Remox Corporation

Vapor Extraction / Thermal Oxidation

VE/TO

REMOX CORPORATION

VAPOR EXTRACTION/THERMAL OXIDATION

ENVIRONMENTAL CONTROL AND
DECONTAMINATION PROCESSES

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(714) 751-0042

MILT SHRODE - PRESIDENT

REMOX CORPORATION

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RS-214
(1-90)

Standard Specification
Remox Fume Thermal Oxidizer
For High BTU Vapors

1. Equipment Specifications

A. 1,400°F. operating temperature (1,500°F. design temperature) with 0.3 second residence time.
B. Varying flow rate (static pressure control required).
C. Fume concentration can vary from 0-Saturation
D. F.M. piping train (natural gas or propane only).
E. Natural gas burner turndown 4:1 .
F. Fume piping train with flame arrestor or velocity section (requires 2.2 PSIG pressure drop)

2. Scope of Equipment Supply

A. **Vertical cylindrical oxidizer casing with a double wal insulation designed with a stainless steel radian tub in addition to refractory.**
B. Combustion chamber inlet plenum.
C. Hirt Multi-jet gas burner with a gas-electric igniter pilot. The Hirt Multi-jet burner's unique design allows for intimate mixing of fuel and combustion air, which results in complete combustion and maximum heat release.
D. Main control panel housing the instruments, including the temperature indicating controller, high temperature limit, ultraviolet combustion safeguard system, purge timer, alarm silencing switch, operating lights to show normal operation, starter pushbutton, gas pilot ignition pushbutton system, ignition transformer, fan draft switch, terminal strips, control circuit fuse, and nameplates.
E. Gas piping train, including safety shutoff valves, automatic gas flow control valve, high and low gas pressure switches, pressure gauge, manual isolating valves, pilot gas regulator, pilot solenoid shutoff valve and pressure taps. All interconnecting piping mounted on the unit will be supplied, and all control items will be fully wired.
F. Fume piping train with pressure gauge, on/off valve, and flame arrestor or velocity section.
G. Temperature recorder.

3. Operating Features
   A. The fume stream will enter into a separate burner system where it will then mix with the combustion air and auxiliary burner. A Hirt Multi-jet burner is used to supply the combustion gases. It is of the nozzle-mixing type and thereby eliminates the possibility of flashing back to some remote mixing device. It can be turned down, without hazard, until the fire is extinguished, and then readily re-ignited from the pilot. The burner produces a large cross-sectional area flame pattern for easy mixing with the fumes, with minimum fume bypass.
   B. The combustion safeguard pilot is easily and safely applied because the pilot becomes, in effect, another burner jet. An arrangement of mixing baffles is supplied so that optimum fuel-gas-air-fume mixing is obtained which results in minimum operating temperature for economical fuel requirements.
   C. In order to conserve fuel, the temperature of the oxidizer gas discharge is carefully controlled to the minimum destruction temperature.
   D. An electronic controller, with thermocouple burnout safeguard, actuates a throttling electric motor-driven gas valve to hold the oxidation temperature at the set point. Should the temperature control system fail, a temperature limit will protect the blower by shutting down both the fume and the main burner gas safety shut-off valve.
   E. In order to assure that the burner is not operating unless it is burning normally and the start-up sequence has been properly followed, a flame-rectification type of combustion safeguard relay is interlocked to the blower starter, draft switch, high temperature limit, and alarm howler.
   F. A Factory Mutual approved main gas safety shutoff valve and pilot solenoid will be installed in the gas lines so that in case of any interlock failure the pilot and main gas will be automatically shut off, the howler sounded, and the component failure indicated by extinguishing of an operating light.
   G. This system is completely automatic with the exception of a start-up sequence.

H. A hinged, dust-tight (class 12) covered panelboard will be supplied, containing all the equipment not normally mounted elsewhere, including: operating lights to show normal operation, and as an aid to troubleshooting, flame-rectification combustion safeguard system, starting pushbutton, gas pilot ignition pushbutton system, alarm with relay and silencing switch, terminal strips, control circuit fuse, and Bakelite nameplates.

