

PROJECT REPORT

Ref No: 6717

Project Start Date : December 5th 2005
Project Finished: December 19th 2005
Summary : Solar Central Water Heating System for TEKFEN factory
Location: Adana Turkey
Project Director: İbrahim Sudas isudas@auraset.com

SUMMARY

The project included the design, manufacture and installment of central solar water heating system of the TEKFEN factory in Adana, Turkey.

The project consisted of 3 phases:

- **the design :** project was first designed in the beginning of July. After revisions the final project was approved by November 14th.
- **manufacturing:** The manufacturing (panels, tanks, stand) and the procurement (automation, pump, plumbing, etc) was done between November 21st -December 5th.
- **on site installation :** Project installation was carried out between December 5-19th and was delivered in working condition on December 19th.

The factory produces bags for fertilizers and works 24-hours in 3 shifts. The project was designed and the installation was carried out exclusively by Auraset engineers and installation teams. Solar panels stand and the vertical boilers were manufactured by Auraset.

Factory is owned by a conglomerate that owns the largest contracting group in Turkey known with construction of dams, bridges, industrial facilities all over Turkey, Russia and Asia. (Company is famous with its strictness with regards to technical standards. Detailed technical documents and drawings were presented at each stage in the project.

Related web links:

Tekfen Group <http://www.tekfen.com.tr/english/index.asp>
Bag factory http://www.toros.com.tr/English/tst_torba.asp

ASSIGNMENTS carried out during the course of the Project:

1. The system was designed according to the insolation values of month of "May" in Adana region. The system is designed to produce 5 tones of hot water daily to provide hot water for the 100 employees of the factory. The challenge was to divide the hot water into three parts so that for each of the three shifts there is enough water to take shower.

Facts for the design of the project (average values for May):

Ambient temperature: 21,3
Water temperature: 20,7
Required water temperature: 50
Collectors used: AA 950 BC (1,6 m2)

Daily calorie requirement: $5000 * (50 - 20,7) = 146500\text{kcal} / \text{day}$

Solar Panel requirement: 36 units

Application:

All collectors store the heat produced throughout the day in the 4 solar boilers. The first shift uses solar boiler no 1 and 2, the 2nd and 3rd shifts utilize solar boilers no 3 and 4 respectively.

Principle:

Water heated in the panels are circulated between the panels and the tank serpentes by the help of 2 automatically controlled pumps. Water stored in the tanks reach the collecting and distributor line in three separate lines and will be distributed to the showers individually for each shift by manual valves.

Usage:

During winter months when boiler is in operation, hot water produced by the solar collectors is connected to the cold water inlet of the boiler. In sunny days solar heating line will be given directly to the showers through the boiler outlet.

2. The project required the design of a special platform for the placement of the solar panels. The tilt angle was designed to 36° . One challenge was the line of pine trees located to the south of the location where solar panels were decided to be located. The shadow of the trees were preventing the panel garden from almost 1,5 hour of direct sunshine in the afternoon. The platform was leveled up 2 meters to overcome this problem. Walkways of 50 cm width were also included in the platform.



3. The platform was pre-manufactured at the factory, to decrease the amount of installation hours on-site as well as to avoid any potential problems that may delay the delivery date.

Manufacturing and Pre-assembly of platform at the factory site.

4. The project also included the lay out of concrete foundations for the platform, also carried out by Auraset. The moutage of the platform after concrete foundation was completed, took 4 workers 2 days without the need for special equipment, i.e. crane.



5. 4 units of vertical solar boilers each 1250 lt. capacity was designed and manufactured for the project. The tanks were

Technical Specs

Body	Hot deep galvanized
Shell thickness	6 mm.
Serpentines	Ø42 , 7 m ²
Insulation	10 mm glasswool
Casing	Galvanized steel



Manufacturing and Loading of solar tanks at the factory

6. Installation was realized by, in average 5 workers in 11 working days. This included:
- a) Assembly of the platform
 - b) Placement of vertical tanks
 - c) Piping between the collectors and collectors and the vertical boilers
 - d) Piping between the vertical boilers and the factory heating centre
 - e) Installation of pumps and automation
 - f) Insulation of entire piping.
 - g) Concrete foundation was laid out before the installation was started, during the manufacturing of product at the factory.

7. Following documents are presented in the attachment that demonstrates the technical aspect of the project:

- a) Platform 1
- b) Platform 2
- c) Platform 3
- d) Project Principle
- e) Plumbing Model

- f) Panel- exchanger connection
- g) Placement of Platform and Tanks
- h) Panel-Piping connections
- i) Tank hot and cold water connections



