evaporator and air at the top, middle and bottom of the cooling system were collected at 30 min time interval. The No-load experiments were each run twice and the average taken as representative data for better accuracy. Also, data showing the pressure of the refrigerant at the suction and at the discharge of the compressor was gathered (Tables 1 and 2).

2. Experimental design, materials and methods

A 530 mm × 560 mm × 790 mm (width × depth × height) tomato postharvest storage system was designed and constructed as shown in Fig. 1. The principle of the vapour compression refrigeration system was employed by using a 1/10 aspera R600a compressor, 1/10 air cooled condenser, 1/10 plate and tube evaporator and capillary tube of 0.91mm internal diameter and length 3442 mm, used to control the internal environmental condition of the system. The capacities of the mechanical cooling components were chosen based on the design calculations [1]. The evaporator was positioned within

Table 1		
Experimental data showing no-load test,	performed on the tomato	postharvest storage system.

Time (min)	Average No Load Test Average ambient temperature –29.50 °C										
	T1(°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	76 (°C)	77 (°C)	78 (°C)	R/H (%)	P1 (psi)	P2 (psi)
0	30.00	31.00	29.50	28.00	28.00	29.00	25.50	27.50	79.50	34.00	30.00
30	19.50	53.50	39.00	11.00	14.00	13.50	18.00	15.17	33.00	0.00	92.50
60	17.00	58.50	42.50	10.50	10.00	9.50	15.00	11.50	34.50	0.00	92.50
90	17.00	60.00	42.00	9.50	9.50	7.50	14.00	10.33	36.00	0.00	95.00
120	17.00	61.00	41.50	9.00	9.00	7.00	14.00	10.00	36.50	0.00	95.00
150	15.50	61.50	44.00	10.00	9.00	7.00	14.00	10.00	35.50	0.00	95.00
180	15.50	62.00	44.00	10.00	8.50	7.00	14.00	9.83	36.00	0.00	95.00
210	16.50	62.50	44.00	9.50	8.00	6.50	14.00	9.50	36.00	0.00	95.00
240	16.00	61.50	42.00	9.50	8.50	6.50	14.00	9.67	35.50	0.00	95.00
270	15.50	61.50	42.00	8.50	8.50	6.50	13.50	9.50	35.50	0.00	95.00
300	15.50	60.50	39.50	7.50	7.50	6.00	13.00	8.83	35.50	0.00	95.00
330	16.50	60.00	39.00	7.50	7.50	6.00	13.00	8.83	35.50	0.00	95.00
360	15.50	59.50	40.00	7.50	7.50	6.00	13.00	8.83	36.50	0.00	95.00
390	15.50	58.50	37.00	6.50	7.50	6.00	13.00	8.83	36.00	0.00	95.00
420	15.50	58.50	37.50	7.00	7.50	6.00	13.00	8.83	35.50	0.00	95.00
450	15.00	59.00	39.50	6.50	8.00	6.00	13.00	9.00	35.00	0.00	95.00
480	15.50	58.00	38.00	6.50	7.50	6.00	13.00	8.83	34.50	0.00	95.00
510	15.50	59.50	40.50	7.50	7.50	6.00	13.00	8.83	35.00	0.00	95.00
540	16.50	60.00	40.50	8.00	7.50	6.00	13.00	8.83	35.50	0.00	95.00
570	16.50	60.50	40.50	7.50	7.50	6.50	13.00	9.00	35.00	0.00	95.00
600	15.00	60.50	41.00	8.00	7.50	6.50	13.00	9.00	37.50	0.00	95.00
630	15.00	50.50	40.00	8.00	7.50	6.50	13.00	9.00	37.00	0.00	95.00
660	15.50	58.50	37.50	6.00	7.50	5.50	12.50	8.50	35.50	0.00	95.00
690 720	15.00	57.00	37.00	6.00	7.50	5.50	12.00	8.33	35.50	0.00	95.00
720	15.50	57.50	37.00	6.00	7.00	5.00	12.00	8.00	34.50	0.00	95.00
750	15.00	50.50	35.50	5.50	7.00	5.50	12.00	8.17 9.17	34.00	0.00	95.00
760	14.50	57.50	28.00	6.00	7.00	5.50	12.00	0.17	22 50	0.00	95.00
840	14.50	58.00	27.00	6.00	7.00	5.50	12.00	0.17	24.00	0.00	95.00
870	14.50	58.00	2750	6.00	7.00	5.00	12.00	8.17	24.00	0.00	95.00
000	16.00	57.50	26.50	6.00	7.00	5.00	12.00	8.00	24.00	0.00	95.00
930	16.00	57.50	37.50	5.50	6.50	5.00	12.00	7.83	33 50	0.00	95.00
960	16.00	57.50	37.00	5.50	7.00	5.00	12.00	8.00	33.50	0.00	95.00
900	16.50	57.50	36.50	5.50	7.00	5.00	12.00	8.00	33.50	0.00	95.00
1020	16.00	58.00	37.50	6.00	7.00	5.00	12.00	8.00	33.50	0.00	95.00
1020	16.00	57.50	37.00	6.00	6.50	5.00	12.00	7.83	33.00	0.00	95.00
1080	16.00	57.50	36 50	5 50	6.50	5.00	12.00	7.83	33.00	0.00	95.00
1110	16.00	57.50	37.00	6.00	7.00	5.00	12.00	8.00	33.00	0.00	95.00
1140	16.00	58.00	37.50	6.00	7.00	5.00	12.00	833	33.00	0.00	95.00
1170	16.00	58.00	37.50	6.00	7.00	5.50	13.00	8 50	33.00	0.00	95.00
1200	16 50	58.00	37.00	6.00	7.00	5.50	13.00	8 50	33.00	0.00	95.00
1230	15 50	58 50	38.00	6.00	750	5 50	13.00	8.67	33.00	0.00	95.00
1260	15.50	58.00	37.50	6.00	7.50	5.50	13.00	8.67	33.00	0.00	95.00
1290	15.50	58.00	37.00	6.00	7.50	5.50	13.00	8.67	33.00	0.00	95.00
1320	15.50	58.00	37.50	6.50	7.50	5.50	13.50	8.83	33.00	0.00	95.00
1350	15.50	58.00	38.50	6.50	7.50	6.00	14.00	9.17	33,50	0.00	95.00
1380	15.00	58.50	39.00	6.50	7.50	6.00	14.00	9.17	33.00	0.00	95.00
1410	16.00	59.00	38.50	6.50	8.00	6.00	14.00	9.33	33.50	0.00	95.00
1440	16.50	59.00	38.50	6.50	8.00	6.50	7.00	7.17	33.50	0.00	95.00
	10.00	22.00	30.50	0.00	0.00	0.00			33.50	0.00	22.00

