



JIRO COMPRESSION LIMITED
Trailer Mounted Standard 9000 Series Compressor

AREA CLASSIFICATION

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Ramco Project #21128

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1.0 INTRODUCTION

The following is the area classification study of a trailer mounted engine driven screw compressor designed and packaged by Jiro Compression Limited. Jiro refers to this particular compressor package as their standard 9000 Series, and it is intended that the package will be re-produced in numbers for rental units without change to the standard design. It is further intended that these standard compressors shall be installed for the purpose of compressing field natural gas streams.

This report considers the interior of this compressor building/trailer, as well as the area outside the trailer that is hazardous as a result of the compressor package itself. This report does not specifically address any other hazardous location at sites where these compressors may be used.

The following area classification is based on both the "Division" (North American) and the "Zone" (IEC) systems of area classification. This will facilitate application of these standard compressor packages at existing facilities that presently employ the "Division" system, as well as new facilities employing the "Zone" system of classification. The 1998 edition of the Canadian Electrical Code allows the use of equipment approved under both the existing "North American" system and the new "IEC" based system. Equipment approved under the North American standards will use the A, B, C and D gas grouping while equipment approved to the IEC based standards will use the IIA, IIB and IIC groupings. For this reason we have given both the North American and the IEC gas grouping.

2.0 BACKGROUND - CLASS I BUILDINGS

It has been common practice in the petroleum industry to classify the interior of buildings in which flammable gases or vapors are handled, processed, or stored as Class I, Division 1 locations. In many cases this division 1 classification was derived simply because the facilities were enclosed and it was felt that the concentration of gas or vapor in the building would quickly reach hazardous proportions in the event of a breakdown or failure of equipment. This resulted in electrical installations in these buildings being wired almost exclusively with equipment contained in explosion-proof enclosures and being connected by the use of wire in conduit and/or armored cables, both of which require installation of sealing fittings. The recognition that these explosion-proof wiring systems were frequently improperly installed and/or maintained led to a re-examination of both the area classification and the wiring systems used in Class I hazardous locations.

The 1998 Canadian Electrical Code divides Class I hazardous areas into three zones. The definitions of these zones are:

Class I, Zone 0 locations are those areas in which explosive gas atmospheres are present continuously or are present for long periods.

Class I, Zone 1 locations are those areas in which explosive gas atmospheres are likely to occur in *normal* operation.

Class I, Zone 2 locations are those areas in which explosive gas atmospheres are not likely to occur in *normal* operation, and if they do occur, they will exist for a short time; or where flammable volatile liquids, gases or vapors are handled, processed, or used, but in which liquids, gases or vapors are normally contained within closed containers or closed systems from which they can escape only as a result of accidental rupture or breakdown of the containers or systems or the *abnormal* operation of the equipment by which the liquids or gases are handled, processed or used.

The following rule of thumb is outlined by API relating the time that flammable mixtures might occur to the Zone 0, Zone 1, and Zone 2 hazardous classifications.

Typical Relationship Between Zone Classification
and the Presence of Flammable Mixtures

<u>Zone</u>	<u>Flammable Mixture Present</u>
0	1000 or more hours / year (10%)
1	10 < hours / year < 1000 (0.1% - 10%)
2	10 > hour / year (0.1%)

Facilities classified prior to the adoption of the 1998 Canadian Electrical Code were classified under the divisional system. This system of area classification divided Class I hazardous areas into two divisions. The definitions of these divisions are:

Class I, Division 1 locations are those areas where hazardous concentrations of flammable gases or vapours exist continuously, intermittently, or periodically under normal operating conditions.

Class I, Division 2 locations are those areas where flammable volatile liquids, flammable gases, or vapours are handled, processed, or used, but in which the liquids, gases, or vapours are normally confined within closed containers or closed systems from which they can escape only as a result of accidental rupture or breakdown of the containers or systems or the abnormal operation of the equipment by which the liquids or gases are handled, processed or used.

While flammable gases or vapors exist continuously in most hazardous locations, the concentrations are very low under normal operating conditions. For these gases or vapors to become hazardous, from the perspective of ignition by electrical equipment, they would have to accumulate in concentrations above their lower explosive limit (LEL). For example, facilities processing methane would require concentrations of gas above 5% by volume. This would be equivalent to 100% LEL on the combustible gas detectors permanently mounted in most buildings. The actual operating experience in most enclosed hazardous facilities more closely parallels the definition for Division 2

than Division 1. In other words, gas or vapor concentrations approaching or above 100% LEL are rare in most process buildings, and when they do occur they are generally the result of a breakdown or failure of equipment. Most buildings operate with background gas concentrations below 1% LEL.

In the early 1990's some users began to use "fugitive emissions" studies to predict the amount of gas or vapor which would be released in a building under normal operating conditions. This would then allow a determination of the amount of ventilating or make-up air that would be required in the building to continuously dilute these "predicted" emissions to a safe level. The basis for this approach is contained in the API (American Petroleum Institute) document RP500-Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities. RP500 outlines the concept of "adequate ventilation" as a means of ensuring the fugitive emissions in a building are continuously diluted to a safe level. It defines adequate ventilation as "ventilation (natural or artificial) that is sufficient to prevent the accumulation of significant quantities of vapor-air mixtures in concentrations above 25 percent of their lower explosive limit (LEL)".

It is important to understand that the calculated values of emissions were predictions based on typical data from measurement on facilities. Experience in the field indicated that the predicted values were very likely well above the actual levels encountered in the field.

Having calculated the predicted air make-up volumes, the user was then faced with determining the actual volume of air which would be entering a building. This was relatively simple where air is forced into a building by mechanical means. What was more difficult was predicting the amount of air entering a building by natural means from leakage around doors and windows and other openings in the shell of a building. Generally the natural occurring ventilation was ignored in calculating the amount of make-up air required. Many facilities were classified Class I, Division 1 with no mechanical ventilation, yet they were not experiencing any significant accumulation of vapors due to fugitive emissions. In Western Canada the cost of heating excessive amounts of cold make-up air can be very high. Therefore there was a need to improve our ability to:

- a) accurately predict emission levels, and
- b) accurately calculate or predict the amount of natural ventilation in buildings, or
- c) learn to use the operating experience in our facilities to predict performance in new facilities.

Actual operating experience in most buildings in which gases or vapors are handled or processed has been that they operate in such a manner that no detectable quantities (i.e. Below 1% LEL) of gases or vapors are present under normal operating conditions. In many cases these buildings have no continuously operating mechanical ventilation. The natural ventilation in these buildings exceeds the requirements for adequate ventilation. Again the problem many designers and operators have faced was the difficulty in

accurately determining the volume of air entering these buildings by natural means, even though they know by observation that the buildings met the definition of a Class I, Division 2 hazardous location. The NFPA standard 497A (Recommended Practice for Classification of Class I Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas) provides guidance in classifying hazardous buildings where this situation is encountered. Paragraph 2-7.5 of this publication reads as follows:

“When classifying buildings, careful evaluation of prior experience with the same or similar installations should be made. It is not enough to merely identify a potential source of vapor within the building and proceed immediately to defining the extent of a Division 1 or Division 2 location. Where experience indicates that a particular design concept is sound, a more hazardous classification for similar installations is not justified. Furthermore, it is conceivable that a location might be reclassified from Division 1 to Division 2, or from Division 2 to non-hazardous, based on experience.”

Using this approach one can conclude that for the purpose of classifying an existing building the observed performance can legitimately be compared to the definitions for Class I, Division 1 or 2 or non-hazardous locations. In making this comparison, a rule of thumb of 10 hours per year above the LEL is often used by industry as the dividing line between Division 1 and Division 2 (see table on page 2 of this section). Carrying this one step further, the area classification decisions made for a building based on the observed performance can legitimately be used for new buildings of similar construction containing similar equipment.