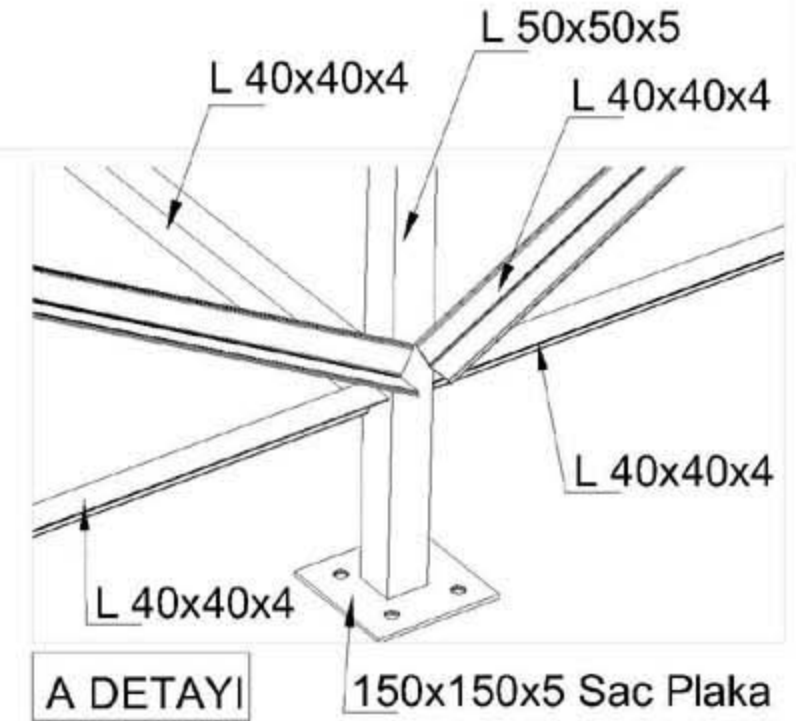
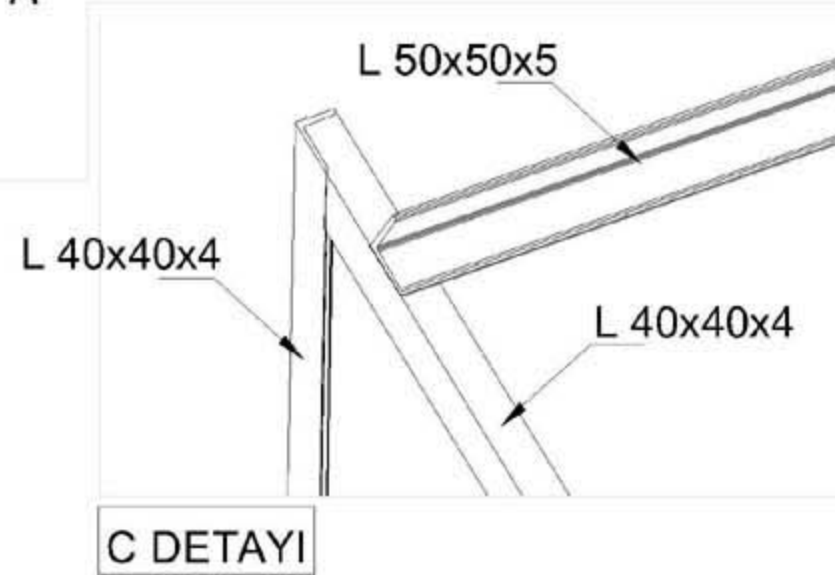
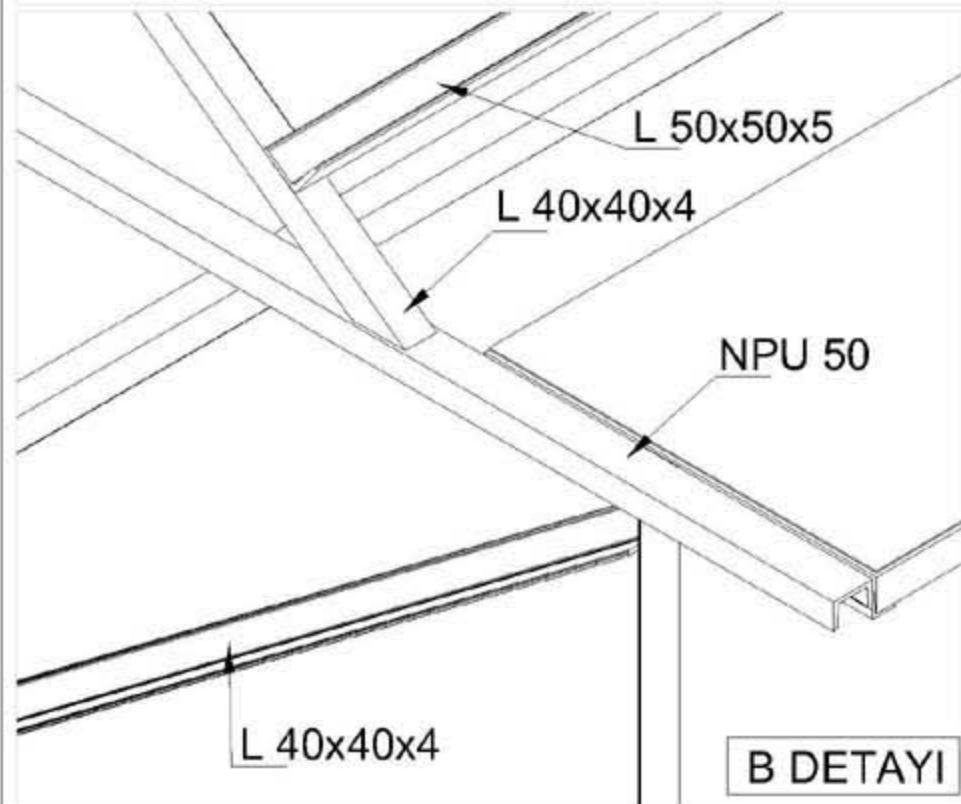
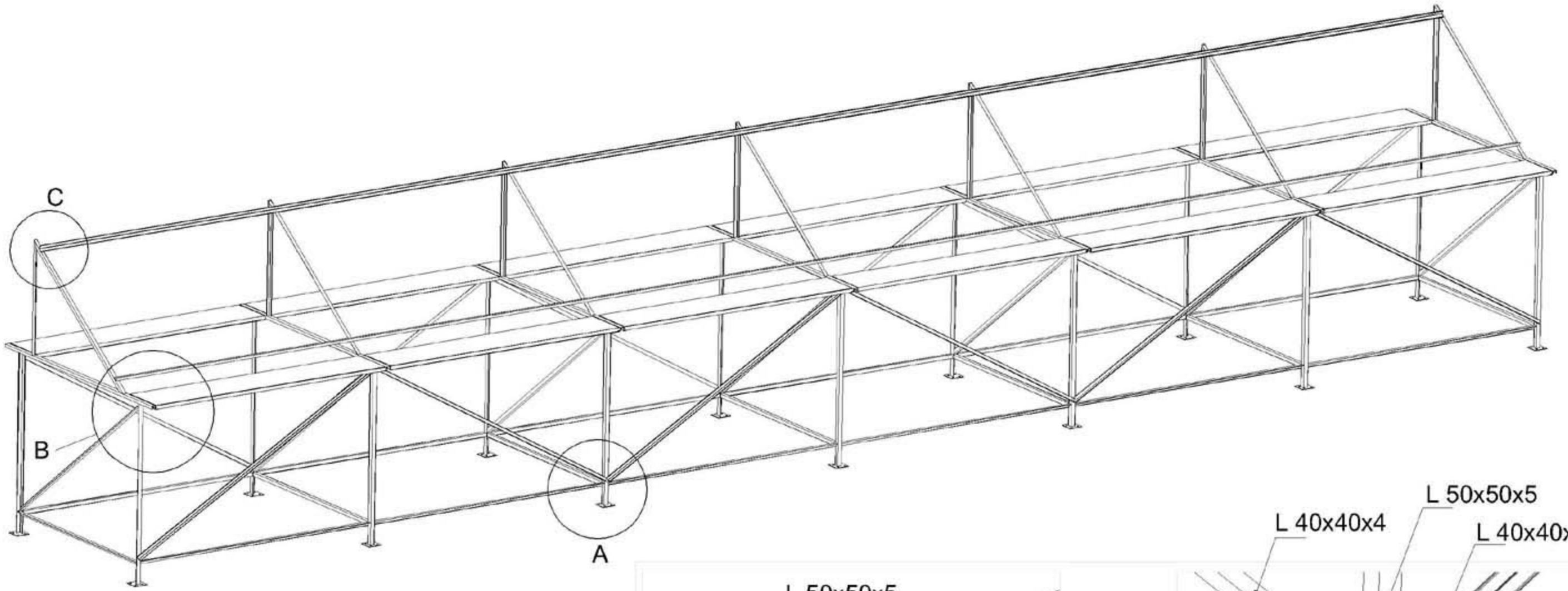
The platform and its concrete foundation