the refrigerating space, from the top to the back of the system. The working fluid responsible for heat exchange process and also known as the life force of a cooling system is the refrigerant [2–4]. The refrigerant flowing through the system was Isobutane (R600a) charged at a pressure of 2.34 bar. The inner compartment or the cooling chamber was made from aluminum sheet metal. The humidity

Table 2

Exi	perimental	data showing	r no-load t	est when	humidity	was introdu	ced to the	tomato	postharvest	storage s	vstem.
~ ~ ~	bermenten	aaca ono min	,	cot mineri	inchine y	mas microada	cea co cine	connaco	poblinarie	beorage b	,

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Time (min)	Average No load, Humidity Introduction Test Average ambient temperature – 29.5 °C										
0 31.00 32.50 31.00 27.00 28.00 27.50 27.67 97.50 34.00 30.00 30 21.00 58.00 47.50 17.50 18.00 17.00 25.00 90.00 3.50 110.250 90 21.00 61.00 41.50 14.50 15.00 15.00 15.00 55.00 97.00 0.5.0 97.50 120 13.00 50.50 40.00 15.00 12.00 15.17 94.50 0.00 92.50 180 18.50 59.50 40.50 12.00 14.00 11.50 18.00 14.00 94.50 14.67 94.50 0.00 95.00 210 18.00 61.00 43.30 12.00 14.00 15.00 14.17 93.50 0.00 95.00 310 18.00 61.00 43.50 12.00 14.00 15.00 14.50 94.50 0.00 95.00 310 18.00 61.00 43.5		T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	T6 (°C)	77 (°C)	78 (°C)	R/H (%)	P1 (psi)	P2(psi)
30 21.00 58.00 47.50 17.50 18.00 17.00 25.00 20.00 3.50 10.250 60 20.50 60.50 45.50 14.50 15.50 13.00 22.50 17.00 95.00 2.50 97.50 120 13.00 60.50 41.00 14.00 15.00 15.00 15.17 94.50 0.00 92.50 120 13.00 55.05 40.00 12.00 14.00 11.00 15.17 94.50 0.00 92.50 210 13.00 61.00 44.50 13.00 11.00 11.60 18.00 11.70 91.50 14.00 92.50 300 18.00 61.50 44.50 12.00 13.50 10.50 17.50 14.00 92.00 0.00 92.50 300 18.00 61.50 44.50 13.00 10.50 17.50 14.00 92.00 0.00 92.50 300 15.00 61.50 44.5	0	31.00	32.50	31.00	27.00	28.00	27.50	27.50	27.67	97.50	34.00	30.00
6020.5060.5045.5016.5014.5023.5018.1794.003.00100.0012019.0060.5041.0014.0015.0013.0022.5015.8395.000.5092.5015018.5055.040.0012.0014.0011.0020.0015.7794.500.0092.5018018.5055.040.0012.0014.0011.0018.5014.6794.500.0097.5024018.0061.0043.0012.0014.0011.5018.5014.6794.500.0095.0030018.0061.0043.0012.0014.0010.5017.5014.0092.500.0095.0031018.0061.0044.5012.0013.0010.5017.5014.0092.500.0092.5032016.5051.5011.5013.0010.5015.0013.3789.500.0092.5032016.5061.0043.0011.5013.0015.0015.0013.3089.500.0092.5042016.5061.0043.0011.5013.0015.0015.0013.3089.000.0092.5051015.5061.0043.0011.5013.0095.0015.0012.3386.000.0095.0057015.0061.0043.0011.0013.0095.0015.0012.3386.000.00 <td>30</td> <td>21.00</td> <td>58.00</td> <td>47.50</td> <td>17.50</td> <td>18.00</td> <td>17.00</td> <td>25.00</td> <td>20.00</td> <td>90.00</td> <td>3.50</td> <td>102.50</td>	30	21.00	58.00	47.50	17.50	18.00	17.00	25.00	20.00	90.00	3.50	102.50
90 21.00 61.00 41.50 15.50 13.00 22.50 17.00 95.00 2.50 97.50 120 19.00 60.50 41.00 13.00 15.00 12.00 15.33 95.00 0.00 92.50 180 18.50 60.50 40.00 12.00 14.00 11.00 15.07 94.50 0.00 92.50 180 61.00 44.50 12.00 14.00 11.50 18.00 14.67 94.50 0.00 95.00 270 18.00 61.00 43.50 12.00 14.00 10.50 18.00 14.77 93.50 0.00 95.00 300 18.00 61.50 44.50 12.00 14.00 15.00 13.00 10.50 15.00 13.00 92.50 300 17.50 61.50 41.50 11.00 13.00 15.00 13.00 10.00 13.00 92.50 300 17.50 61.00 43.00 11.	60	20.50	60.50	45.50	16.00	16.50	14.50	23.50	18.17	94.00	3.00	100.00
120 19.00 66.50 41.00 15.00 13.00 21.50 16.50 95.00 0.50 92.50 150 18.50 59.50 40.00 12.50 14.00 11.50 20.00 15.17 94.50 0.00 90.00 210 19.00 59.50 40.00 12.00 14.00 11.00 18.50 14.67 94.50 0.00 97.50 270 18.00 61.00 43.00 12.00 14.00 10.50 18.00 14.00 92.50 0.00 95.00 300 18.00 61.50 44.50 12.00 14.00 10.50 17.50 14.00 92.50 300 17.50 61.50 43.50 11.50 13.00 15.00 13.00 92.50 92.50 420 16.50 61.00 43.00 11.00 13.00 15.00 13.00 92.50 440 15.00 15.00 15.00 15.00 15.00 15.00 9	90	21.00	61.00	41.50	14.50	15.50	13.00	22.50	17.00	95.00	2.50	97.50
