

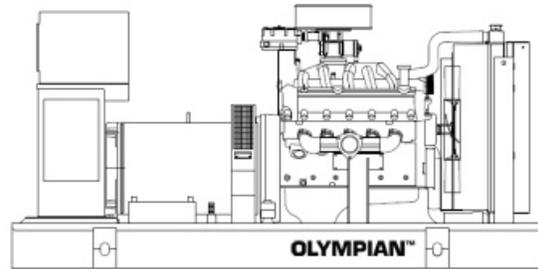
# Technical Note

## Regulator Selection for Stand-by Generator Sets

v.1

Stand-by generators require an extra level of attention when designing fuel piping and selecting a pressure regulator.

Since a generator typically requires elevated pressure it is best that the Local Distribution Company (LDC) supply 2-5 PSIG and let the mechanical contractor install a separate line pressure regulator.



It is important to establish the gas pressure requirements for the generator including minimum and maximum allowable pressures as well as lock up pressure. Because of EPA emissions requirements, many generators require extremely tight pressure control. Normal regulator sizing techniques must be modified because most manufacturers sizing tables are based on 2" w.c. of droop and 3-5" w.c. of lock-up. As an example, some CAT gensets require that the fuel pressure of the generator not deviate more than 2" w.c. from static to full load. This includes pressure losses in the pipe.

In order to meet these requirements, the line pressure regulator should be sized for a minimum of 1.5 to 2 times the actual 100% Fuel Flow requirement for the genset. Effectively "oversizing" the regulator minimizes droop and lock-up associated with spring loaded regulators because the regulator does not need to stroke open as much to meet demand. This holds the pressure closer to the set point from idle to full load

Where multiple gensets are installed, each one should have a dedicated line pressure regulator. Trying to feed multiple gensets from a single regulator can be problematic.

The line pressure regulator should be installed 6-10 Feet from the fuel connection on the genset. The piping downstream of the regulator should be upsized (belled-up) by 1-2 pipe sizes. This creates a "reservoir" for black starts and absorbs line pack when the genset turns off.

Addition piping considerations:

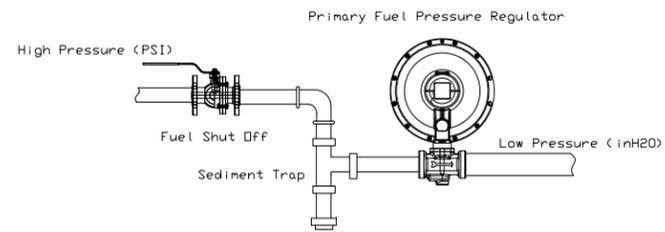
A 1/4" pressure tap should be installed 2-4 feet downstream of the regulator. This permits a pressure gauge to be installed; in the event of regulator instability, this tap can be used to install an external control line. The piping between the regulator and the genset should be straight and unobstructed. The flex hose should be installed perpendicular to the gas inlet with no kinks or bends. Inlet pressure valves should be full port ball valves.

Additional Code requirements:

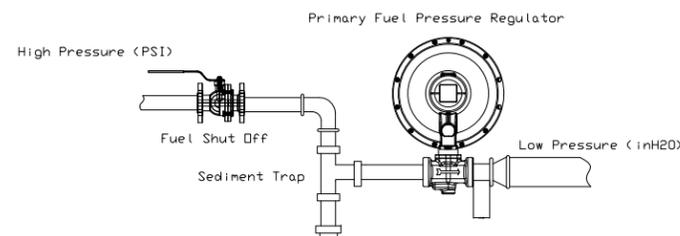
NFPA 110, Emergency and Standby Power, Section 5-9:

NFPA 110 requires the fuel supply line to be connected ahead of the building's main shutoff valve & marked as supplying an emergency generator. The building's main gas valve must be marked to alert first responders/maintenance personnel as to the presence of a separate emergency power supply shutoff valve.

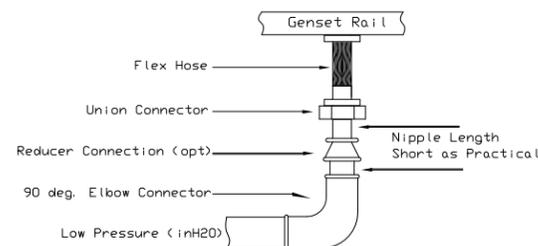
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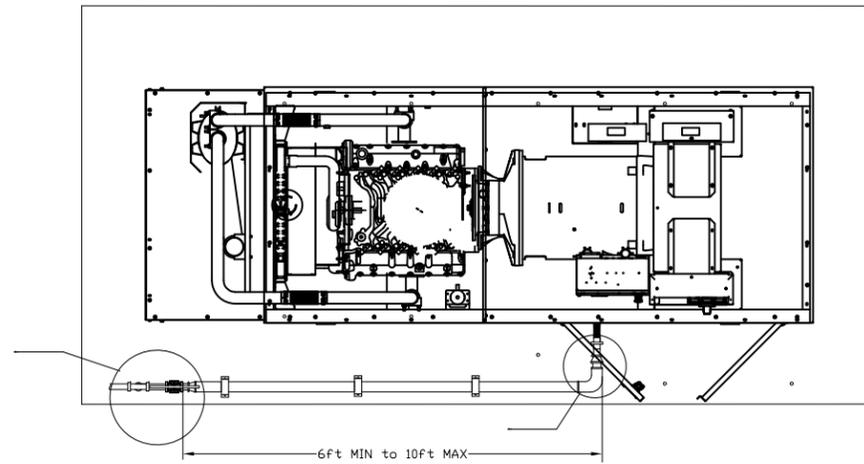
DETAIL A  
Straight Pipe Run