4. Operating Economy

A.Remox units are able to achieve low operating costs for the following reasons:

1. We assist the customer in designing the fume gathering system so that only the minimum amount of air must be processed.
2. The burner is automatically throttled back as any vapors are present in the fume stream so that the heat of combustion of the vapors reduces the gas burner requirements at all periods and conditions of operation.
3. Temperature is controlled at the lowest permissible level with the smallest differential so that only a minimum amount of fuel is required to make up the required heat of thermal oxidation.
4. When the fume contains a minimum of 10% oxygen, it is used as the source of combustion air for the burner and the oxidation process, eliminating the need for additional extraneous heat-absorbing "outside" air (with the exception of a minimum loading).

5. Installation

Remox equipment will need at least the following items to be supplied by others:

A. Concrete foundations, pad, and steel support structure.
B. Connection of all utilities to the thermal oxidizer system terminal points, including 115 volt,single phase, 60 Hz power connection and fused and unfused disconnects and regulated pressure natural gas or LPG supply at 5 PSIG to the burner mounted on the thermal oxidizer.
C. Ducting required to and from Remox supplied equipment.

D. Any permits, air pollution control approvals, and any other regulatory documents which may be required.
E. Remote control panel and interconnecting wiring between the local and remote control panels.
F. Installation of the thermal oxidizer system.
G. Installation engineering and supervision.
H. Start-up.
I. Air pollution compliance testing.
Note: A turnkey installation, or any portion thereof, can be provided upon request.

6. Delivery

Approval drawings can be submitted within 4 weeks after receipt of your purchase order. Nominal shipment can be made within 12 weeks after our receipt of approved drawings. If a shorter time schedule is desired, it can be provided upon request depending upon the schedule for existing orders. Additional funds may be needed for the overtime required to meet the shortened schedule.

7. Terms

Our terms of payment are:
30% due with purchase order
30% due with submittal of general arrangement, process schematic, and piping and instrumentation diagram.
30% due before shipment
10% due within 30 days of shipment

All equipment is f.o.b. Montebello, California, exclusive of all taxes and fees.

9. Performance Guarantee

A. A performance guarantee will be available after the client provides the following analytic information about the vapor stream to be oxidized:

1. Total hydrocarbon concentration (TPH) of the vapor stream, in parts per million.

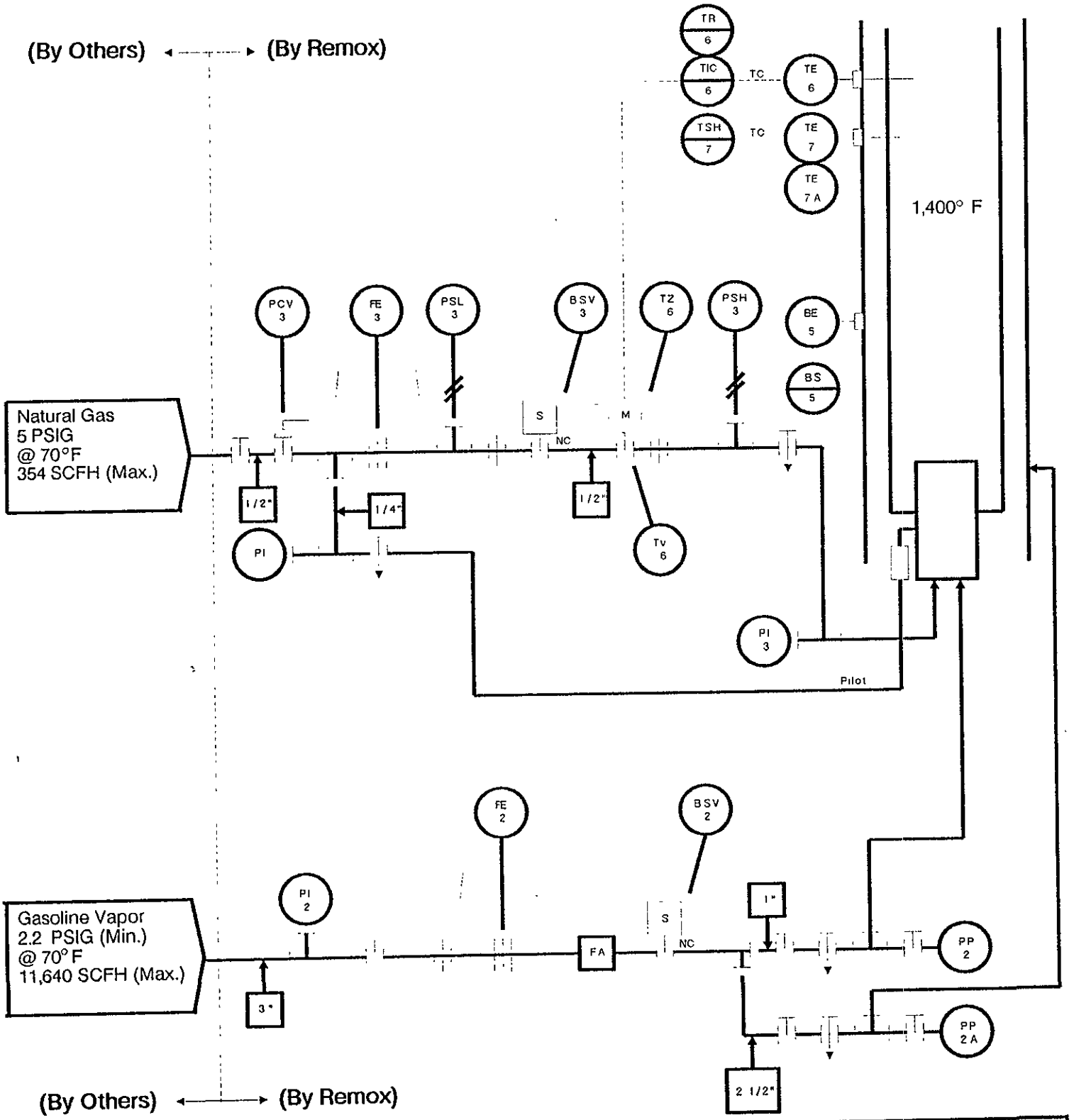
2. Flowrate of the vapor stream.