15018.060.5040.5012.0012.0012.5015.3795.000.0092.5018018.0059.5040.5012.0014.0011.0019.0014.6794.500.0090.0024018.0061.0044.5013.0014.0011.5018.5014.6794.500.0097.5027018.0061.0043.5012.0014.0010.5017.5014.0092.500.0095.0030018.0061.0043.5012.5014.0010.5017.5014.0092.500.0095.0036018.0061.5044.5012.0013.5010.5017.0013.6791.000.0092.5039017.5061.5044.5012.0013.0095.0013.3389.000.0092.5045017.0060.0042.0011.0013.0095.0015.0012.6789.000.0092.5051015.5061.0043.0011.0013.0095.0015.0012.6888.000.0095.0057015.5061.0043.0011.5013.0095.0015.0012.3386.000.0095.0060015.5063.0043.5011.0013.0095.0014.5012.3386.000.0095.0061015.5063.0043.5011.0013.0095.0013.5012.3386.000.00 <td>120</td> <td>19.00</td> <td>60.50</td> <td>41.00</td> <td>14.00</td> <td>15.00</td> <td>13.00</td> <td>21.50</td> <td>16.50</td> <td>97.00</td> <td>0.50</td> <td>92.50</td>	120	19.00	60.50	41.00	14.00	15.00	13.00	21.50	16.50	97.00	0.50	92.50
180 18.50 59.50 40.00 12.50 14.00 11.50 12.00 14.67 94.50 0.00 90.00 210 19.00 59.50 40.50 12.00 14.00 11.50 18.00 14.67 94.50 0.00 97.50 270 18.00 61.00 43.50 12.00 14.00 10.50 18.00 14.07 93.50 0.00 95.00 300 18.00 61.00 43.50 12.00 14.00 10.50 17.50 14.00 92.00 0.00 92.50 390 17.50 61.50 43.50 11.50 13.00 10.50 16.00 13.17 90.50 0.00 92.50 450 17.00 61.00 44.00 11.00 13.00 15.00 13.00 89.50 0.00 92.50 510 15.50 61.00 43.00 11.00 13.00 95.00 15.00 12.50 85.00 0.00 95.00 54	150	18.50	60.50	40.50	13.00	15.00	12.00	20.50	15.83	95.00	0.00	92.50
10 19.00 59.50 40.50 12.00 14.00 11.00 19.00 14.67 94.50 0.00 97.50 270 18.00 61.00 43.50 12.00 14.00 10.50 18.00 14.17 93.50 0.00 95.00 300 18.00 61.00 43.50 12.00 14.00 10.50 17.50 14.00 92.50 0.00 95.00 300 18.00 61.00 43.50 12.50 13.50 15.50 14.00 92.50 0.00 92.50 390 17.50 61.50 44.50 12.00 13.50 15.50 13.03 95.00 13.33 89.50 0.00 92.50 420 16.50 61.00 42.00 11.50 13.00 95.00 15.00 12.67 89.00 0.00 92.50 450 15.50 61.00 43.00 11.00 13.00 95.00 12.50 85.00 0.00 95.00 65.00 <td< td=""><td>180</td><td>18.50</td><td>59.50</td><td>40.00</td><td>12.50</td><td>14.00</td><td>11.50</td><td>20.00</td><td>15.17</td><td>94.50</td><td>0.00</td><td>90.00</td></td<>	180	18.50	59.50	40.00	12.50	14.00	11.50	20.00	15.17	94.50	0.00	90.00
240 18.00 61.00 44.50 12.00 14.00 11.50 18.50 14.67 94.50 0.00 95.00 300 18.00 61.00 43.50 12.00 14.00 10.50 17.50 14.00 92.00 0.00 95.00 330 18.00 61.50 45.00 12.50 14.00 10.50 17.50 14.00 92.00 0.00 95.00 360 18.00 61.50 45.00 12.50 14.00 10.50 17.00 14.00 0.00 92.50 420 16.50 61.00 42.00 10.50 13.00 15.00 13.00 89.00 0.00 92.50 4450 15.50 61.00 43.00 11.00 13.00 95.00 15.00 12.50 80.0 0.00 95.00 510 15.50 61.50 41.50 11.00 13.00 95.00 12.30 86.00 0.00 95.00 570 15.00 61.0	210	19.00	59.50	40.50	12.00	14.00	11.00	19.00	14.67	94.50	0.00	90.00
270 18.00 61.00 43.00 12.00 14.00 10.50 18.00 14.00 92.50 0.00 95.00 300 18.00 61.00 43.50 12.00 14.00 10.50 17.50 14.00 92.00 0.00 95.00 360 18.00 61.50 43.50 12.00 13.00 10.50 16.00 13.17 90.00 0.00 92.50 420 16.50 61.00 44.00 11.00 13.00 10.50 16.00 13.33 89.50 0.00 92.50 440 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.50 88.00 0.00 95.00 570 15.00 61.00 43.00 11.50 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 61.50 43.50 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00	240	18.00	61.00	44.50	13.00	14.00	11.50	18.50	14.67	94.50	0.00	97.50
300 18.00 61.00 43.50 12.00 14.00 10.50 17.50 14.00 92.00 0.00 95.00 330 18.00 61.50 44.50 12.00 13.50 10.50 17.50 14.00 92.00 0.00 92.50 390 17.50 61.50 44.50 12.00 13.50 10.50 16.00 13.37 95.50 0.00 92.50 420 16.50 61.00 44.00 11.00 13.00 10.50 15.00 13.00 95.00 15.50 81.00 0.00 92.50 510 15.50 61.00 43.00 11.00 13.00 95.00 12.50 85.00 0.00 95.00 570 15.00 61.00 43.00 11.00 13.00 95.0 14.50 12.33 86.00 0.00 95.00 660 15.50 61.50 15.00 13.00 95.0 14.50 12.33 85.00 0.00 95.00	270	18.00	61.00	43.00	12.00	14.00	10.50	18.00	14.17	93.50	0.00	95.00
330 18.00 62.00 45.00 12.50 14.00 17.50 17.50 18.07 91.00 0.00 92.50 360 18.00 61.50 44.50 11.50 13.00 10.50 16.00 13.17 90.50 0.00 92.50 420 16.50 61.00 44.00 11.00 13.00 10.50 16.00 13.01 89.50 0.00 92.50 450 17.50 60.00 43.00 11.00 13.00 9.50 15.00 12.67 89.00 0.00 92.50 540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.33 86.00 0.00 95.00 630 15.50 61.00 43.00 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 660 15.50 62.00 43.00 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00	300	18.00	61.00	43.50	12.00	14.00	10.50	17.50	14.00	92.50	0.00	95.00