Test Run



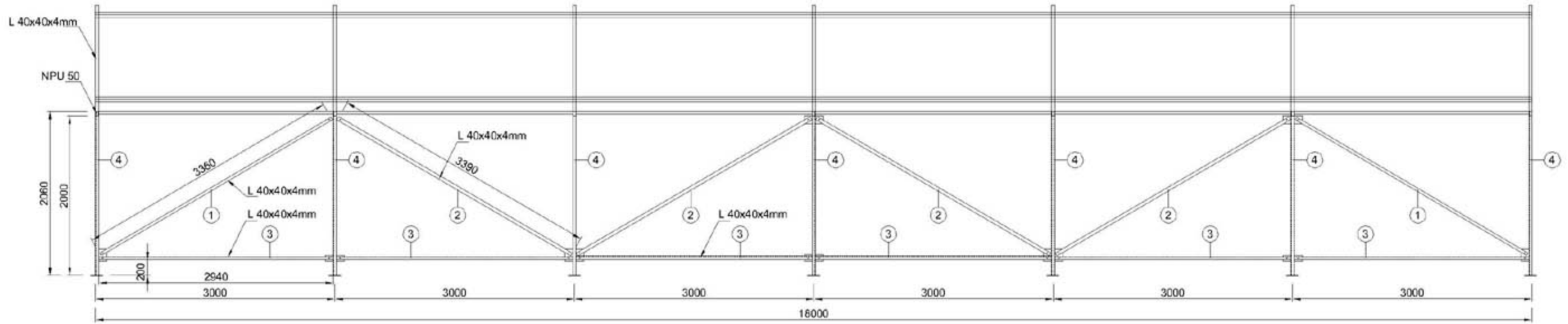
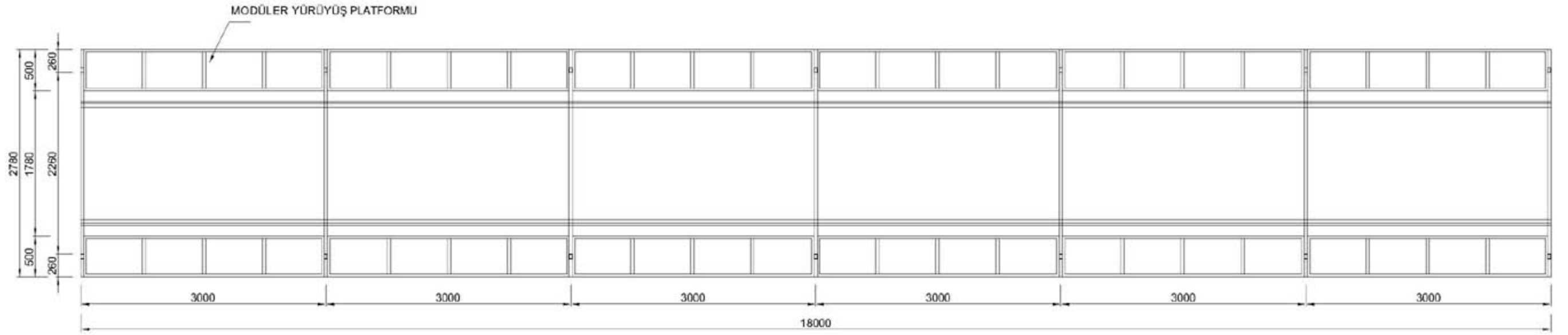
Piping Installation