In performing or revising area classifications of existing buildings, the observed or actual performance (usually based on permanently mounted gas detector records), supplemented with on-site surveys of the building with portable detectors are usually of more value than fugitive emission studies in determining the proper classification of a building. In this approach, fugitive emissions studies are used more as a means of confirming observed performance than as a primary means of classification. In evaluating the results of the fugitive emissions study it is generally assumed that all metal buildings will leak a minimum of one air change per hour. Additional openings such as ventilating louvers and ridge vents, even when closed will add significantly to the amount of natural ventilation in the building. Mechanical ventilation that is operated **at all times** while the plant is in operation may also be considered for the purposes of achieving adequate ventilation.

While the use of gas detection is useful in the determining the past performance of a building, the addition of gas detection in itself does not reduce the area classification from Class I, Division 1 to Class I, Division 2. The determination of area classification involves both the frequency *and* duration of the occurrence of flammable concentrations (above 100% LEL) of gases or vapors. It is possible, in unattended facilities without gas detection, to have flammable concentrations of gas present for long periods of time, certainly more than the 10 hour rule of thumb, without anyone being aware of the situation. Therefore, while gas detection does not by itself reduce the area classification,

it can influence the classification by alerting operating personnel of an abnormal situation thus reducing the exposure time below the 10 hour rule of thumb.

Today most new enclosed hydrocarbon production or processing facilities are being designed as Class I, Division 2 facilities. The wiring systems that are developing are a mixture of traditional Division 2 wiring methods supplemented with equipment that uses European technology for devices which produce arcs or sparks in their normal operation. The move to Division 2 is also allowing much greater flexibility in the use of solid state devices for monitoring and control of processes. Overall, the Division 2 designs are gradually eliminating the problems the industry has encountered in the past with "explosion proof" enclosures that were necessary in the Division 1 designs. The Division 2 wiring systems now being installed are safer, more cost effective and easier to maintain than the Division 1 wiring systems of the past.

3.0 ANALYSIS

The following drawings were submitted by Jiro Compression for examination in the preparation of this study:

Drawing #	JC-9000-D-01	Rev. 1	Trailer/Building Layout
Drawing #	JC-9000-D-02	Rev. 1	Trailer/Building Layout
Drawing #	JC-9000-A-01	Rev. 1	P&ID
Drawing #	JC-9000-A-02	Rev. 1	P&ID
Drawing #	JC-9000-A-03	Rev. 1	P&ID
Drawing #	JC-9000-A-04	Rev. 1	P&ID
Drawing #	JC-9000-A-05	Rev. 1	P&ID
Drawing #	JC-9000-A-06	Rev. 1	P&ID
Drawing #	JC-9000-A-07	Rev. 1	P&ID

Fugitive gas emissions were calculated following the method outlined in Appendix B of the 1997 editions of API RP500 - "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2" and API RP505 - "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 2". The gas emission rates were estimated based on the API document #4322 titled, "Fugitive Hydrocarbon Emissions from Petroleum Production Operations" - 1980 edition. Because the exact locations where the standard 9000 Series compressor packages will be applied is unknown, there is no gas analysis available for this study. It is most likely that these standard compressors will be located at wellsites for the purpose of compressing field natural gas streams. Therefore, Table E1 (titled Predicted Hydrocarbon Emissions Per Component for Onshore Producing Operations) of the API 4322 has been used.

As shown in the attachments, the calculated minimum air exchange rate to achieve adequate ventilation for a Division 2 (Zone 2) classification in the standard 9000 Series compressor trailer is **0.84 air changes per hour**.

The standard 9000 Series compressor trailer is equipped with:

- Two 3' x 3' adjustable louvers;
- Two 3' x 3' windows;
- One 3' x 4' maintenance access panel;
- Two 3' x 7' single man-doors, and;
- One gas cooler fan complete with two 50" x 50" louvres in the rear wall of the trailer.

Natural building ventilation will be achieved through the static louvres and by leakage through and around the doors, windows, the removable maintenance panel and all piping penetrations in the walls. The shaft driven cooler fan through its louvres in the rear wall will provide forced mechanical ventilation.

The standard 9000 Series compressor trailer houses a natural gas engine (Caterpillar 3306, 220 HP) driven screw compressor (Mycom 160VLRD), an inlet gas filter, a suction scrubber, a fuel gas scrubber, an oil coalescing filter, two catalytic style gas heaters, and associated valves, fittings and piping. Due to the high rate of air movement created within the trailer by the gas cooler, as well as the substantial amount of heat that will be generated in the building by the engine and compressor, the interior ventilation rate is expected to be many times in excess of the minimum rate to achieve "adequate ventilation". The gas cooler fan coupled to and driven by the engine shaft will provide forced mechanical ventilation within the building. The gas cooler will draw air from inside the building and force it through the cooler to the outside. Fresh air will be drawn from outside the building through the static louvres replacing the air forced out the building through the cooler opening. The mechanical ventilation rate in this building will be well in excess of the minimum requirement to achieve adequate ventilation and no pockets of stagnant air are expected. All areas of the trailer will be adequately ventilated.

On September 13th, 2001, a smoke test was performed by Jiro and witnessed by this author on a similar compressor package, a smaller Standard 3500 Series trailer mounted unit. The test consisted of filling a closed 3500 Series compressor with smoke. Once a sufficient density of smoke was achieved, observations were recorded. While the unit was not running, smoke was observed naturally exiting out of the static vent and cooler louvres. Once the unit was started, the building was evacuated of smoke through the cooler in less than five minutes. While the unit was running, the smoke producing machine was used to probe the unit to determine if there were any stagnant areas. When smoke was dispensed in the corners behind the inlet and fuel gas scrubbers at the opposite end of the trailer from the cooler, the smoke was drawn across the building to the cooler fan and was evacuated very quickly (less than a minute for this smoke to reach the cooler).

Experience has therefore shown that compressor buildings similar to the 9000 Series will not experience flammable concentrations of gas during normal operation. Flammable concentrations of gas might occur only as the result of a failure of equipment. While these occurrences are rare, a Zone 2 area classification requires that when these situations do occur, they be corrected within a short period. This time frame is recommended by API to be less than 10 hours. In order to assure prompt detection of any such gas release, a combustible gas detection system shall be permanently installed as part of the standard package design.

Furthermore, the area classification of the interior of the compressor building is based on the principle that ignitable quantities of gas or vapors do not occur during normal operation due to adequate ventilation. However, it is possible that ignitable concentrations of flammable gases or vapors could occur as the result of an abnormal situation, such as a failed packing within the building. The extent of the Class I, Division 2 or Zone 2 hazardous area outside the trailer should be based on the area that would be affected by an abnormal situation such as a large release of gas or vapor inside. Such gases would leak out of the trailer around doors, windows and other penetrations in the building shell. They will also be blown out of the building by the cooler fan. Therefore, the area for 3 meters in all directions outside this compressor trailer will be classified as Class I, Division 2 or Zone 2.

4.0 CONCLUSIONS

The proper area classification for the interior of the Standard 9000 Series compressor trailer is Class I, Division 2 or Zone 2, Group D or IIA. Equipment with a maximum surface operating temperature up to 482°C (the ignition temperature of natural gas) or with a T1 or lower surface temperature code will be suitable for use in this building.

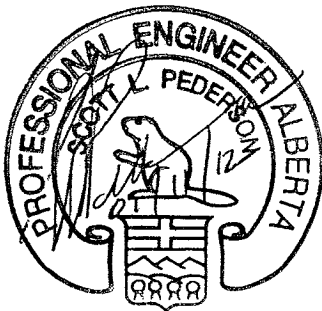
This area classification assigned to the interior of the compressor trailer is subject to the following conditions. If any of these conditions are not met, the area classification in this report will not apply and the classification of the interior of the compressor building will revert to Class I, Division 1 or Zone 1.

1. The ventilation devices may be shut, but may not be closed off or removed. If changes are required to the standard design that will reduce the ventilation rate in the building, the effect on the concentration of fugitive emissions must be evaluated.
2. Any deviations in the standard design of the Jiro 9000 Series compressor package with respect to the piping, valves and fittings as shown in the drawings listed above must be evaluated for their effect on the concentration of fugitive emissions in the building.
3. Procedure and controls must be in place to ensure abnormal situations resulting in combustible concentrations of gas do not persist for more than 10 hours per year.