160 18.00 61.50 44.50 12.00 13.50 10.50 13.67 91.00 0.00 92.50 390 17.50 61.50 43.50 11.50 13.00 10.50 16.00 13.37 90.50 0.00 92.50 450 17.00 60.00 42.00 10.50 15.00 12.67 88.00 0.00 92.50 480 16.50 61.00 42.00 11.50 13.00 9.50 15.00 12.50 88.00 0.00 95.00 540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.33 86.00 0.00 95.00 630 15.50 61.00 43.00 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 85.00 0.00 95.00 640 15.50 62.00 <td>330</td> <td>18.00</td> <td>62.00</td> <td>45.00</td> <td>12.50</td> <td>14.00</td> <td>10.50</td> <td>17.50</td> <td>14.00</td> <td>92.00</td> <td>0.00</td> <td>95.00</td>	330	18.00	62.00	45.00	12.50	14.00	10.50	17.50	14.00	92.00	0.00	95.00
390 17.50 61.50 43.50 11.50 13.00 10.50 16.00 13.17 90.50 0.00 92.50 420 16.50 61.00 44.00 11.00 13.50 10.00 16.00 13.30 89.50 0.00 92.50 480 16.50 60.00 42.00 11.50 13.00 9.50 15.50 12.67 89.00 0.00 92.50 540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.50 88.00 0.00 95.00 570 15.00 61.00 43.00 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00 630 15.50 62.00 41.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 720 <td>360</td> <td>18.00</td> <td>61.50</td> <td>44.50</td> <td>12.00</td> <td>13.50</td> <td>10.50</td> <td>17.00</td> <td>13.67</td> <td>91.00</td> <td>0.00</td> <td>92.50</td>	360	18.00	61.50	44.50	12.00	13.50	10.50	17.00	13.67	91.00	0.00	92.50
420 16.50 61.00 44.00 11.00 13.50 16.00 13.33 89.50 0.00 92.50 450 17.00 60.00 42.00 10.50 13.00 16.00 13.00 89.00 0.00 92.50 510 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.50 89.00 0.00 95.00 540 15.50 61.00 43.00 11.50 13.00 9.50 15.00 12.33 86.00 0.00 95.00 670 15.50 61.50 41.50 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 660 15.50 61.50 41.50 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00 750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 750 15.50 <td>390</td> <td>17.50</td> <td>61.50</td> <td>43.50</td> <td>11.50</td> <td>13.00</td> <td>10.50</td> <td>16.00</td> <td>13.17</td> <td>90.50</td> <td>0.00</td> <td>92.50</td>	390	17.50	61.50	43.50	11.50	13.00	10.50	16.00	13.17	90.50	0.00	92.50
450 17.00 60.00 42.00 10.50 13.00 16.00 13.00 89.00 0.00 92.50 480 16.50 60.00 43.00 11.00 13.00 9.50 15.50 12.67 89.00 0.00 92.50 540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.30 86.00 0.00 95.00 570 15.00 61.50 41.50 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 85.00 0.00 95.00 660 15.50 62.00 43.50 11.50 13.00 9.50 14.50 12.07 83.50 0.00 95.00 720 15.50 62.00 42.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 750	420	16.50	61.00	44.00	11.00	13.50	10.50	16.00	13.33	89.50	0.00	92.50
480 16.50 60.00 43.00 11.00 13.00 9.50 15.50 12.67 89.00 0.00 92.50 510 15.50 61.00 42.50 11.50 13.00 9.50 15.00 12.50 87.50 0.00 95.00 570 15.00 61.00 43.00 11.00 13.00 9.50 15.00 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 85.00 0.00 95.00 660 15.50 62.00 45.50 11.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.50 0.00 95.00 750 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 <tr< td=""><td>450</td><td>17.00</td><td>60.00</td><td>42.00</td><td>10.50</td><td>13.00</td><td>10.00</td><td>16.00</td><td>13.00</td><td>89.00</td><td>0.00</td><td>92.50</td></tr<>	450	17.00	60.00	42.00	10.50	13.00	10.00	16.00	13.00	89.00	0.00	92.50
510 15.50 61.00 42.50 11.50 13.00 9.50 15.00 12.50 88.00 0.00 95.00 540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.50 87.50 0.00 95.00 670 15.00 61.00 43.00 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00 660 15.50 63.00 39.50 13.00 9.50 14.00 12.00 83.50 0.00 95.00 750 15.50 63.00 39.50 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 61.50 41.00 11.00 13.00 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50	480	16.50	60.00	43.00	11.00	13.00	9.50	15.50	12.67	89.00	0.00	92.50
540 15.50 61.00 43.00 11.00 13.00 9.50 15.00 12.50 87.50 0.00 95.00 570 15.00 61.00 43.00 11.50 12.50 9.50 15.00 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 660 15.50 62.00 45.50 11.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 690 16.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 720 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 <tr< td=""><td>510</td><td>15.50</td><td>61.00</td><td>42.50</td><td>11.50</td><td>13.00</td><td>9.50</td><td>15.00</td><td>12.50</td><td>88.00</td><td>0.00</td><td>95.00</td></tr<>	510	15.50	61.00	42.50	11.50	13.00	9.50	15.00	12.50	88.00	0.00	95.00