TST ADANA TESİSLERİ
GÜNEŞ ENERJİSİ
PANEL TAŞIYICI PLATFORMU

ÇİZEN	HARUN MADENLİ	<i>H.M.</i>	ÖLÇEK -
KONTROL	İBRAHİM SÜDAŞ		

REVİZYON NO	: -
TARİH	: 16.08.2005
RESİM NO	: GE - 01 - 09



18 Adet kollektörlerin boydan boya yayılı yük tutarı 800 kg.

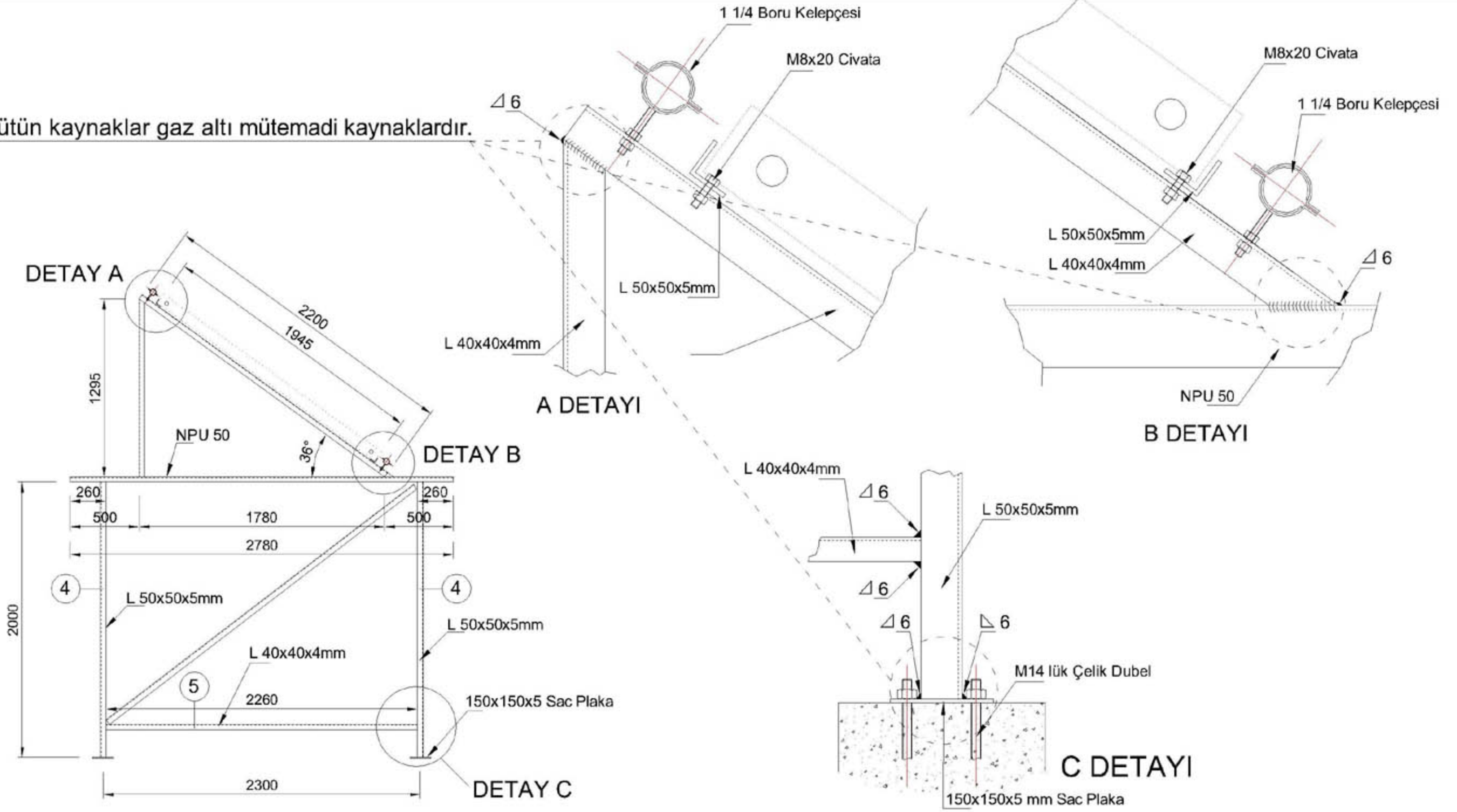


TST ADANA TESİSLERİ
GÜNEŞ ENERJİSİ
PANEL TAŞIYICI PLATFORMU

ÇİZEN	HARUN MADENLİ	ÖLÇEK
KONTROL	İbrahim SÜDAŞ	

REVİZYON NO	: 0
TARİH	: 16.08.2005
RESİM NO	: GE - 01 - 08

Bütün kaynaklar gaz altı mütemadi kaynaklardır.