4. The compressor packages are maintained in a manner that will ensure significant levels of combustible gas (above 1 – 5 % of the LEL) do not exist under normal operating conditions.
5. A combustible gas detection system is installed and maintained in accordance with the manufacturer's recommendations or in accordance with ANSI/ISA Recommended Practice 12.13, Part II, Installation Operation and Maintenance of Combustible Gas Detection Instruments.
6. This report is based on use of the 9000 Series compressors with Group D or IIA gases. Use with gases of other groups will require review of the installed electrical equipment and replacement of any devices not suitable for the other gas groups. Furthermore, the extent of the Division 2 or Zone 2 boundary around the compressor trailer must be extended from the 3 m envelope to an additional 4.5 meters with a height of 600 mm above grade if large concentrations of heavier than air gases are present.
7. The conclusions of this area classification report are based on the understanding that these standard compressor packages will be installed in field gas applications. If these compressors are installed in gas plant applications, or in applications where API 4322 Table E1 should not apply, then the concentration of fugitive emissions in these buildings must be re-evaluated.

5.0 ATTACHMENTS

Fugitive Emissions Calculations
Fugitive Emissions Survey, Table E1 API 4322
Jiro Compression 9000 Series Compressor Drawings



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Jiro Compression Ltd.
Standard Trailer Mounted 9000 Series Compressor

Fugitive Emission Calculations - Compressor Building

Emissions are based on column(s) 1 of table E-1

Molecular weight of the Gas is estimated to be 24

Total gas emissions from data sheets are: 0.200 lbs./hr.

Allowances made 10 % equaling 0.02 lbs./hr. for instrument gas, and liquids

Total emissions have been found to be: 0.220 lbs./hr.

Assuming maximum ambient temperature of 100° F

Gas volume per pound mole = $\frac{359 (460 + 100)}{460 + 32} = 408.62$ cubic feet

Total hydrocarbon leakage rate = $\frac{(0.220) (408.62)}{(60) (24)} = 0.062$ lbs./hr.

Required make-up air volume to achieve adequate ventilation is:

$$\frac{(0.062)}{(0.045)(0.25)} = 5.549 \text{ cfm}$$

Additional safety factor of 4: $5.549 \times 4 = 22.20$ cfm or 1331.80 cfh

Building Volume = (22 L x 8.5 W x 8.5 eave)
= (1589.5)
= 1590 cubic feet

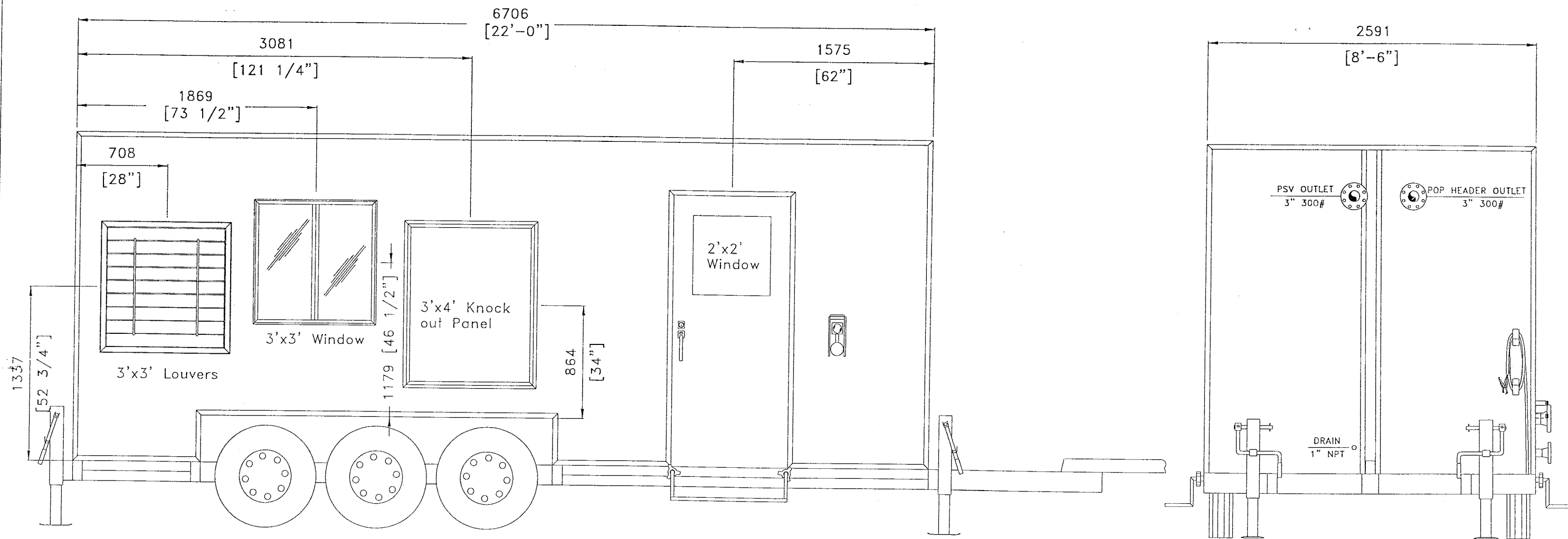
Required air exchange rate = cfh / volume = **0.84 air changes per hour**