570 15.00 61.00 43.00 11.50 12.50 9.50 15.00 12.33 86.00 0.00 95.00 600 15.50 61.50 41.50 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 660 15.50 62.00 43.00 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00 660 15.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.50 0.00 95.00 750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 61.50 41.50 10.50 12.50 9.50 13.50 18.33 80.00 0.00 95.00 840 15.50 61.50 42.00 10.50 12.50 9.00 13.00 11.67 81.00 0.00 95.00 <tr< td=""><td>540</td><td>15.50</td><td>61.00</td><td>43.00</td><td>11.00</td><td>13.00</td><td>9.50</td><td>15.00</td><td>12.50</td><td>87.50</td><td>0.00</td><td>95.00</td></tr<>	540	15.50	61.00	43.00	11.00	13.00	9.50	15.00	12.50	87.50	0.00	95.00
600 15.50 61.50 41.50 11.00 13.00 9.50 14.50 12.33 86.00 0.00 95.00 630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 85.00 0.00 95.00 660 15.50 62.00 45.50 11.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.50 0.00 95.00 780 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 810 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.00 42.00 10.50 12.50 9.00 13.00 11.63 0.00 95.00 900	570	15.00	61.00	43.00	11.50	12.50	9.50	15.00	12.33	86.00	0.00	95.00
630 15.50 62.00 43.00 11.00 13.00 9.50 14.50 12.33 85.00 0.00 95.00 660 15.50 62.00 45.50 11.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.50 0.00 95.00 750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 62.00 42.00 11.00 13.00 9.50 13.50 12.00 82.00 0.00 95.00 810 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 844 15.50 61.00 42.00 11.00 12.50 9.00 13.50 11.83 80.50 0.00 95.00 870 17.50 61.00 42.00 11.00 12.50 9.00 13.00 11.50 80.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 79.50 0.00 95.00 990 15.50 60.00 40.00 10.00 12.00 8.50 12.00 18.3 79.00 0.00 95.00 1020 15.00 60.50 42.50 <	600	15.50	61.50	41.50	11.00	13.00	9.50	14.50	12.33	86.00	0.00	95.00
660 15.50 62.00 45.50 11.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 61.50 38.50 11.00 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 62.00 41.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 62.00 42.00 11.00 13.00 9.50 13.50 12.00 82.00 0.00 95.00 810 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 870 17.50 61.00 42.00 10.50 12.50 9.00 13.00 11.67 81.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.83 79.50 0.00 92.50 930	630	15.50	62.00	43.00	11.00	13.00	9.50	14.50	12.33	85.00	0.00	95.00
690 16.50 61.50 38.50 10.50 13.00 9.50 14.00 12.17 84.50 0.00 95.00 720 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 62.00 42.00 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.50 42.00 10.50 12.50 9.00 13.50 11.83 81.00 0.00 92.50 970 17.50 61.00 42.00 11.00 12.50 9.00 13.00 11.50 79.50 0.00 92.50 930 16.00 61.50 42.00 11.00 13.00 13.00 11.83 79.50 0.00 92.50 930	660	15.50	62.00	45.50	11.50	13.00	9.50	14.00	12.17	84.50	0.00	95.00
720 15.50 63.00 39.50 11.00 13.00 9.50 13.50 12.00 83.50 0.00 95.00 750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 80.50 0.00 95.00 840 15.50 61.00 42.00 11.00 12.50 9.00 13.50 11.67 81.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.83 79.50 0.00 95.00 960 16.00 60.50 42.00 11.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 <tr< td=""><td>690</td><td>16.50</td><td>61.50</td><td>38.50</td><td>10.50</td><td>13.00</td><td>9.50</td><td>14.00</td><td>12.17</td><td>84.50</td><td>0.00</td><td>95.00</td></tr<>	690	16.50	61.50	38.50	10.50	13.00	9.50	14.00	12.17	84.50	0.00	95.00
750 15.50 62.00 41.00 11.00 13.00 9.50 13.50 12.00 83.00 0.00 95.00 780 15.50 62.00 42.00 11.00 13.00 9.50 13.50 12.00 82.00 0.00 95.00 810 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.50 42.00 11.00 12.50 9.00 13.50 11.83 80.50 0.00 95.00 900 17.00 61.00 41.50 10.50 12.50 9.00 13.00 11.50 80.00 0.00 92.50 930 16.00 60.50 42.00 11.00 12.00 8.50 12.00 18.3 79.00 0.00 95.00 990 15.50 60.00 41.00 10.50 12.50 8.50 12.00 10.83 79.00 0.00 95.00	720	15.50	63.00	39.50	11.00	13.00	9.50	13.50	12.00	83.50	0.00	95.00