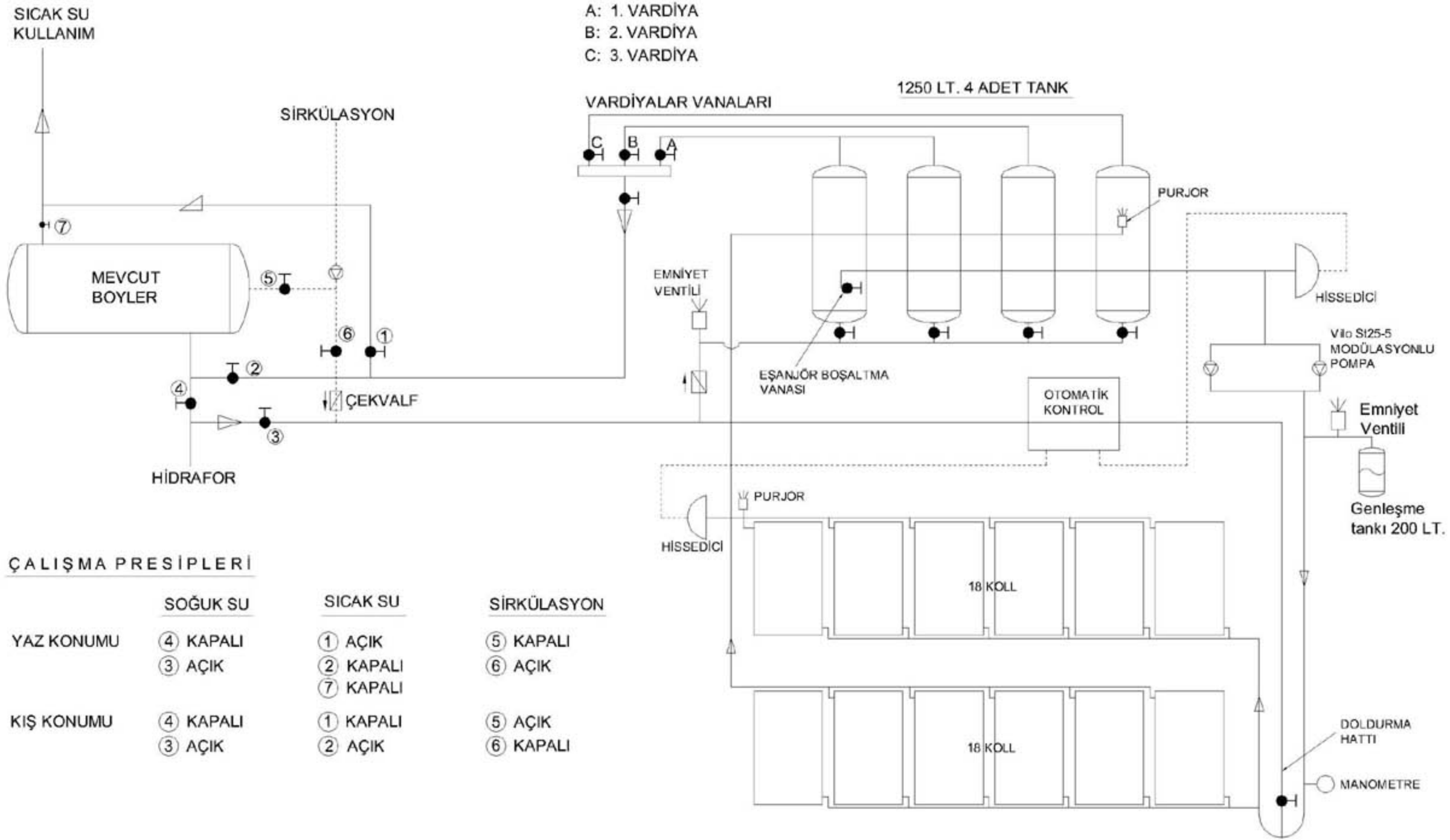
Platform Bağlantı Detayı

18 Adet kollektörlerin boydan boya yayılı yük tutarı 800 kg.



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GÜNEŞ ENERJİSİ
PANEL TAŞIYICI PLATFORMU
KAYNAK DETAYI

ÇİZEN	HARUN MADENLİ	ÖLÇEK	REVIZYON NO	: 0
KONTROL	İBRAHİM SÜDAŞ		TARİH	: 18.08.2005
			RESİM NO	: GE - 01 - 07



5846 SAYILI FİKİR VE SANAT ESERLERİ KANUNU'NA GÖRE:

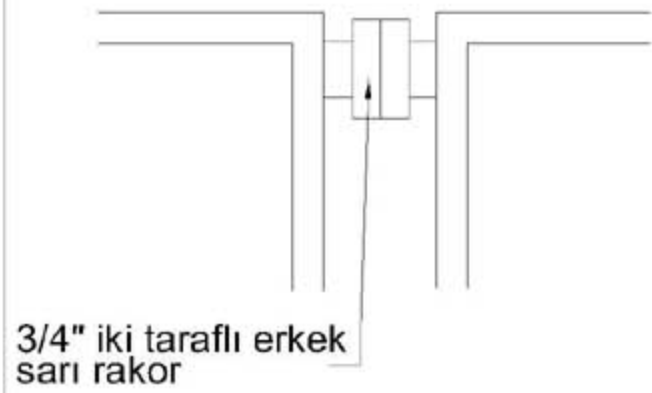
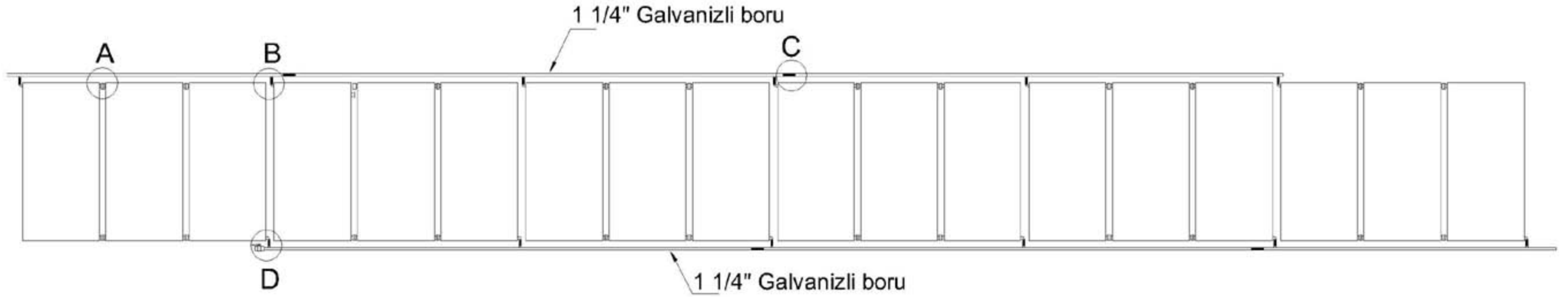
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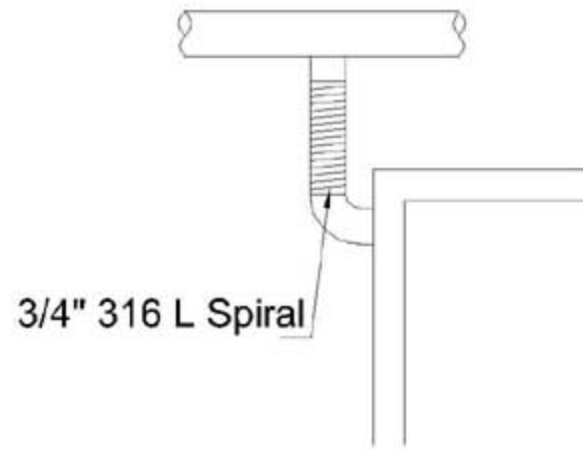
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PRENSİP ŞEMASI