3. Additional analytical data (a gas chromatograph "footprint") to demonstrate that the chemical composition of the extracted vapors is consistent with information supplied to Remox Corporation about the vapor stream to be oxidized. The data shall be provided to Remox on a Title 22 Profile Sheet from a California DHS certified laboratory.

B. We guarantee to combust client specified total petroleum hydrocarbon vapors in the stream through the thermal oxidizer to a Destruction Rate Efficiency of 99%, but not less than 5 PPM. We will comply with the requirements of the local air pollution control authority as of the date of our proposal.

B. We will prepare the necessary thermal oxidizer drawings for approval, or for submittal to the air pollution board for permits and approvals as required.

C. Standard construction provides a 0.3 second retention time of the fumes in the combustion chamber, with capability of sustained operation at 1,500°F. For special applications, units with longer retention time and/or higher operating temperatures are available as required.



Remox Corporation

1374 Logan Ave -Suite G-Costa Mesa, CA 92626
(714) 751-0042

Date: 01-12-90	**Scale:** None

Title: RHFV – 200 P & I Diagram
Ref. Dwg. #1436-2C-0

File: GTOGA03.GEM

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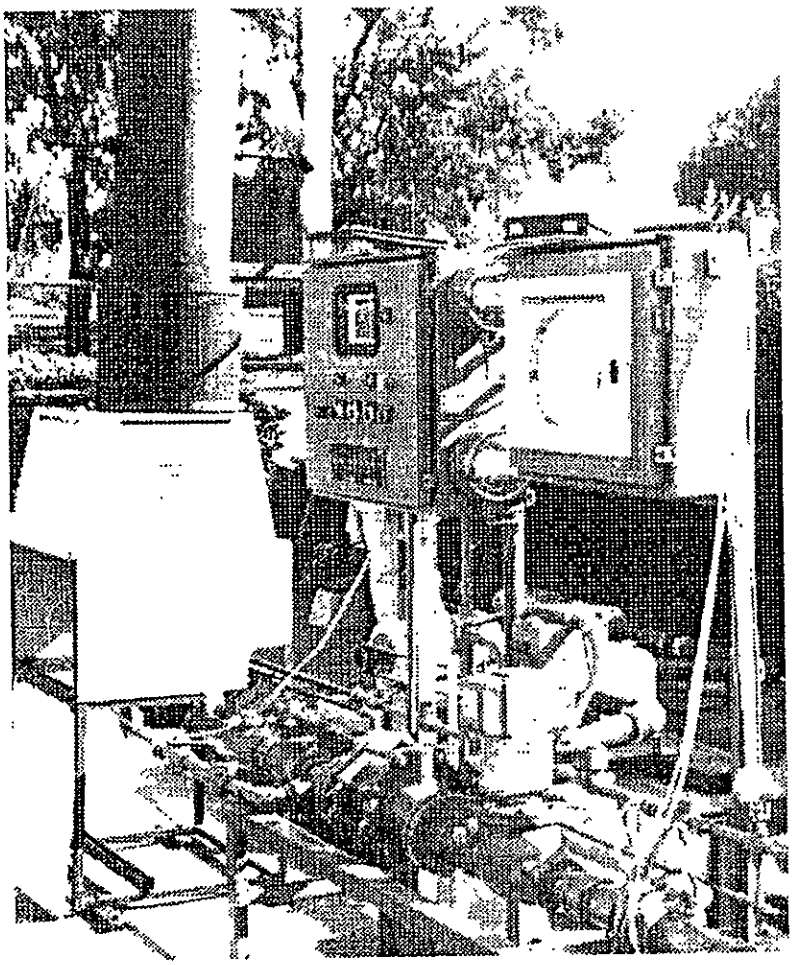