780 15.50 62.00 42.00 11.00 13.00 9.50 13.50 12.00 82.00 0.00 95.00 810 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 80.50 0.00 95.00 870 17.50 61.00 42.00 11.00 12.50 9.00 13.00 11.57 81.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 80.00 0.00 92.50 960 16.00 60.50 42.00 11.00 12.00 8.50 12.00 18.33 79.00 0.00 95.00 1020 15.00 60.50 42.50 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 <t< td=""><td>750</td><td>15.50</td><td>62.00</td><td>41.00</td><td>11.00</td><td>13.00</td><td>9.50</td><td>13.50</td><td>12.00</td><td>83.00</td><td>0.00</td><td>95.00</td></t<>	750	15.50	62.00	41.00	11.00	13.00	9.50	13.50	12.00	83.00	0.00	95.00
810 15.50 61.50 41.50 10.50 12.50 9.50 13.50 11.83 81.00 0.00 95.00 840 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 80.50 0.00 95.00 870 17.50 61.00 42.00 11.00 12.50 9.00 13.50 11.67 81.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 79.50 0.00 92.50 960 16.00 60.50 42.00 11.00 12.00 8.50 12.00 18.3 79.50 0.00 95.00 990 15.50 60.00 40.00 10.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.00 60.50 42.50 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 <tr< td=""><td>780</td><td>15.50</td><td>62.00</td><td>42.00</td><td>11.00</td><td>13.00</td><td>9.50</td><td>13.50</td><td>12.00</td><td>82.00</td><td>0.00</td><td>95.00</td></tr<>	780	15.50	62.00	42.00	11.00	13.00	9.50	13.50	12.00	82.00	0.00	95.00
840 15.50 61.50 42.00 10.50 12.50 9.50 13.50 11.83 80.50 0.00 95.00 870 17.50 61.00 42.00 11.00 12.50 9.00 13.50 11.67 81.00 0.00 90.00 900 17.00 61.00 41.50 10.50 12.50 9.00 13.00 11.50 80.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.83 79.50 0.00 92.50 960 16.00 60.50 42.00 11.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.50 60.00 41.00 10.50 12.50 8.50 12.00 10.83 79.00 0.00 95.00 1050 15.50 60.00 42.50 10.50 12.50 8.50 12.00 11.00 79.50 0.00 95.00 <	810	15.50	61.50	41.50	10.50	12.50	9.50	13.50	11.83	81.00	0.00	95.00
870 17.50 61.00 42.00 11.00 12.50 9.00 13.50 11.67 81.00 0.00 90.00 900 17.00 61.00 41.50 10.50 12.50 9.00 13.00 11.50 80.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 79.50 0.00 92.50 960 16.00 60.50 42.00 11.00 12.00 8.50 12.00 18.33 79.00 0.00 95.00 1020 15.50 60.00 41.00 10.50 12.50 8.50 12.00 10.83 79.00 0.00 95.00 1050 15.50 60.00 41.00 10.50 12.50 8.50 12.00 11.00 79.50 0.00 95.00 1110 15.00 62.50 46.00 12.00 12.00 11.17 80.50 0.00 95.00 1110 15.00<	840	15.50	61.50	42.00	10.50	12.50	9.50	13.50	11.83	80.50	0.00	95.00
900 17.00 61.00 41.50 10.50 12.50 9.00 13.00 11.50 80.00 0.00 92.50 930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 79.50 0.00 92.50 960 16.00 60.50 42.00 11.00 13.00 9.50 13.00 11.83 79.50 0.00 95.00 990 15.50 60.00 40.00 10.50 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.50 60.00 41.00 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 1080 15.00 60.50 42.50 10.50 12.50 8.50 12.00 11.17 80.50 0.00 95.00 1110 15.00 60.00 39.50 9.00 12.00 11.17 80.50 0.00 95.00 1110 15.00 </td <td>870</td> <td>17.50</td> <td>61.00</td> <td>42.00</td> <td>11.00</td> <td>12.50</td> <td>9.00</td> <td>13.50</td> <td>11.67</td> <td>81.00</td> <td>0.00</td> <td>90.00</td>	870	17.50	61.00	42.00	11.00	12.50	9.00	13.50	11.67	81.00	0.00	90.00
930 16.00 61.50 45.50 11.00 12.50 9.00 13.00 11.50 79.50 0.00 92.50 960 16.00 60.50 42.00 11.00 13.00 9.50 13.00 11.83 79.50 0.00 95.00 990 15.50 60.00 40.00 10.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.00 60.50 42.50 10.50 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1050 15.50 60.00 41.00 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 1080 15.00 60.50 42.50 10.50 12.50 9.00 12.00 11.17 80.50 0.00 95.00 1140 17.00 60.00 39.50 9.00 12.00 11.33 80.50 0.00 95.00 1200 16.00<	900	17.00	61.00	41.50	10.50	12.50	9.00	13.00	11.50	80.00	0.00	92.50
960 16.00 60.50 42.00 11.00 13.00 9.50 13.00 11.83 79.50 0.00 95.00 990 15.50 60.00 40.00 10.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.00 60.50 42.50 10.50 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1050 15.50 60.00 41.00 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 1080 15.00 60.50 42.50 10.50 12.50 8.50 12.00 11.00 79.50 0.00 95.00 1110 15.00 60.00 39.50 9.00 12.50 9.00 12.00 11.17 80.50 0.00 95.00 1140 17.00 60.00 39.50 10.00 13.00 9.00 12.00 11.33 80.50 0.00 95.00	930	16.00	61.50	45.50	11.00	12.50	9.00	13.00	11.50	79.50	0.00	92.50