**PREDICTED HC EMISSIONS PER COMPONENT
FOR ONSHORE PRODUCING OPERATIONS
TABLE E1**

PROJECT: Jiro Compression Ltd. Series 9000
DATE: 11/10/01

BUILDING: Trailer Mounted 9000 Series
BY: Scott Pederson

COMPONENT		TOTAL HYDROCARBONS					NON-METHANE					NON-METHANE / NON-ETHANE						
		GAS		OTHER			GAS		OTHER			GAS		OTHER				
TYPE	STYLE	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	TOTAL EMISSIONS (LBS/DAY)	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	TOTAL EMISSIONS (LBS/DAY)	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	NUMBER OF COMPONENTS	PREDICTION FACTOR (LBS/DAY)	TOTAL EMISSIONS (LBS/DAY)		
VL	GATE		0.4150		0.0059	0.0000		0.1600		0.0037	0.0000		0.1280		0.0033	0.0000		
	MULTI BALL	5	0.0016		0.0001	0.0000		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		
	PLUG		0.0279		0.0003	0.1395		0.0108		0.0002	0.0000		0.0086		0.0002	0.0000		
	GLBE	3	0.1220		0.0015	0.0000		0.0471		0.0009	0.0000		0.0375		0.0008	0.0000		
	NDLE	1	0.4710		0.0062	1.4130		0.1820		0.0039	0.0000		0.1450		0.0035	0.0000		
	CHCK	2	0.0832		0.0010	0.0832		0.0321		0.0006	0.0000		0.0256		0.0006	0.0000		
	BTFY		0.0789		0.0009	0.1578		0.0305		0.0006	0.0000		0.0243		0.0005	0.0000		
	RELF	3	0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		
	CHOK		0.0026		0.0001	0.0078		0.0010		0.0001	0.0000		0.0008		0.0001	0.0000		
			1.1200		0.0155	0.0000		0.4320		0.0097	0.0000		0.3440		0.0087	0.0000		
SUB TOTAL						1.8013	SUB TOTAL					0.0000	SUB TOTAL					0.0000
CN	FLFF	21	0.0082		0.0002	0.1722		0.0032		0.0001	0.0000		0.0025		0.0001	0.0000		
	FLRI		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		
	FLBO		0.0152		0.0016	0.0000		0.0059		0.0010	0.0000		0.0047		0.0009	0.0000		
	THRD	48	0.0332		0.0008	1.5936		0.0128		0.0005	0.0000		0.0102		0.0005	0.0000		
	GRVD		0.0090		0.0002	0.0000		0.0035		0.0001	0.0000		0.0028		0.0001	0.0000		
	FRIC		0.0009		0.0001	0.0000		0.0003		0.0001	0.0000		0.0003		0.0001	0.0000		
	GASK		0.0963		0.0024	0.0000		0.0372		0.0015	0.0000		0.0296		0.0013	0.0000		
	UNIN	6	0.0723		0.0018	0.4338		0.0279		0.0011	0.0000		0.0222		0.0010	0.0000		
	LAND		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		0.0001		0.0001	0.0000		
	TUBE		0.1910		0.0050	0.0000		0.0738		0.0031	0.0000		0.0587		0.0028	0.0000		
	ORIN		0.1420		0.0042	0.0000		0.0548		0.0026	0.0000		0.0436		0.0023	0.0000		
	FLGA		0.2670		0.0070	0.0000		0.1030		0.0044	0.0000		0.0821		0.0039	0.0000		
SUB TOTAL						2.1996	SUB TOTAL					0.0000	SUB TOTAL					0.0000
HA	FLFF		0.0092		0.0020	0.0000		0.0036		0.0014	0.0000		0.0028		0.0013	0.0000		
	FLGA		0.0011		0.0001	0.0000		0.0004		0.0002	0.0000		0.0003		0.0002	0.0000		
	THIF		0.5830		0.1730	0.0000		0.2250		0.1080	0.0000		0.1790		0.0968	0.0000		
SUB TOTAL						0.0000	SUB TOTAL					0.0000	SUB TOTAL					0.0000
SP	RERO		2.6300		0.0084	0.0000		1.0200		0.0053	0.0000		0.8080		0.0047	0.0000		
	ROSH	1	0.7750		0.0013	0.7750		0.2990		0.0008	0.0000		0.2380		0.0008	0.0000		
	MESL		0.3080		0.0004	0.0000		0.1190		0.0002	0.0000		0.0946		0.0002	0.0000		
	WLHD		1.8200		0.0029	0.0000		0.7030		0.0018	0.0000		0.5600		0.0016	0.0000		
SUB TOTAL						0.7750	SUB TOTAL					0.0000	SUB TOTAL					0.0000
DI	VLOP		0.1330		0.6440	0.0000		0.0515		0.4020	0.0000		0.0410		0.3610	0.0000		
	DPRS		0.1030		0.5220	0.0000		0.0396		0.3260	0.0000		0.0315		0.2920	0.0000		
SUB TOTAL						0.0000	SUB TOTAL					0.0000	SUB TOTAL					0.0000
SM	GATE		0.1650		0.0072	0.0000		0.0638		0.0045	0.0000		0.0508		0.0040	0.0000		
	BALL		0.1140		0.0045	0.0000		0.0441		0.0028	0.0000		0.0351		0.0025	0.0000		
	PLUG		0.1280		0.0057	0.0000		0.0494		0.0035	0.0000		0.0393		0.0032	0.0000		
	GLBE		0.0545		0.0021	0.0000		0.0210		0.0013	0.0000		0.0167		0.0012	0.0000		
	NDLE		0.1320		0.0053	0.0000		0.0510		0.0033	0.0000		0.0406		0.0030	0.0000		
	CHCK		0.2770		0.0136	0.0000		0.1070		0.0085	0.0000		0.0852		0.0076	0.0000		
	RELF		6.6700		0.2670	0.0000		2.5700		0.1670	0.0000		2.0500		0.1500	0.0000		
SUB TOTAL						0.0000	SUB TOTAL					0.0000	SUB TOTAL					0.0000
PP	OPUSU		0.0000		0.1230	0.0000		0.0000		0.0767	0.0000		0.0000		0.0688	0.0000		
	WLCL		0.0000		0.6440	0.0000		0.0000		0.4030	0.0000		0.0000		0.3610	0.0000		
	COSU		0.0000		0.0808	0.0000		0.0000		0.0505	0.0000		0.0000		0.0453	0.0000		
	OPTK		0.0000		0.0303	0.0000		0.0000		0.0190	0.0000		0.0000		0.0170	0.0000		
SUB TOTAL						0.0000	SUB TOTAL					0.0000	SUB TOTAL					0.0000
TOTAL GROUP 1						4.7759	TOTAL GROUP 2					0.0000	TOTAL GROUP 3					0.0000
TOTAL ALL GROUPS						4.78	LBS/DAY					0.20	LBS/HR					



EXTERIOR VIEW

SCALE 1:30

REV.	DESCRIPTION	BY	APP.	DATE
1	DIMENSIONS CHANGED AS PER SHELTER KING	CRC		01-08-22
2	ISSUED FOR CONSTRUCTION	CRC		01-01-24



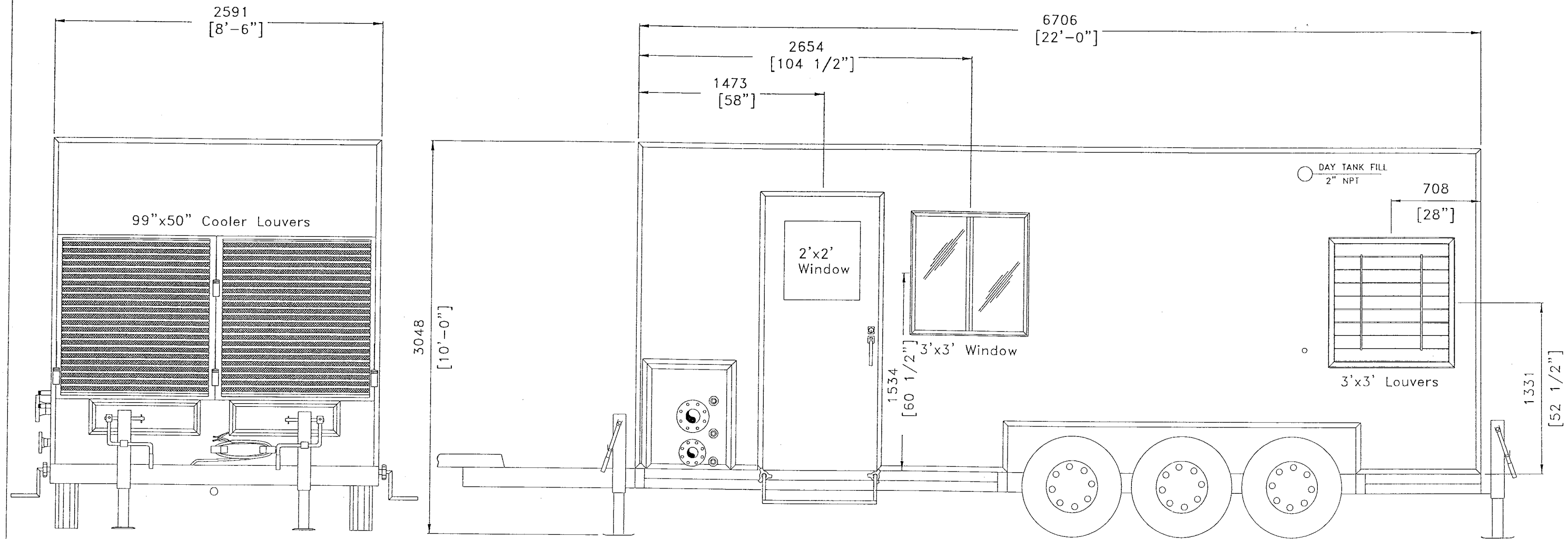
5221-46 St.
Box 1450, Stettler Alberta
T0C 2L0
Phone: 403.742.5538
Fax: 403.742.5539

JIRO COMPRESSION LTD.
an EnSource company

CADD Department E-mail
cad@jirocompression.com

**9000 SERIES COMPRESSOR
CATERPILLAR ENGINE w/MYCOM SCREW
TRAILER/SOUR**

COMPANY:	JIRO COMPRESSION	JOB NO.:	9000
Drawn by:	C.R. COATES	Checked by:	
DATE:	01-01-24	SCALE:	1:30
DRAWING NO.:	JC-9000-D-01	REV.:	1



EXTERIOR VIEW
SCALE 1:30

REV.	DESCRIPTION	BY	APP.	DATE
1	DIMENSIONS CHANGED AS PER SHELTER KING	CRC		01-08-22
0	ISSUED FOR CONSTRUCTION	CRC		01-01-24