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KONTROL	İBRAHİM SUDAŞ	

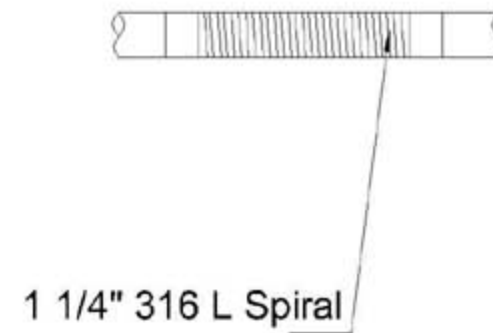
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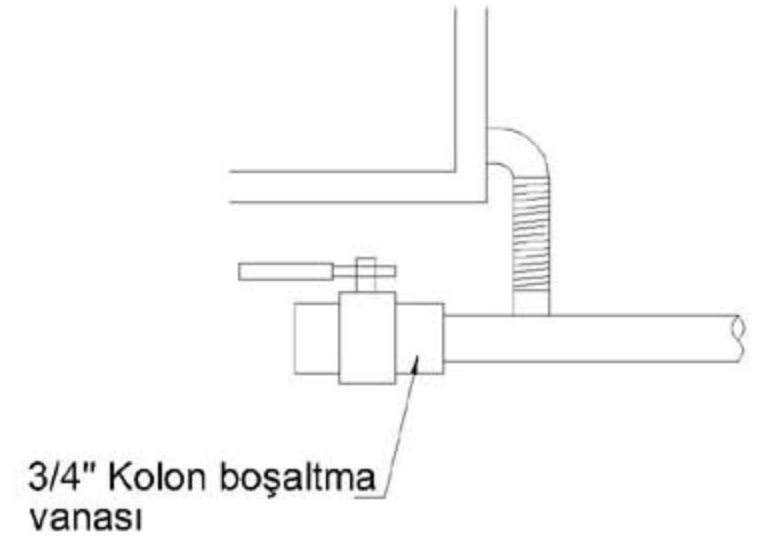
A DETAYI



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C DETAYI



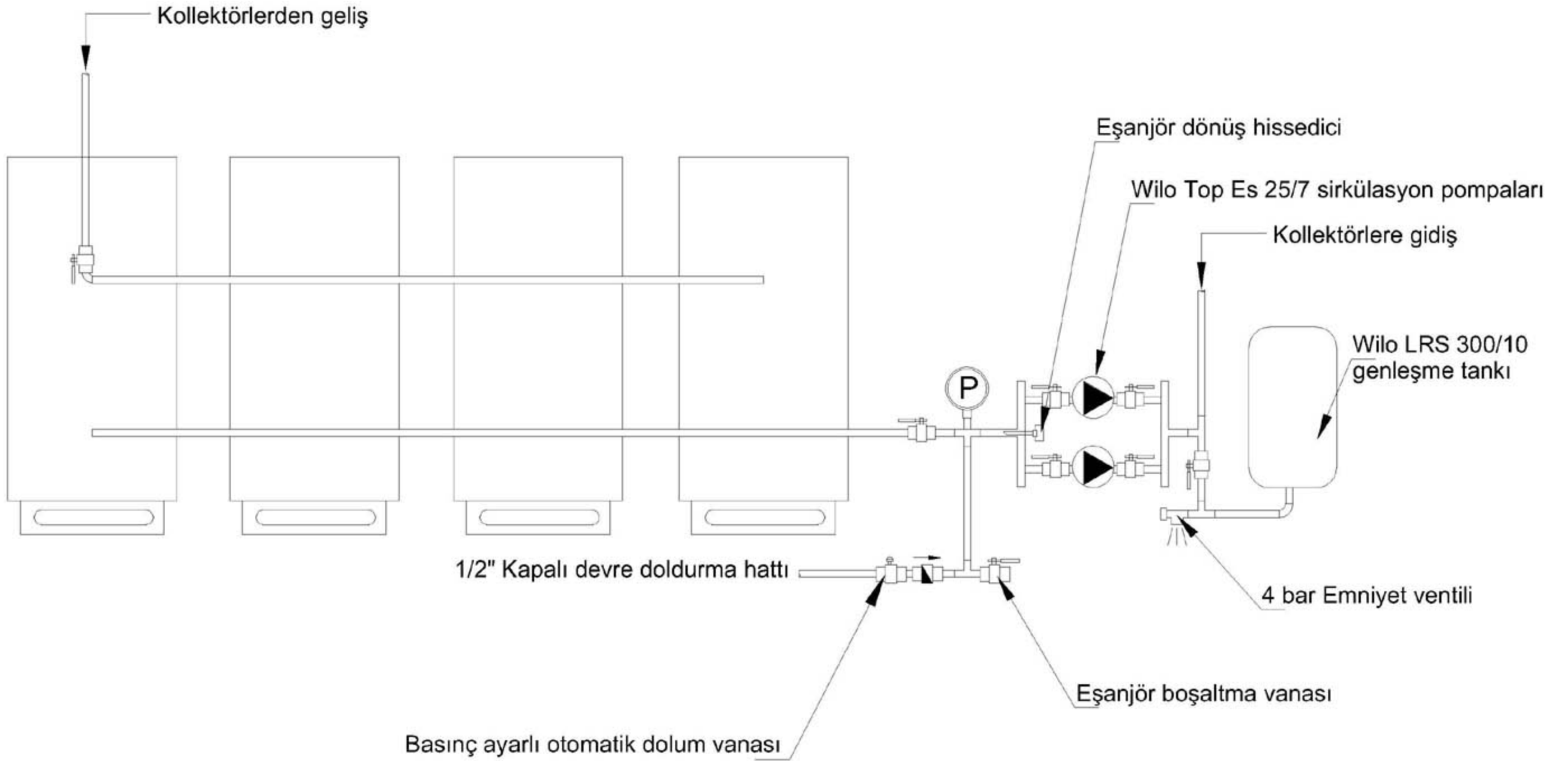
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KOLLEKTÖR BORU BAĞLANTISI