Model RHFV 200

Model RHFV 200 is now our standard unit. We can effect savings in costs by producing each one identical. We can speed up production by the use of jigs and keeping production parts in stock. This unit is designed to utilize a maximum of 200 SCFM @ 300,000 BTU/HR. If the fume concentration is hotter than 300,000 BTU/HR,you can either dilute the fume stream,cut down on the SCFM's, or set another identical unit on the fume stream in parallel to the first one. At the price of our standard unit, two units are still less expensive than one large unit designed to handle double the capacity of our standard unit.

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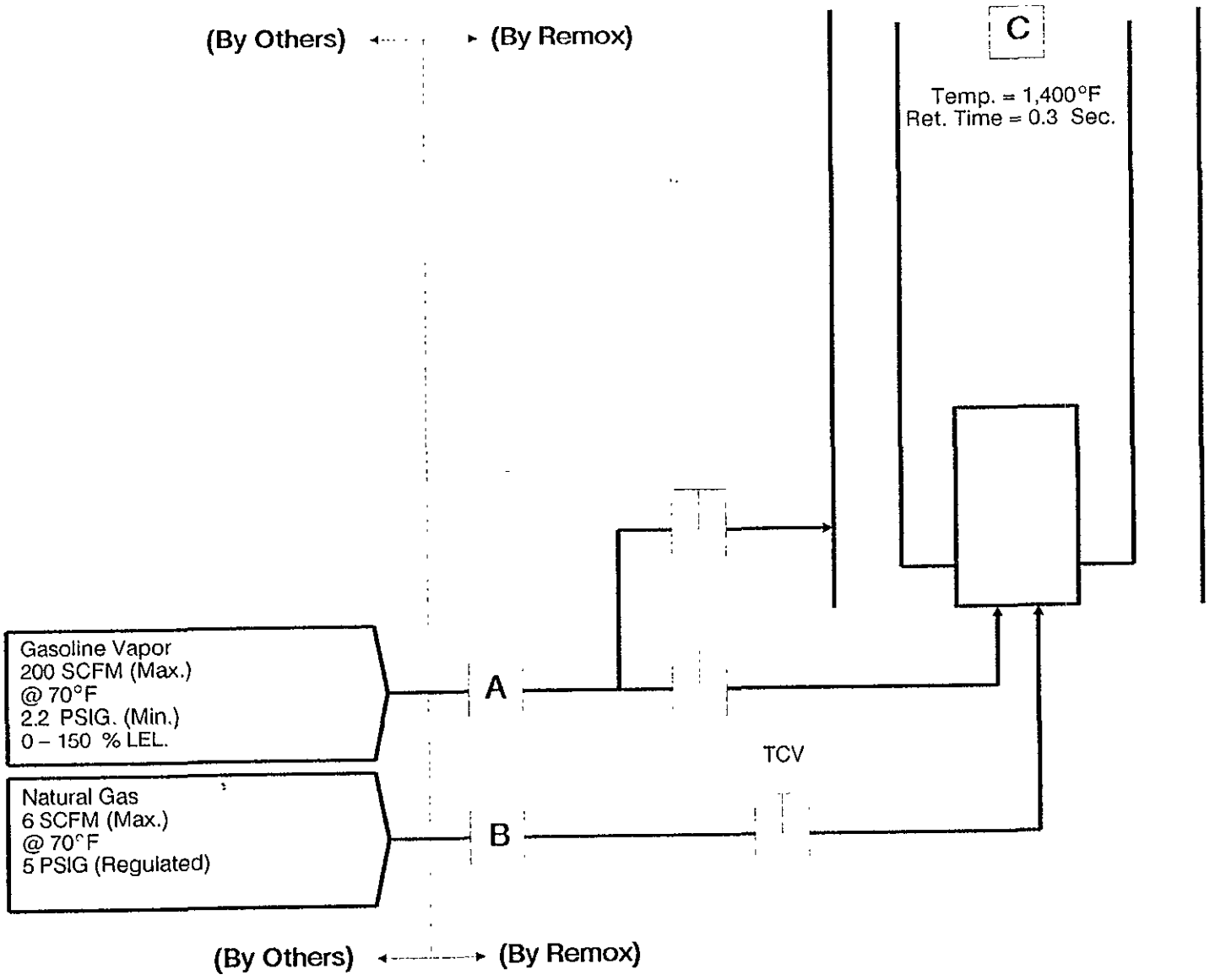