5221-46 St.
Box 1450, Stettler Alberta
T0C 2L0
Phone: 403.742.5538
Fax: 403.742.5539

JIRO COMPRESSION LTD.
an EnSource company

CADD Department, E-mail
cad@jircompression.com

9000 SERIES COMPRESSOR
CATERPILLAR ENGINE w/MYCOM SCREW
TRAILER/SOUR

COMPANY: JIRO COMPRESSION		JOB NO.: 9000	
Drawn by: C.R. COATES	Checked by:	DATE: 01-01-24	SCALE: 1:30
DRAWING NO.: JC-9000-D-02		REV.: 1	

V-110
SUCTION SCRUBBER

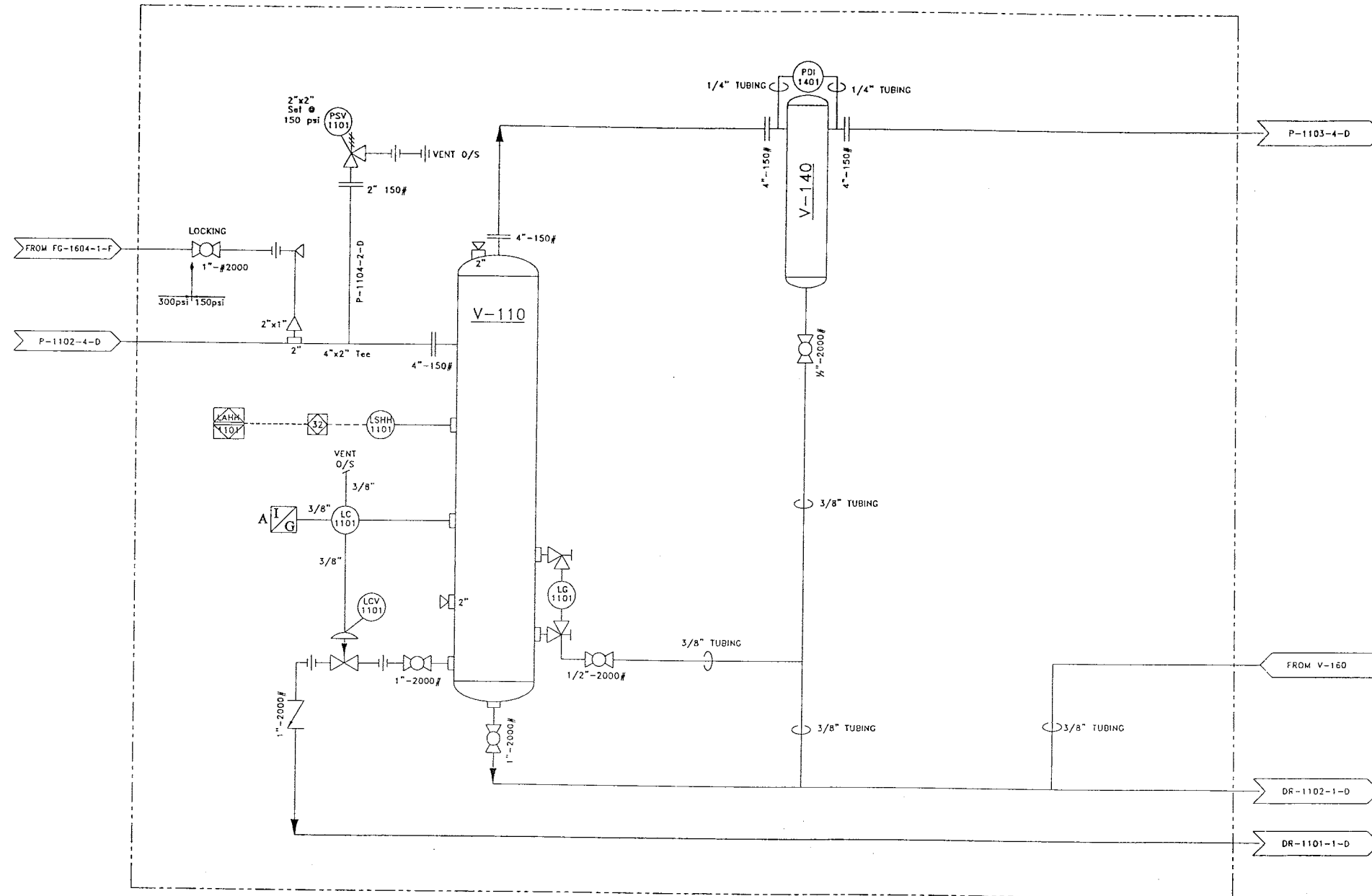
Size: 610mm ϕ x 1,219mm S/S
(23.26" x 48" S/S)
MAWP: 275psi @ 100°F
Manufacturer: PENFABCO
CRN: H3189.213
Sour 1/16" CA
Serial: PE-7221

V-140
INLET GAS FILTER

Manufacturer: JIRO COMPRESSION
MAWP: 150psi @ 100°F
CRN: P-2041.2
Serial: B-079

MATERIAL LIST

ITEM	DESCRIPTION	MAKE	MODEL
LSHH-1101	LEVEL SHUTDOWN HIGH HIGH	MURPHY	L1200
LC-1101	LEVEL CONTROLLER	FISHER	2680A
LG-1101	LEVEL GAUGE C/W 330 COCKS	PENBERTHY	1RM-7NQ
PSV-1101	PRESSURE SAFETY VALVE, 2"x2" NPT, SET @150 PSI	MERCER	81-2882111S
LCV-1101	DUMPVALVE 1/2" PORT FC	FISHER	128PQC
PDI-1401	PRESSURE DIFFERENTIAL GAUGE	MID-WEST	141AA-00-00



CH 14 INLET SCRUBBER LEVEL HI
MURPHY, L1200 SWITCH

* SEE DWG JCR-9000-A-01
FOR COMPLETE 9000 P&ID

LINE TYPE	LEGEND	MAIN PROCESS GAS	OIL/GAS COMBINED	UTILITY PROCESS
---	SKID BOUNDARY	---	---	---
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REV.	DESCRIPTION	BY	APP.	DATE
1	AS BUILT	DGB		01-09-11
0	ISSUED FOR CONSTRUCTION	CRC		01-07-23



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9000 SERIES COMPRESSOR MYCOM 160VLRD w/ 3306 ATAC ENGINE TRAILER MOUNTED, SOUR SERVICE			
COMPANY:		JIRO COMPRESSION RENTAL	
JOB NO.:		9000	
Drawn by:	Checked by:	Approved by:	DATE:
WST			00-07-04
SCALE:	DRAWING NO.:		REV.:
N.T.S.	JCR-9000-A-02		1