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KONTROL	İBRAHİM SÜDAŞ	

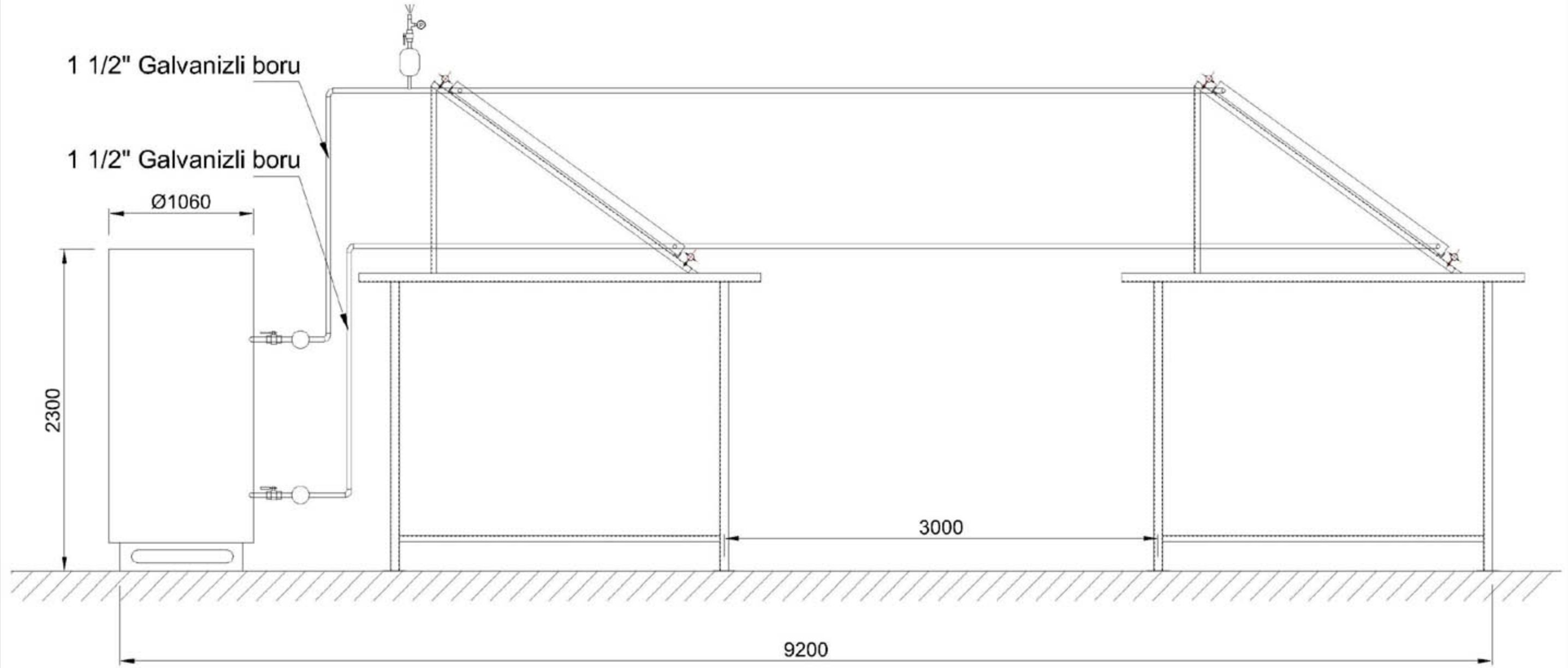
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RESİM NO	: GE - 01 - 05



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KOLLEKTÖR-EŞANJÖR BAĞLANTISI

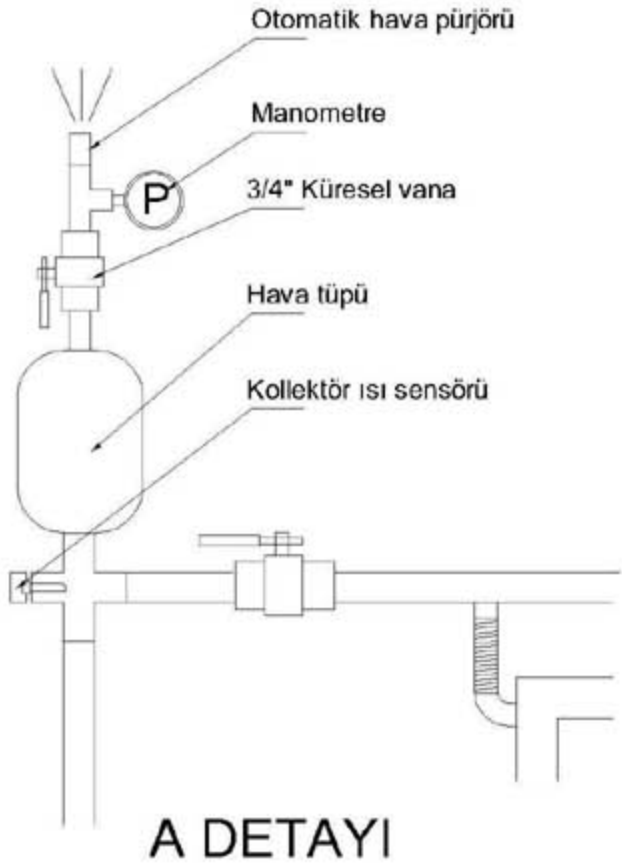
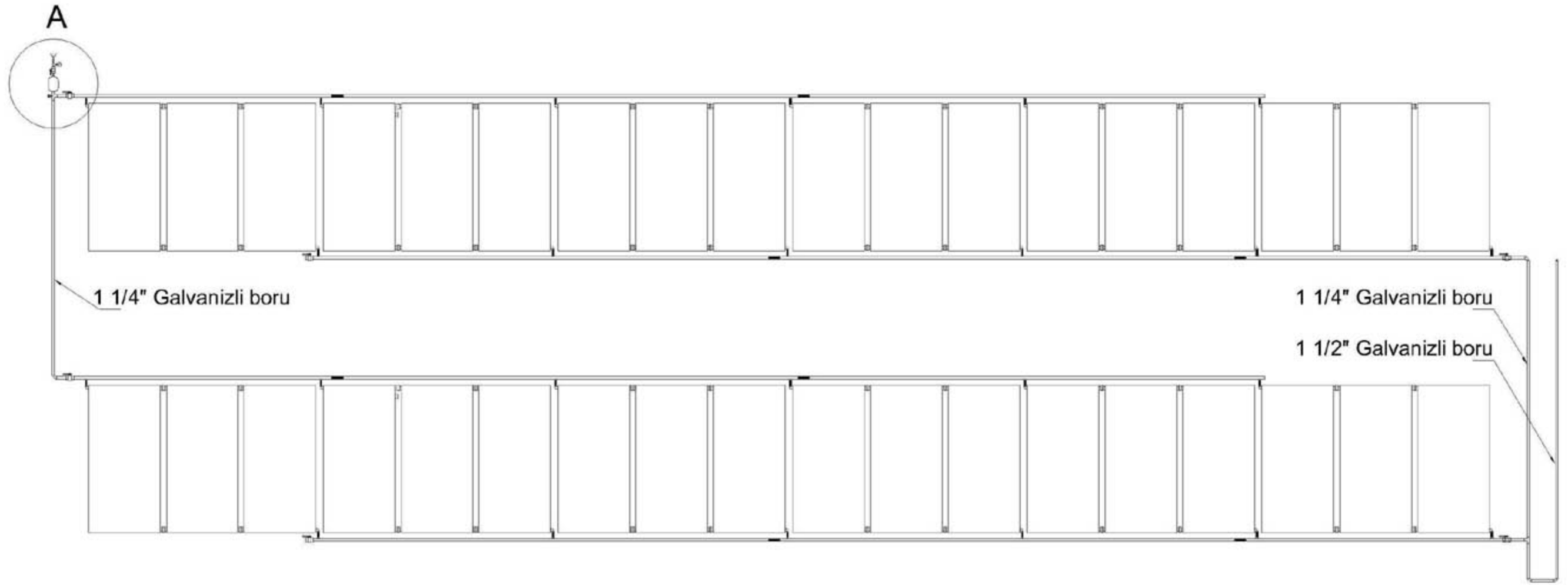
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KONTROL	İBRAHİM SÜDAŞ	