990 15.50 60.00 40.00 10.00 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1020 15.00 60.50 42.50 10.50 12.00 8.50 12.00 10.83 79.00 0.00 95.00 1050 15.50 60.00 41.00 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 1050 15.00 60.50 42.50 10.50 12.50 8.50 12.00 11.00 79.00 0.00 95.00 1080 15.00 60.50 46.00 12.00 12.50 9.00 12.00 11.17 80.50 0.00 95.00 1140 17.00 60.00 39.50 10.00 13.00 9.00 12.00 11.33 80.50 0.00 95.00 1200 16.00 60.00 39.50 10.00 13.50 9.50 12.00 11.33 80.50 0.00 95.00	960	16.00	60.50	42.00	11.00	13.00	9.50	13.00	11.83	79.50	0.00	95.00
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	990	15.50	60.00	40.00	10.00	12.00	8.50	12.00	10.83	79.00	0.00	95.00
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1080	15.00	60.50	42.50	10.50	12.50	8.50	12.00	11.00	79.50	0.00	95.00
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1110	15.00	62.50	46.00	12.00	12.50	9.00	12.00	11.17	80.50	0.00	95.00
1170 16.00 60.00 40.00 9.50 13.00 9.00 12.00 11.33 80.50 0.00 95.00 1200 16.00 60.00 39.50 10.00 13.00 9.00 12.00 11.33 80.50 0.00 95.00 1230 14.50 63.00 46.00 12.00 13.50 9.50 12.00 11.67 80.50 0.00 95.00 1260 15.00 63.00 42.00 10.50 13.50 10.00 12.00 11.83 79.50 0.00 95.00 1290 14.00 62.50 41.50 10.00 13.50 9.50 12.00 11.83 79.50 0.00 95.00 1320 13.50 62.00 41.50 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1320 13.50 61.00 42.00 9.50 13.00 9.50 12.00 11.50 80.00 0.00 95.00	1140	17.00	60.00	39.50	9.00	12.50	9.00	12.00	11.17	81.00	0.00	95.00
1200 16.00 60.00 39.50 10.00 13.00 9.00 12.00 11.33 80.50 0.00 95.00 1230 14.50 63.00 46.00 12.00 13.50 9.50 12.00 11.67 80.50 0.00 90.00 1260 15.00 63.00 42.00 10.50 13.50 10.00 12.00 11.83 79.50 0.00 95.00 1260 15.00 63.00 42.00 10.50 13.50 12.00 11.83 79.50 0.00 95.00 1260 14.00 62.50 41.50 10.00 13.50 9.50 12.00 11.67 80.00 0.00 95.00 1320 13.50 62.00 41.50 10.00 13.00 9.50 12.00 11.50 80.50 0.00 95.00 1350 13.50 61.00 42.00 9.50 12.00 11.50 80.00 0.00 95.00 1380 14.00 6	1170	16.00	60.00	40.00	9.50	13.00	9.00	12.00	11.33	80.50	0.00	95.00
1230 14.50 63.00 46.00 12.00 13.50 9.50 12.00 11.67 80.50 0.00 90.00 1260 15.00 63.00 42.00 10.50 13.50 10.00 12.00 11.83 79.50 0.00 95.00 1290 14.00 62.50 41.50 10.00 13.50 9.50 12.00 11.67 80.00 0.00 95.00 1320 13.50 62.00 41.50 10.00 13.00 9.50 12.00 11.50 80.50 0.00 95.00 1350 13.50 61.00 42.00 9.50 12.00 11.50 80.00 0.00 95.00 1350 13.50 61.00 42.00 9.50 12.00 11.50 80.00 0.00 95.00 1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1410 13.00 60.50 41	1200	16.00	60.00	39.50	10.00	13.00	9.00	12.00	11.33	80.50	0.00	95.00
1260 15.00 63.00 42.00 10.50 13.50 10.00 12.00 11.83 79.50 0.00 95.00 1290 14.00 62.50 41.50 10.00 13.50 9.50 12.00 11.67 80.00 0.00 95.00 1320 13.50 62.00 41.50 10.00 13.00 9.50 12.00 11.67 80.00 0.00 95.00 1350 13.50 61.00 42.00 9.50 13.00 11.50 80.50 0.00 95.00 1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1410 13.00 60.50 41.50 9.00 13.00 9.50 12.00 11.53 80.00 0.00 95.00 1440 13.	1230	14.50	63.00	46.00	12.00	13.50	9.50	12.00	11.67	80.50	0.00	90.00
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1320 13.50 62.00 41.50 10.00 13.00 9.50 12.00 11.50 80.50 0.00 95.00 1350 13.50 61.00 42.00 9.50 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1410 13.00 60.50 41.50 9.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1440 13.00 60.00 41.00 9.00 13.00 9.00 12.00 11.33 80.00 0.00 95.00	1290	14.00	62.50	41.50	10.00	13.50	9.50	12.00	11.67	80.00	0.00	95.00
1350 13.50 61.00 42.00 9.50 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1410 13.00 60.50 41.50 9.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1440 13.00 60.00 41.00 9.00 13.00 9.00 12.00 11.33 80.00 0.00 95.00	1320	13.50	62.00	41.50	10.00	13.00	9.50	12.00	11.50	80.50	0.00	95.00
1380 14.00 61.00 42.00 10.00 13.00 9.50 12.00 11.50 80.50 0.00 95.00 1410 13.00 60.50 41.50 9.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1440 13.00 60.00 41.00 9.00 13.00 9.00 12.00 11.33 80.00 0.00 95.00	1350	13.50	61.00	42.00	9.50	13.00	9.50	12.00	11.50	80.00	0.00	95.00
1410 13.00 60.50 41.50 9.00 13.00 9.50 12.00 11.50 80.00 0.00 95.00 1440 13.00 60.00 41.00 9.00 13.00 9.00 12.00 11.33 80.00 0.00 95.00	1380	14.00	61.00	42.00	10.00	13.00	9.50	12.00	11.50	80.50	0.00	95.00
1440 13.00 60.00 41.00 9.00 13.00 9.00 12.00 11.33 80.00 0.00 95.00	1410	13.00	60.50	41.50	9.00	13.00	9.50	12.00	11.50	80.00	0.00	95.00
	1440	13.00	60.00	41.00	9.00	13.00	9.00	12.00	11.33	80.00	0.00	95.00