V-150
OIL COALESCING VESSEL

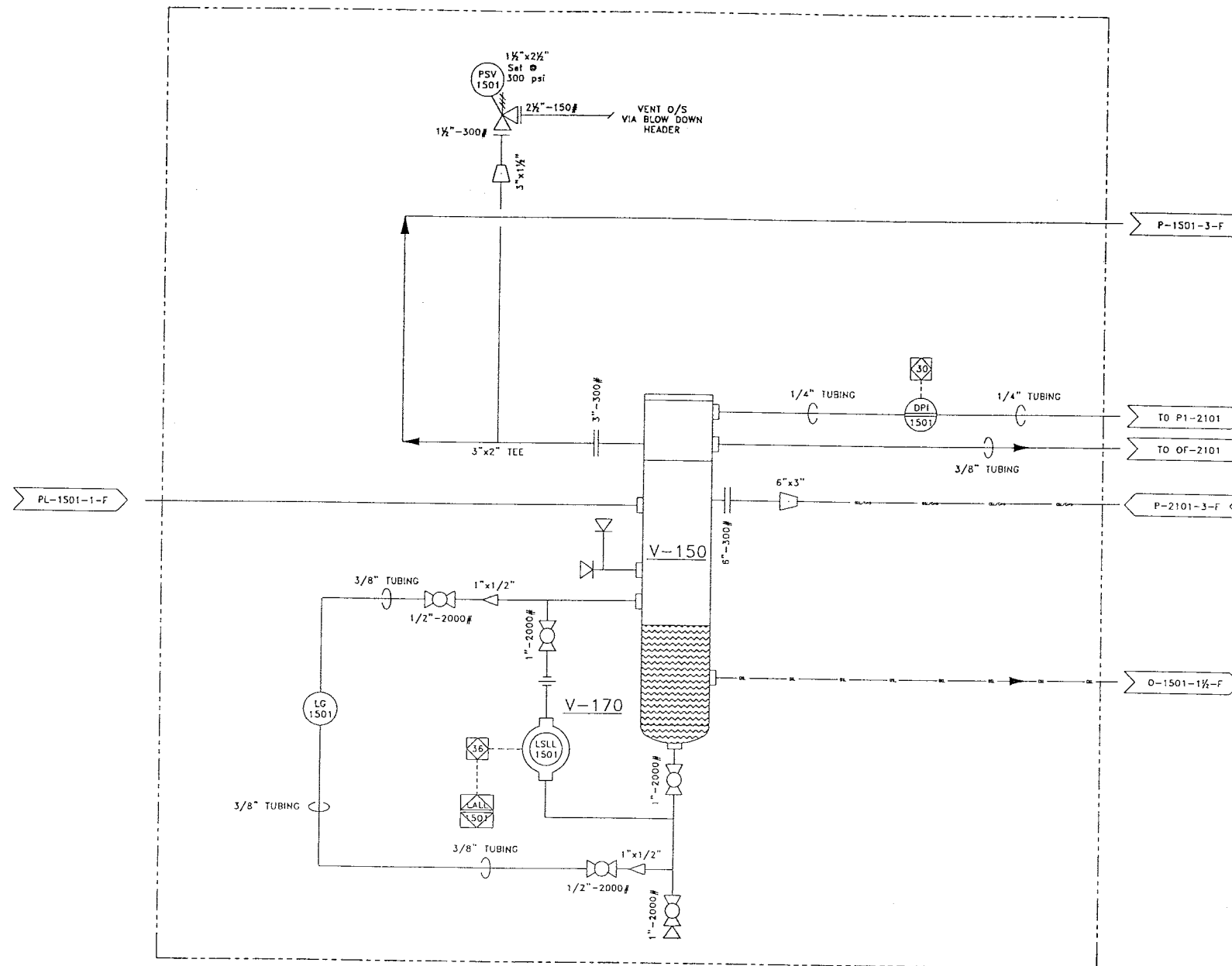
Size: 610mmØ x 1,270mm S/S
(23.26" x 50" S/S)
MAWP: 300psi @ 250°F
Manufacturer: PENFABCO
CRN: L9951.2
Serial: PE7258

V-170
FLOAT CHAMBER

Make: MURPHY
Model: 15-05-0597
MAWP: 2000psi @ 400°F
CRN: OH1476.2

MATERIAL LIST

ITEM	DESCRIPTION	MAKE	MODEL
PSV-1501	PRESSURE SAFETY VALVE, 1½"x2½", SET @ 300 PSI	MERCER	9138G111813S
LG-1501	LEVEL GAUGE	PENBERTHY	IRM-7NQ
LSELL-1501	LEVEL SHUTDOWN LOW LOW	MURPHY	L1200
DPI-1501	DIFFERENTIAL PRESSURE GAUGE	-	-



* SEE DWG JCR-9000-A-01
FOR COMPLETE 9000 P&ID

LINE TYPE	MAIN PROCESS GAS	OIL/GAS COMBINED	UTILITY PROCESS
LEGEND	---	---	---
SKID BOUNDARY	---	---	---
	---	---	---

REV.	DESCRIPTION	BY	APP.	DATE
1	AS BUILT	DGB		01-09-11
0	ISSUED FOR CONSTRUCTION	CRC		01-07-25



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9000 SERIES COMPRESSOR
MYCOM 160VLRD w/ 3306 ATAAC ENGINE
TRAILER MOUNTED, SOUR SERVICE

COMPANY: JIRO COMPRESSION RENTAL		JOB NO.: 9000	
Drawn by: WST	Checked by:	Approved by:	DATE: 00-07-04
SCALE: N.T.S.		DRAWING NO.: JCR-9000-A-03	
REV.: 1			

**V-180
LUBE MANIFOLD**
 Manufacturer: JIRO COMPRESSION
 Size: 2" x 20"
 MAWP: 300psi
 CRN: OH 3945.231
 Serial : ZLP-163

**S-210
SCREW COMPRESSOR**
 MYCOM V-SERIES GAS SCREW
 160VLRD
 max of 80psi SUCTION
 max of 300psi DISCHARGE
 Serial: 1642 550

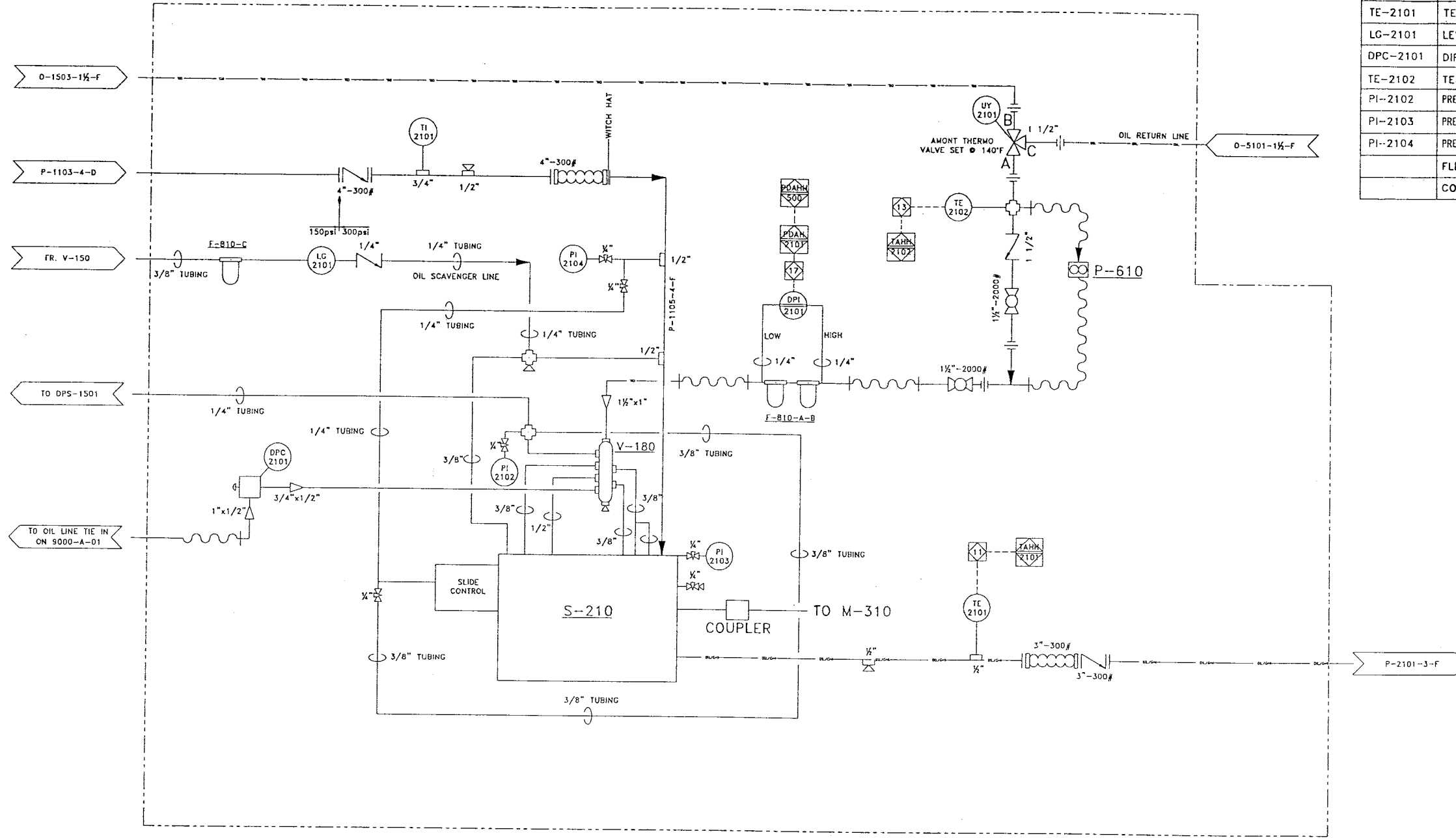
**P-610
PUMP**
 Model: DZ300E19036
 Serial: E097436