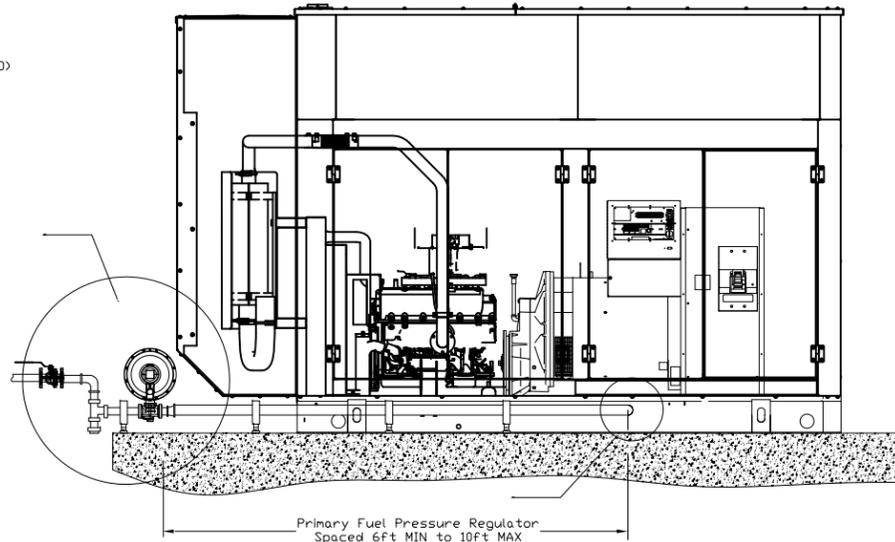
DETAIL A-1  
Bell-Up Pipe Run



DETAIL B  
Flex Hose Connection



TOP VIEW



SIDE VIEW

FUEL SYSTEM REQUIREMENTS

Utility High Pressure Fuel Supply  
2.0 PSI Absolute Minimum.  
15.0 PSI Maximum.  
Note: Optimum pressure, 5 PSI.

Primary Fuel Pressure Regulator  
Commercial/Industrial Rated.

Shall be rated for Engine/Mechanized application.

2.0in Connectors (Inlet & Outlet).

Minimum CFH Rating of 1.5x Greater Than  
the 100 percent Required Fuel Flow  
Rating of the Genset. Calculated using  
a Specific Gravity of 0.65 NG,  
1.6 LPG-V.

6inH2O to 14inH2O Spring Rate.

Orifice Size dependent upon CFH  
Flow Rate requirement of Genset.

Output Pressure to be set at  
13.0inH2O.

Maximum Allowable Pressure Drop  
from a static condition to full  
load, shall not be equal to or  
greater than 2.0inH2O.

Installed 6 to 10ft. from flex hose  
connection, on the same side as the  
flex hose connection.

The Diaphragm case shall be orientated  
in a Vertical Plane.

Flex Hose Connection

The flex hose shall be directly  
connected to the genset inlet connector.

The flex hose shall be installed in a  
straight line perpendicular to the  
generator set rail with no bends or  
kinks.

Sediment Trap and Fuel Shut Off Valve

A sediment trap shall be installed on the high  
pressure side (inlet) of the Primary Fuel  
Pressure Regulator.

A fuel shut off valve shall be installed on  
the high pressure side (inlet) of the Primary  
Fuel Pressure Regulator.

INSTALLATION DRAWING

OLYMPIAN NORTH AMERICA		<b>OLYMPIAN™</b>			
LTA and LG MODEL GAS GENSETS					
NG or LPG-V FUEL TYPES		FILE NAME	073112A.DWG	SIZE	B
SINGLE FUEL SYSTEM LAYOUT		SCALE	NTS	FIRST USE	LTA / LG
ISSUE DATE 08/01/2012		DWG NO.	073112A	REV	A

REVISION HISTORY		
REV	BY	DATE
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<b>MILTON CAT</b>  POWER SYSTEMS DIVISION	Olympian Natural/LP Vapor Gas Fuel Layout Caterpillar	
	ALL DIMENSIONS IN INCHES	DRAWN BY:
	NOT TO SCALE	CHECKED:
	DATE: 6/20/2013	APPROVED: _____
DWG No. XXXXXXXX	SHEET 1 OF 1	