	A Gasoline Vapor			B	C
	FLOW (SCFM)	Concentration (PPM)	Heat Value (BTU/HR)	Nautral Gas (SCFH)	Flue Gas (SCFM)
Case 1	194	0	0	354	200
Case 2	194	4,560	266,000	88	200
Case 3	66.7	15,000	300,000	54	200

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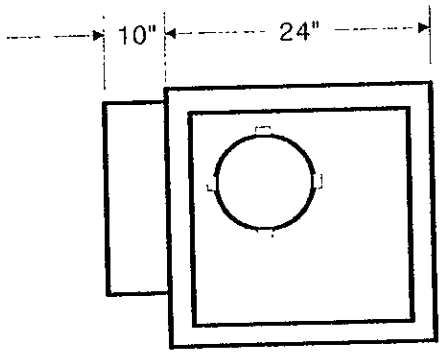
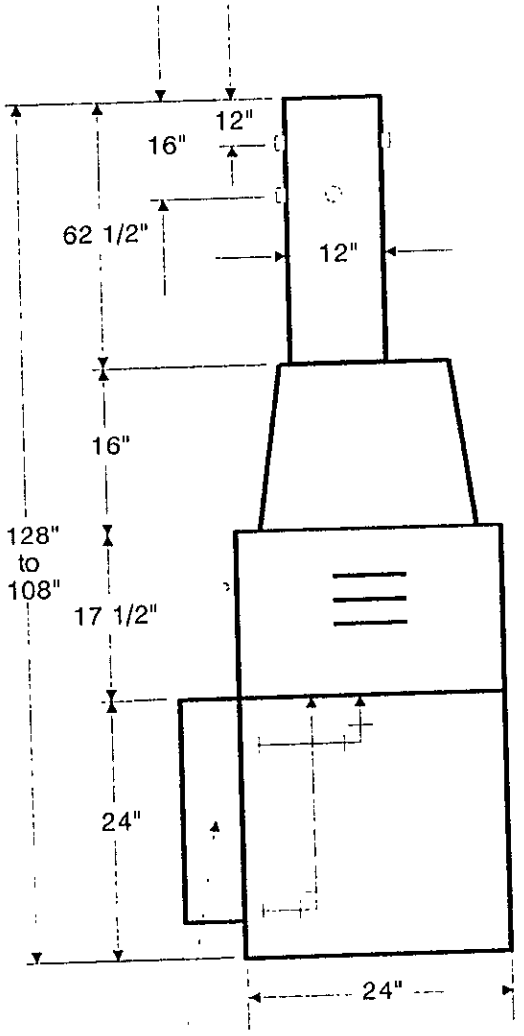
Date: 01-12-90 **Scale:** None

