

ENFORCING LIMITS ON DE-RATED NATURAL GAS-FIRED IC ENGINES USED IN OILFIELDS

This protocol describes how Waukesha and Minneapolis Moline gas-fired, carbureted IC engines may be derated and how the derating will be enforced. This protocol applies to permit applications received on or after June 17, 2008 for installing derated engines or derating currently permitted engines. This does not apply to engines de-rated prior to June 17, 2008. Operators may propose another derating method, but any proposed alternate methods must be supported by detailed technical documentation and must be approved by the APCD on a case-by-case basis.

The rated brake horsepower of an engine is defined by District Rule 102 as “*the continuous brake horsepower rating specified for the engine by the manufacturer or listed on the original nameplate of the unit, unless otherwise physically limited and specified by a condition in the engine’s Permit to Operate*”. Engines that were originally rated 50 bhp or greater by the manufacturer but that are subsequently derated are subject to permit. This includes de-rating that occurs by the manufacturer prior to delivery. District Rule 333 applies to any IC engine with a rated brake horsepower of 50 or greater, but the rule exempts derated engines having a maximum allowable and enforceable output rating of less than 50 brake horsepower.

In 1992 the Power Application & Manufacturing Company, which is the authorized Waukesha engine distributor for Southern California, conducted testing on Waukesha and Minneapolis Moline engines to determine the appropriate orifice plate sizes to be used to derate the engines below 50 bhp. Since the majority of derated gas-fired IC engines used in Santa Barbara County were manufactured by either Waukesha Engines or Minneapolis Moline, the testing conducted by PAMCO covered the majority of engine models typically derated. All engines in the tests were natural gas-fired, carbureted engines and all orifice plates used in testing were 10 gauge (1/8 inch thick) mild steel stock with sharp edged circular holes. The maximum horsepower of a given model engine was determined by a dynamometer and then corrected for actual temperature

and pressure to SAE standard J1349. Based on a review of this study, permitted horsepower ratings and orifice plate sizes for derated engines will be established based on the table below:

Make	Model	Derated bhp	Orifice (“ diameter)
Waukesha	F1197G & WAK	49.55	0.877
Waukesha	F817G & 145GZ	67	0.984
Waukesha	F817G & 145GZ	49.46	0.825
Waukesha	F817G & 145GZ	38.39	0.716
Waukesha	F817G & 145GZ	31.95	0.644
Waukesha	F554G, 140GK, 140 GZ	49.48	0.877
Waukesha	VRG330	44.7	0.966
Waukesha	VRG310	47.17	1.002
Waukesha	VRG310	18.23	0.537
Waukesha	195GKU	41.82	1.476
Waukesha	195GKU	19.07	0.644
Waukesha	190GLBU	19.86	0.626
Waukesha	135GZU	47.79	1.029
Waukesha	135GZU	19.5	0.572
Minneapolis Moline	283	19.23	0.537
Minneapolis Moline	336	18.21	0.519
Minneapolis Moline	336	46.34	1.163
Minneapolis Moline	403	19.05	0.501
Minneapolis Moline	425	18.98	0.555
Minneapolis Moline	504	18.64	0.510
Minneapolis Moline	504	48.87	0.836
Minneapolis Moline	605	18.78	0.519
Minneapolis Moline	605	29.77	0.644
Minneapolis Moline	605	39.58	0.760
Minneapolis Moline	800	48	0.760

These orifice diameters and reported brake horsepower ratings shall be used for derated IC engines of the above makes and models. If an operator wishes to derate a different make and model engine, or wishes to derate one of the makes and models listed above to a different brake horsepower, the operator must provide detailed technical documentation supporting the proposed derating method and horsepower rating.

In addition, the following condition will be included in any permit for a derated IC engine equipped with an orifice plate:

- (a) **Derating:** The orifice plate on each derated engine shall not have an orifice greater than the diameter listed in the table below. The orifice plate shall be made from 10 gauge mild steel stock with a sharp edge circular orifice. The orifice plate shall be located between the carburetor and the intake manifold. The orifice plate shall be in place at all times the engine operates. The Permittee shall inspect one quarter of the orifice plates every three months and document the results of each inspection. Each orifice plate must be inspected at least once every twelve months and different orifice plates shall be inspected each quarter until all the orifice plates have been inspected. In addition, the Permittee shall assist District personnel in the measurement and/or inspection of an orifice plate upon request. The Permittee shall replace an orifice plate within thirty (30) calendar days after any inspection if it shows corrosion or degradation that enlarges the specified hole diameter, or if there is any other indication the plate is not properly restricting fuel flow to the engine. The APCD shall be notified in writing each time an orifice plate is replaced.

Derated Engines			
Device ID	Rated bhp	Derated bhp	Orifice Size (" diameter)