**F-810 A B
OIL FILTERS**
 Make: DONALDSON
 Model: HMK25
 Part No: P169984
 Filter : P165569

**F-810 C
OIL FILTER**
 Make: DONALDSON
 Model: HMK05
 Part No: P167294
 Filter : P165569

MATERIAL LIST

ITEM	DESCRIPTION	MAKE	MODEL
TI-2101	TEMPERATURE INDICATOR, 3" FACE, -40 TO 160°F	WESTERN GAUGE	-
UY-2101	THERMOSTATIC VALVE	AMOT	1 1/2BHCT14001
DPI-2101	DIFFERENTIAL PRESSURE INDICATOR, FLUSH MOUNT, 2 1/2"FACE, 0-50 PSI/0-350 kPa	MID-WEST	120AA
TE-2101	TEMPERATURE ELEMENT COMES WITH 4" PYRO	PEACOCK	151000157
LG-2101	LEVEL GAUGE	AC&R	SG 04 500WP
DPC-2101	DIFFERENTIAL PRESSURE CONTROLLER	SUNHYDROLICS	CAD0A00-A2
TE-2102	TEMPERATURE ELEMENT c/w 4' PYROLEAD	PEACOCK	151000157
PI-2102	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-400 PSI/0-2800 kPa	WESTERN GAUGE	SSLF
PI-2103	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-400 PSI/0-2800 kPa	WESTERN GAUGE	SSLF
PI-2104	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-400 PSI/0-2800 kPa	WESTERN GAUGE	SSLF
	FLEX JOINT		1 1/2BHCT15001
	COUPLER	ATRA-FLEX	M3



* SEE DWG JCR-9000-A-01 FOR COMPLETE 9000 P&ID

LINE TYPE LEGEND	MAIN PROCESS GAS	OIL/GAS COMBINED	UTILITY PROCESS
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REV.	DESCRIPTION	BY	APP.	DATE
1	AS BUILT		DOB	01-09-11
0	ISSUED FOR CONSTRUCTION		CRC	01-07-23

Jiro
 5221-46 St. Box 1450, Stettler Alberta T0C 2L0
 JIRO COMPRESSION LTD. an EnSource company
 Phone: 403.742.5538 Fax: 403.742.5539
 CADD Department E-mail cad@jirocompression.com

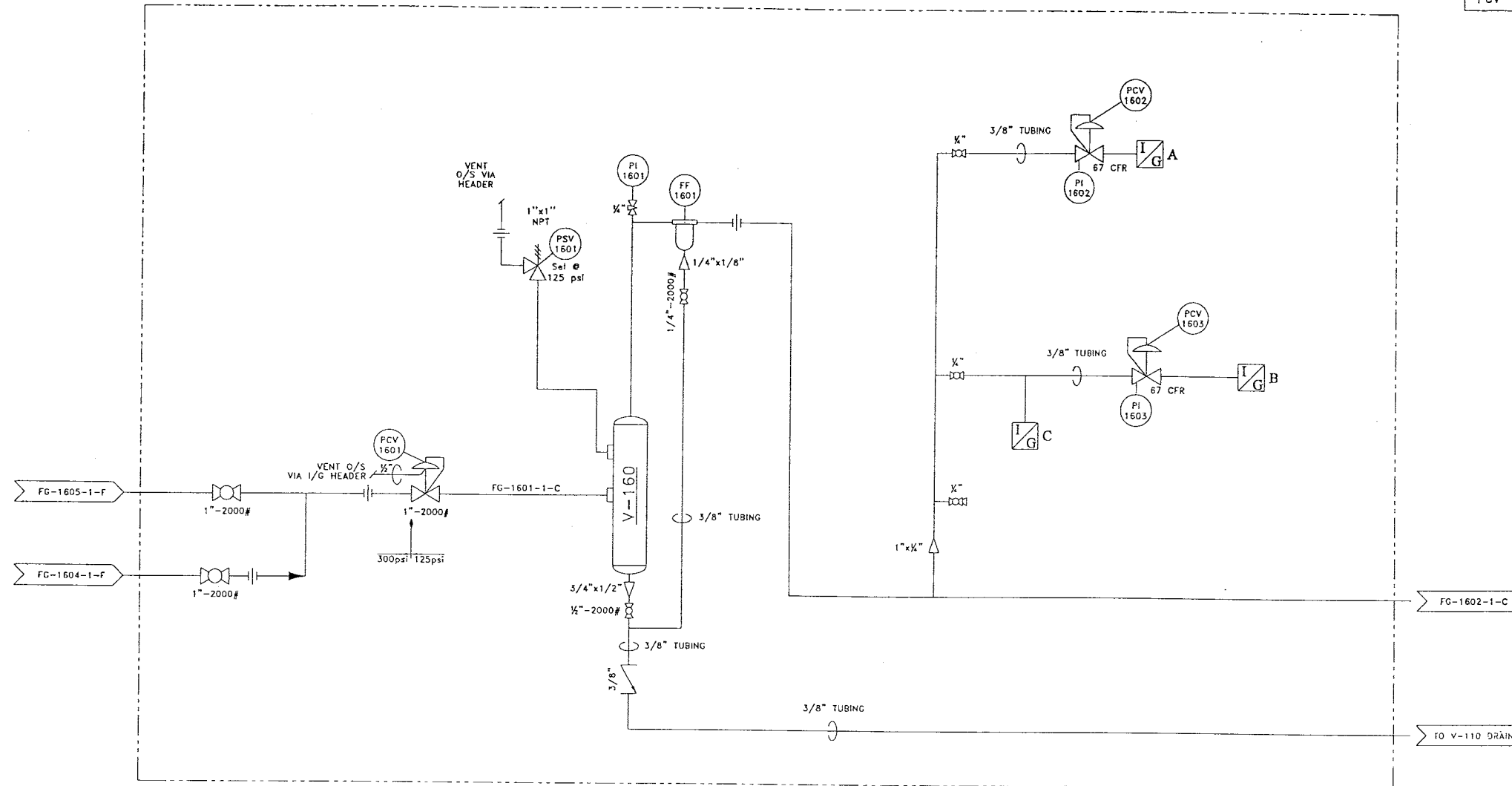
9000 SERIES COMPRESSOR
 MYCOM 160VLRD w/ 3306 ATAC ENGINE
 TRAILER MOUNTED, SOUR SERVICE

COMPANY: JIRO COMPRESSION RENTAL JOB NO.: 9000
 Drawn by: WST Checked by: Approved by: DATE: 00-07-04 SCALE: N.T.S. DRAWING NO.: JCR-9000-A-05 REV.: 1

V-160
FUEL SCRUBBER
 Size: 102mmØ x 914mm S/S
 (4" x 36" S/S)
 Manufacturer: JIRO COMPRESSION
 MAWP: 1440 psi
 CRN: OH3799.231
 Serial: 4DP-386

MATERIAL LIST

ITEM	DESCRIPTION	MAKE	MODEL
PI-1601	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-200 PSI/1400 KPA	WESTERN GAUGE	SSLF
PSV-1601	PRESSURE SAFETY VALVE SET @ 125 PSI	MERCER	9117D511V07E
PCV-1601	PRESSURE CONTROL VALVE SET @ 70-150 PSI, 1/2" PORT	FISHER	627-559
FF-1601	FUEL FILTER, 230PSI/122°F	TECHNOLAB	TLH00129
PI-1602	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-60 PSI/0-400 KPA	WIKA	LF
PCV-1602	PRESSURE CONTROL VALVE SET @ 0-35 PSI	FISHER	67CFR-362
PI-1603	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-60 PSI/0-400 KPA	WIKA	LF
PCV-1603	PRESSURE CONTROL VALVE SET @ 0-35 PSI	FISHER	67CFR-362