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TARİH	: 16.08.2005
RESİM NO	: GE - 01 - 03



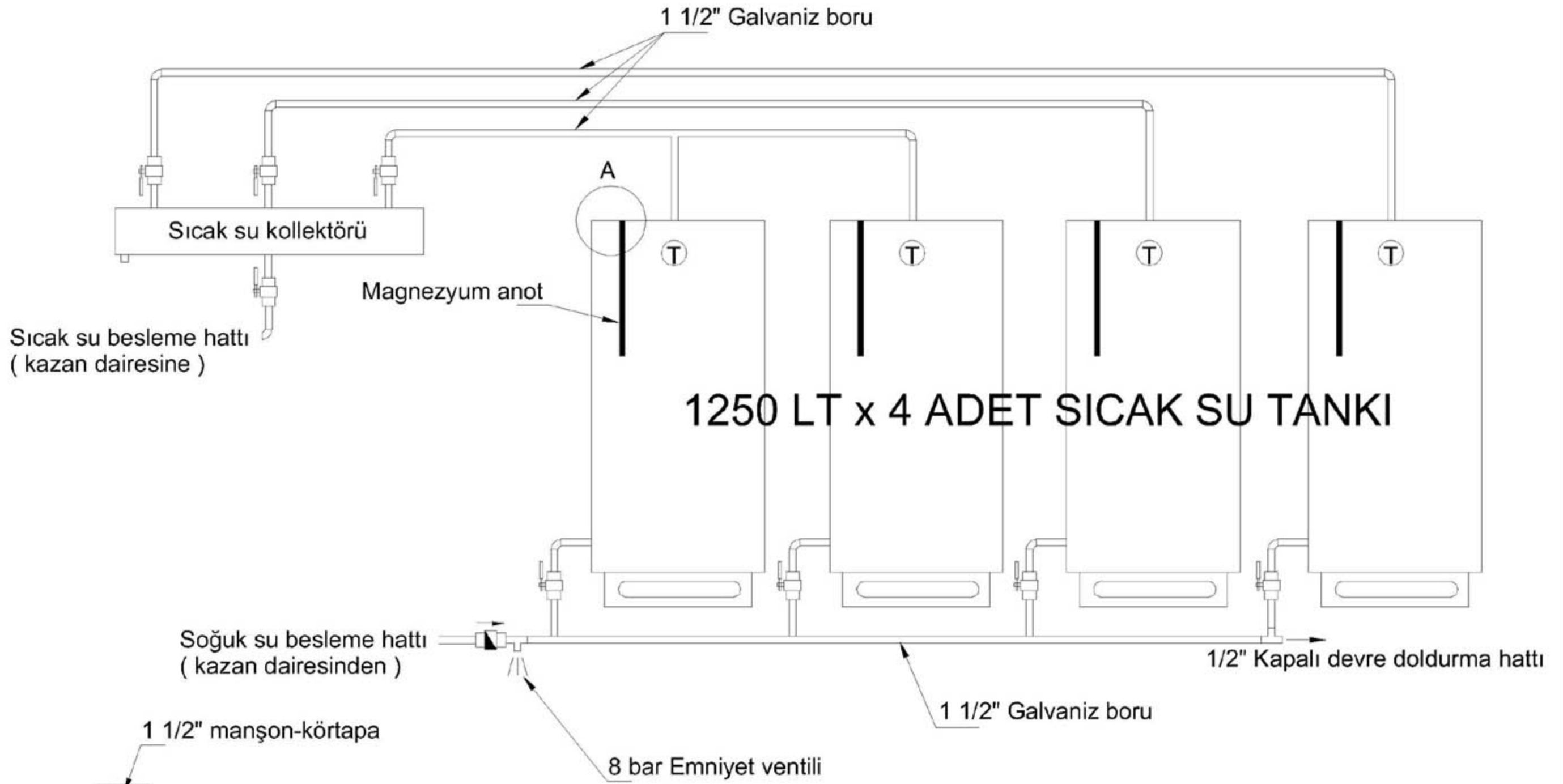
TST ADANA TESİSLERİ
GÜNEŞ ENERJİSİ
PLATFORM VE TANK YERLEŞİMİ

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KONTROL	İBRAHİM SÜDAŞ		TARİH	: 16.08.2005
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GÜNEŞ ENERJİSİ
KOLLEKTÖR BORU BAĞLANTISI

ÇİZEN	HARUN MADENLİ	ÖLÇEK -	REVİZYON NO	: 0
KONTROL	İbrahim SÜDAŞ		TARİH	: 16.08.2005
			RESİM NO	: GE - 01 - 06



A DETAYI



TST ADANA TESİSLERİ
GÜNEŞ ENERJİSİ
SICAK-SOĞUK SU TANK BAĞLANTILARI

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KONTROL	İBRAHİM SÜDAŞ		TARİH	: 16.08.2005
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