level in the cooling system was raised by the application of an open $38 \text{ cm} \times 20 \text{ cm} \times 18.5 \text{ cm}$ (width \times depth \times height) aluminum vessel filled with 14.06 l of water. Data was acquired in form of temperatures at the mechanical cooling components and the internal cooling chamber Fig. 2. Temperatures at the mechanical components can be used in analyzing the coefficient of performance and



Fig. 1. Tomato postharvest storage system.



Fig. 2. Thermocouples and pressure gauge attached to the external components of the system.

exergy [5] of the storage system while the internal temperatures of the cooling chamber can be used in analyzing the transfer of heat [6] in the system. Analysis displaying the data are shown in Figs. 1–4.

 T_1 = Temperature at the compressor suction (inlet)

- T_2 =Temperature at the compressor discharge (outlet)
- T_3 = Temperature at the condenser
- T_4 =Temperature at the capillary tube/ throttling valve



Fig. 3. Loaded Tomato postharvest storage system showing the experimental set up.



Fig. 4. No-Load temperature distribution at three locations within the system, showing the pull down time without humidity introduction.



Fig. 5. Average temperature distribution across the storage system showing the pull down time without humidity introduction.



Fig. 6. No-Load Test showing the rate of temperature drop pertaining to humidity level in the storage system.



Fig. 7. No load temperature distribution at three locations within the storage system showing the pull down time after the introduction of humidity.



Fig. 8. Average temperature distribution across the storage system showing the pull down time after the introduction of humidity.

 T_5 = Temperature at the top of the cooling chamber

 T_6 = Temperature at the middle of the refrigerating space

 T_7 = Temperature at the bottom of the cooling chamber

 T_8 = Average temperature inside the cooling chamber = $\left\{\frac{T5+T6+T7}{3}\right\}$

 P_1 = Pressure at the suction (inlet of compressor)

 P_2 =Pressure at the discharge (outlet of compressor)



Fig. 9. No-Load Test showing the rate of temperature drop pertaining to humidity introduction.

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