* SEE DWG JCR-9000-A-01
 FOR COMPLETE 9000 P&ID

LINE TYPE LEGEND	MAIN PROCESS GAS	OIL/GAS COMBINED	UTILITY PROCESS
SKID BOUNDARY	SECONDARY PROCESS	INSTRUMENTATION	OIL ONLY LINE

REV.	DESCRIPTION	BY	APP.	DATE
1	AS BUILT	DGB		01-09-11
0	ISSUED FOR CONSTRUCTION	CRC		01-07-23



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 Box 1450, Stettler Alberta
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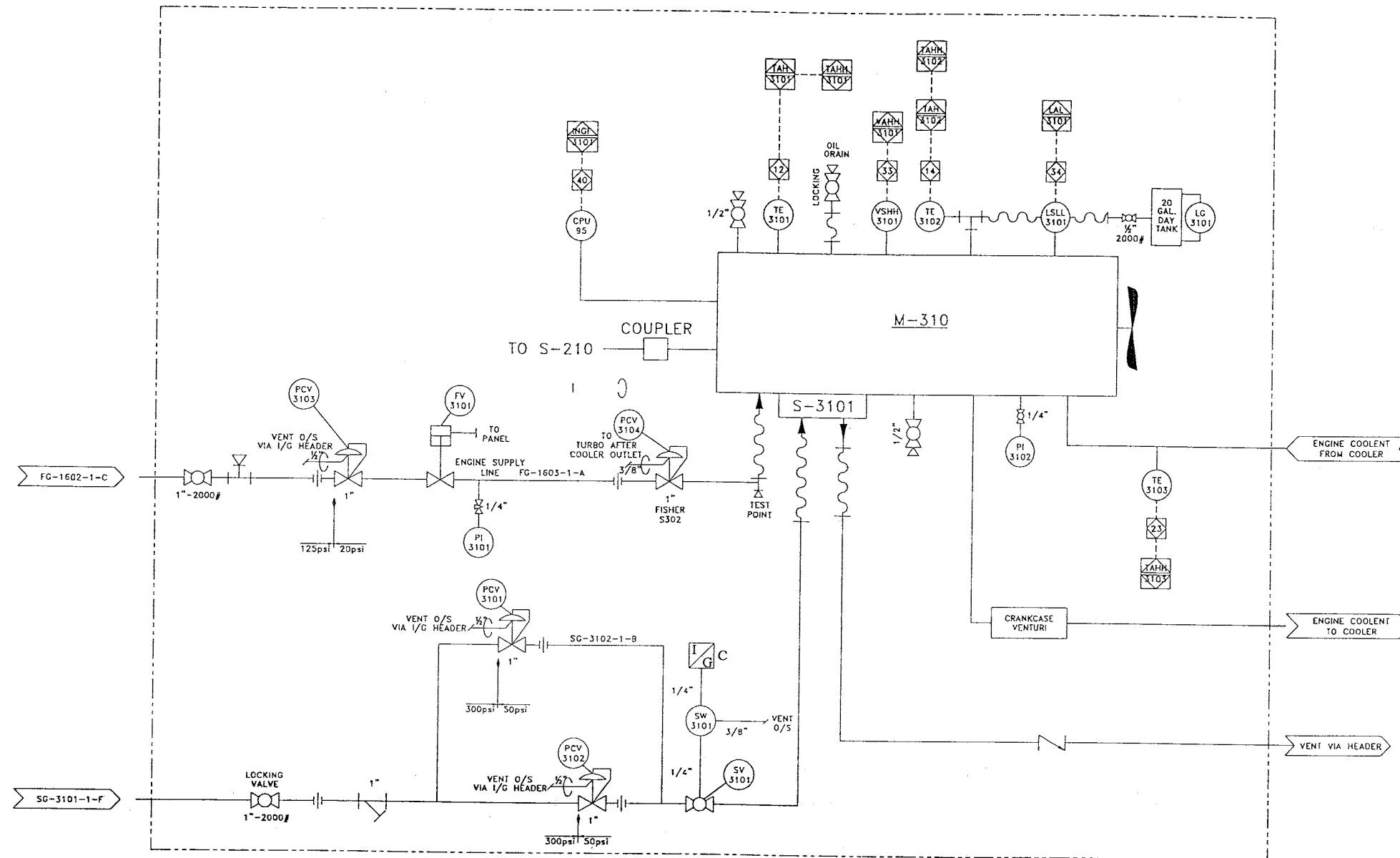
JIRO COMPRESSION LTD.
 an EnSource company

9000 SERIES COMPRESSOR
 MYCOM 160VLRD w/ 3306 ATAC ENGINE
 TRAILER MOUNTED, SOUR SERVICE

COMPANY:		JIRO COMPRESSION RENTAL		JOB NO.: 9000	
Drawn by:	Checked by:	Approved by:	DATE:	SCALE:	DRAWING NO.:
WST			00-07-04	N.T.S.	JCR-9000-A-04
					REV.: 0

**M-310
NATURAL GAS ENGINE**

Manufacturer: CATERPILLAR
Model: 3306ATAAC
220hp
Serial: 07Y8504



MATERIAL LIST

ITEM	DESCRIPTION	MAKE	MODEL
FV-3101	FLOW VALVE	MURPHY	M5081-C
PI-3101	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, 0-60 PSI/0-400 KPA	WIKA	SSLF
PCV-3103	PRESSURE CONTROL VALVE SET @ 5-20 PSIG, 1/2" PORT	FISHER	627-496
PCV-3104	PRESSURE CONTROL VALVE	FISHER	S302
VSHH-3101	VIBRATION SWITCH HIGH HIGH	MURPHY	VS-2
LG-3101	LEVEL GAUGE - 5/8" RED LINE SIGHT GLASS	REDLINE	-
SV-3101	PNEUMATIC START VALVE	TURBOSTART	0010 254
SW-3101	START SWITCH (ON PANEL STAND)	INGERSOLL-RAND	-
LSLL-3101	ENGINE OIL LEVEL SWITCH LOW LOW	KENCO	LCE12
PCV-3101	PRESSURE CONTROL VALVE SET @ 15-40 PSIG, 1/2" PORT	FISHER	627-557
PCV-3102	PRESSURE CONTROL VALVE SET @ 15-40 PSIG, 1/2" PORT	FISHER	627-557
PE-3101	PRESSURE TRANSDUCER	ALTRONIC	691 201-100
PI-3102	PRESSURE INDICATOR 1/4"BTMx2 1/2"FACE, -30 to 30 psi	WESTERN GAUGE	ELITE 250
TE-3101	TEMPERATURE ELEMENT COMES WITH 4" PYRO	PEACOCK	151000157
TE-3102	TEMPERATURE ELEMENT COMES WITH 2" PYRO	PEACOCK	151000156
TE-3103	TEMPERATURE ELEMENT COMES WITH 4" PYRO	PEACOCK	151000157
S-3101	STARTER	TDI TURBOSTART	T30-1

* SEE DWG JCR-9000-A-01
FOR COMPLETE 9000 P&ID

LINE TYPE	LEGEND	MAIN PROCESS GAS	OIL/GAS COMBINED	UTILITY PROCESS
---	SKID BOUNDARY	---	---	---
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REV	DESCRIPTION	BY	APP.	DATE
1	AS BUILT	DCB		01-09-11
0	ISSUED FOR CONSTRUCTION	CRC		01-07-23



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**9000 SERIES COMPRESSOR
MYCOM 160VLRD w/ 3306 ATAAC ENGINE
TRAILER MOUNTED, SOUR SERVICE**

COMPANY:		JIRO COMPRESSION RENTAL		JOB NO.:		9000	
Drawn by:	Checked by:	Approved by:	DATE:	SCALE:	DRAWING NO.:	REV.:	
WST			00-07-04	N.T.S.	JCR-9000-A-06	1	

