

Appendix C—Vertical Single-Acting Specifications

Models 91–691

Equipment Type & Options

Single-acting, vertical, reciprocating piston type vapor compressor
 Single packed rod
 NPT or 300# ANSI connections

Applications

Bulk transfer
 Vapor recovery
 Tank evacuation
 Gas scavenging

Features and Benefits

Self-lubricating piston rings:	Non-lubricated operation to minimize oil in gas
NPT or 300# ANSI connections:	Versatility for your application
Multiple mounting configurations:	Versatility for your application
High efficiency valves:	Quiet, reliable operation
Reversible oil pump:	Allows operation in either direction
Simplified top down design:	Routine maintenance is minimally invasive

Specifications

Specification	Model Number			
	91	291	491	691
Bore of cylinder inches (mm)	3.0 (76.2)	3.0 (76.2)	4.0 (101.6)	4.5 (114.3)
Stroke inches (mm)	2.5 (63.5)	2.5 (63.5)	3.0 (76.2)	4.0 (101.6)
Piston displacement cfm (m ³ /hr)				
minimum @ 400 RPM	4.0 (6.8)	8.0 (13.6) 16.5	17.2 (29.2) 35.5	29.2 (49.6)
maximum @ 825 RPM	8.3 (14.1)	(28.0)	(60.3)	60.2 (102.3)
Maximum working pressure psig (bar g) ¹	335 (23.1)			
Maximum brake horsepower (kW)	7.5 (5.6)	15 (11)	15 (11)	35 (26.1)
Maximum rod load lb (kg)	3,600 (1,632.9)	3,600 (1,632.9)	4,000 (1,814.4)	7,000 (3,175.1)
Maximum outlet temperature °F (°C)	350 (177)			
Bare unit weight lb (kg)	115 (52.2)	160 (72.6)	260 (117.9)	625 (283.5)
Maximum flow—propane gpm (m ³ /hr)	50 (11.4)	101 (22.9)	215 (48.8)	361 (82.0)

¹ These numbers specify pressure-containing abilities of the compressor cylinder and head. For many applications, factors other than the pressure rating will limit the maximum allowable discharge pressure to lower values. These factors include horsepower, temperature and rod load.

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Models 91–691 Material Specifications

Part	Model	Standard Material	Optional Material
Head, Cylinder	All	Ductile iron ASTM A536	None
Crosshead guide crankcase, flywheel, bearing carrier	All	Gray iron ASTM A48, Class 30	None
Flange	691	Ductile iron ASTM A536	Steel weld flange
Valve seat & bumper	91, 291	17-4 PH stainless steel	
	491	Ductile iron ASTM A536	None
	691	17-4 PH stainless steel	
Valve plate	91, 291	410 stainless steel	
	491	17-7 PH stainless steel	None
	691	410 stainless steel	
Valve spring	91, 291, 691	17-7 PH stainless steel	None
	491	Inconel	
Valve gaskets	All	Soft aluminum	Iron-lead, Copper
Piston	All	Gray iron ASTM A48, Class 30	None
Piston rod	All	C1050 steel Nitrotec coated	Chrome oxide
Crosshead	All	Gray iron ASTM 48, Class 30	None
Piston rings	All	PTFE, glass and moly filled	Alloy 50
Ring expanders	All	302 stainless steel	None
Head gasket	All	O-ring, Buna-N	PTFE, Viton ^{®1} , Neoprene ^{®1}
Packing cartridge, connecting rod	All	Ductile iron ASTM A536	None
Packing rings	All	PTFE, glass and moly filled	Alloy 50
Crankshaft	All	Ductile iron ASTM A536	None
Con. rod bearing	All	Bimetal D-2 babbitt	None
Wrist pin	All	C1018 steel	None
Wrist pin busing	All	Bronze SAE 660	None
Main bearing	All	Tapered roller	None
Inspection plate	All	Aluminum	None
O-rings	All	Buna-N	PTFE, Viton ^{®1} , Neoprene ^{®1}
Retainer rings	All	Steel	None
Misc. gaskets	All	Coroprene	None

¹ Registered trademark of the DuPont company.