Title: RHFV – 200 Process Schematic
Ref. Dwg. #1436-30C-0

File: GTOGA02.GEM



Top View

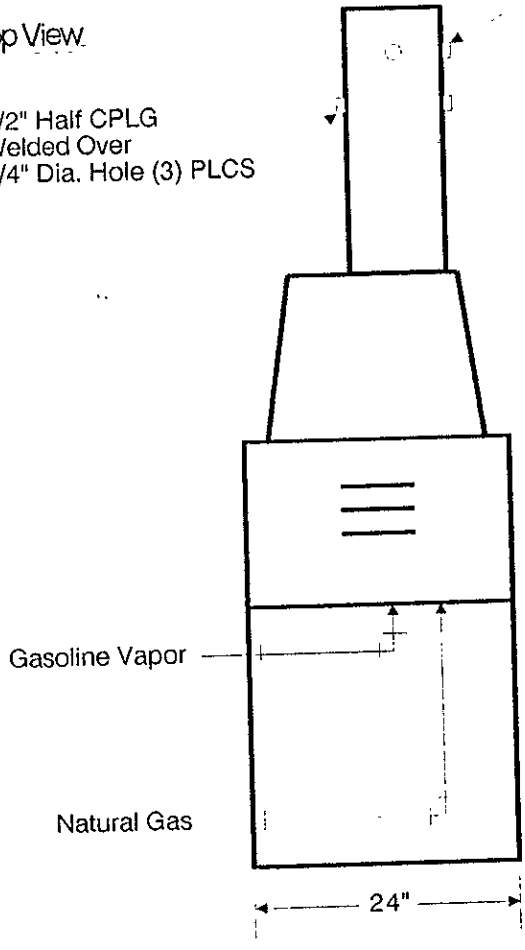


Right Side View

Control Panel

1 1/2" Half CPLG
Welded Over
1 3/4" Dia. Hole (2)

1/2" Half CPLG
Welded Over
3/4" Dia. Hole (3) PLCS



Back View

Note:
1. The pipe train and instruments add 6' horizontal to the width of the unit.
2. Clearance of at least 1.5' at each side of installed unit is necessary for technician.

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Date: 4-11-90	**Scale:** None

Title: RHFV – 200 General Arrangement

File: GTOGA01.GEM

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Hirt Flaring System
Cylindrical

The Hirt Combustion Engineers' Flaring System is the result of 36 years of thermal oxidation experience. Hirt Combustion Engineers' Flaring System is designed to perform at a very high destruction and removal efficiency, and is low cost, user friendly, and maintenance simple.

Hirt Combustion Engineers and Remox Corporation guarantees conformities to the local air quality management district requirements. Both approval to construct and approval to operate.

It is general practice to design a flare with a double wall insulation. Either manual or automatic (motor operated) dampers, temperature sensor, temperature controller, site ports, pilot with flame safeguard, flame arrestor, and motor operated shut-off valve. Generally, Hirt Combustion Engineers designs for a 0.3 of a second or greater retention time (between burner and temperature sensor at up to 1,300 feet per minute combustion gas velocity).

Remox Corporation is offering the following system as a standard unit for VOC vapor recovery where the soil and/or water is contaminated by gasoline.

This system is completely automatic with the exception of a start-up sequence.

The Model RHFV 200

- **12" I.D. X 11' tall Stack
- **Aux.Fuel 5 PSIG (Regulated) 6 SCFM (MAX)
  (Natural Gas or LPG)
- **Vapor Stream 2.2 PSIG (Min.) 200 SCFM (Max)
- **24" deep X 8' wide (including Fuel & Fume train
  and instruments)
- **Weight 875 pounds
  300,000 BTU/HR maximum heat release (stack)

Other Models and sizes are available.

Remox Corporation

The following is a list of standard controls on Remox Models:

Auxiliary Fuel Manifold
Strip Chart Recorder
A NEMA 4 Control Package
(Temperature Control, Lights,
Switches, Flame Safeguard, etc.)

Although a higher number is available, we generally design to achieve 99% D.R.E down to 5 PPM.

The Hirt Flare is designed with a stainless steel radian tube in addition to refractory. This proven design provides for low NOx and low CO emissions.

Typically the low cost design is ideal for the following applications:

IN-SITU Soil Remediation Systems
Water Stripping Column Vapor Destruction
Tank Removal or Cleaning Vapor Destruction
Temporary Oxidizer Service

For drawings and further information, please contact Remox Corporation.