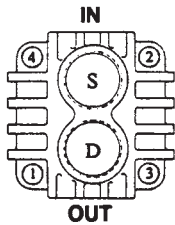
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Bolt Torque Values

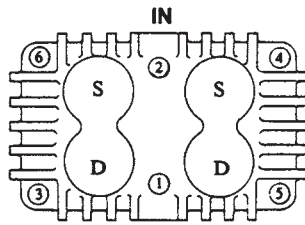
Model	Conn. Rod Bolt ft•lb	Bearing Carrier ft•lb	Bearing Cover ft•lb	Crank-case Inspec Plate ft•lb	X-Head Guide ft•lb	Cyl. to Head (1.2) ft•lb	Valve Cover Plate Bolt ft•lb	Valve Hold-down Screw 2 ft•lb	Piston Lock Nut Torque ft•lb	Piston Screw Torque in•lb	Valve Cap Torque (w/ Gaskets) ft•lb	Valve Cap Torque (w/ O-rings) ft•lb
91	28	38	38	15	30	20	—	40	45	50	40	25
291	28	30	30	13	25	20	—	40	45	50	40	25
491	30	26	35	8	33	33	35	40	45	100	40	25
691	40	40	40	9	40	30	37	40	60	100	40	25

¹ Preliminary tightening – snug all head bolts in the sequence shown. Final torquing – torque all head bolts in the sequence shown to the listed value.

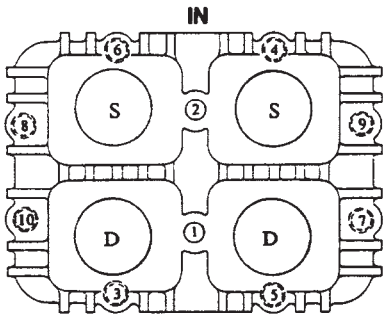
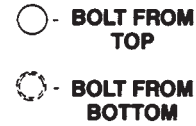
² Retorque to the listed value after 2 – 5 hours running time.



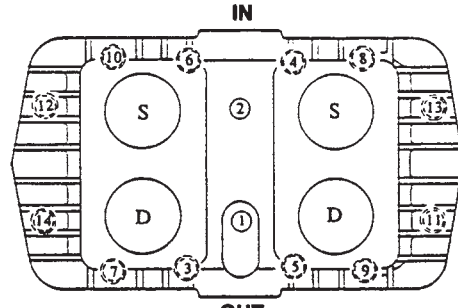
MODEL 91



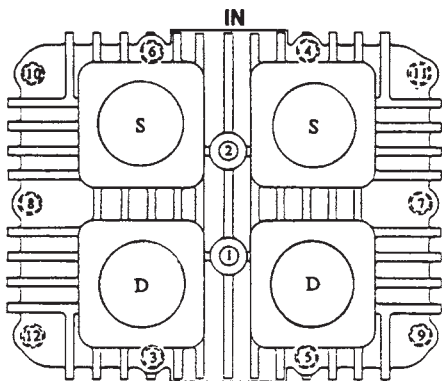
MODELS 290 AND 291



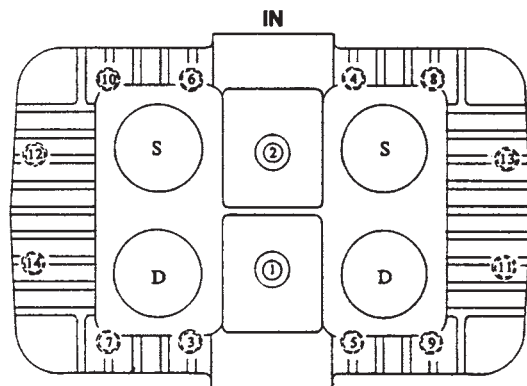
MODEL 490



MODEL 491



MODEL 690



MODEL 691

Appendix C—Vertical Single-Acting Specifications

Clearances and Dimensions

	91	291	491	691/D891 (M crankcase)
**Clearance: “X” piston figure 5.4A & 5.4B	0.020 0.044	0.020 0.044	0.000/0.020 0.024/0.044	0.000/0.015 0.012/0.027
Clearance: connecting rod bearing to crankshaft journal	0.0005 0.0025	0.0005 0.0025	0.0005 0.0025	0.0019 0.0035
Clearance: wrist pin to wrist pin bushing* (max)	0.0009	0.0009	0.0009	0.0020
Cylinder bore diameter (max)	3.009	3.009	4.011	4.515
Cylinder finish (RMS)	16-32	16-32	16-32	16-32
Piston ring radial thickness (min)	0.082	0.082	0.082	0.082
Clearance: oil pump adapter shaft to bushing* (max)	0.0050	0.0050	0.0050	0.0050
Crankshaft end play (cold)	0.000 0.002	0.000 0.002	0.000 0.002	0.002 0.003
Flywheel runout at O.D. (max)	0.020	0.020	0.020	0.020
Clearance: crosshead to crosshead guide bore (max)	0.011	0.011	0.012	0.013
Crosshead guide bore finish	32 RMS (limited number of small pits and scratches are acceptable)			

* Dimensions for honing are included with new bushings (which must be installed, then honed).

** Clearance should be set with machine cold.