

GENERAL INFORMATION

101J
compressor
train

GENERAL DESCRIPTION - The equipment furnished and covered in this manual consists of a Transamerica Delaval turbine driven air compressor train. The train consists of a driving turbine, a first body compressor, a second body compressor, and three intercoolers. The turbine and compressors are mounted on a common fabricated bedplate. The compressor train is equipped with control and lube oil systems and with accessories necessary for the safe and efficient operation of the unit.

The Unit Outline drawing in the last section shows the general arrangement of the equipment, component weights and the connections to be made to the unit.

DESIGN DATA - The design data of the compressor train is shown below and on the Expected Performance Curve in Section 9.

Turbine #100426

Make	Transamerica Delaval
Type	HJ
Number of Stages	8
Rated KW (BHP)	12620 (16929)
Rated Speed, RPM	7980
Maximum Continuous Speed, RPM	8379
Tripping Speed, RPM	9049-9217
Normal Inlet Pressure, PSIG (kg/cm ²)	565 (39.7)
Normal Inlet Temperature, °F (°C)	700 (371)
Maximum Inlet Pressure, PSIG (kg/cm ²)	635 (44.7)
Exhaust Pressure, in. HgA (kg/cm ²)	4 (0.137)
Maximum Exhaust Pressure, PSIG (kg/cm ² G)	15 (1.05)
Casing Sentinel Valve Setting, PSIG (kg/cm ²)	5 (0.35)
Steam Seal Relief Valve Setting, PSIG (kg/cm ²)	15 (1.05)
*Rotor Response Speed, RPM	4200

First Body Compressor #100427

Make	Transamerica Delaval
Type	5CDK44
Number of Stages	5
Design Speed, RPM	7,900
Rotation	Clockwise
Gas Handled	Air
Molecular Wt.	28.53
Relative Humidity, %	50
Ratio of Specific Heats, C _p /C _v	1.395
Flow, M ³ /Hr (CFM)	77,293
Rating, KW (BHP)	4,827 (6470)

*See CAUTION on Page GI-2

GENERAL INFORMATION



Second Body Compressor #100425

Make	Transamerica Delaval
Type	9CK37
Number of Stages	9
Speed, RPM	7,910
Rotation	Clockwise
Gas Handled	Air
Molecular Wt.	28.77
Ratio of Specific Heats, C_p/C_v	1.395
Flow, M^3/hr (CFM)	14,244 (8,383)
Rating, KW (BHP)	6,046 (8,105)

CAUTION

CARE SHOULD BE EXERCISED WHEN THE TURBINE IS OPERATING IN CRITICAL SPEEDS. SHAFT VIBRATIONS SHOULD BE LIMITED TO THE VALUES SPECIFIED AS "MAXIMUM SAFE CONTINUOUS OPERATING LEVEL" (See Operation Section, Page VL-3). IF THIS LEVEL IS EXCEEDED, SPEEDS SHOULD BE CHANGED TO VALUES AT LEAST 10% REMOVED FROM CRITICALS.

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6/82

RECOMMENDED SPARE PARTS

Transamerica Delaval turbines are special purpose machines, built in small quantities to meet the particular requirements of the customer and to meet individual performance characteristics. For this reason, it is not practical for the manufacturer to maintain a complete stock of spare parts. It is, therefore, recommended that the user keep the following spare parts on hand to meet emergencies and minimize down time.

<u>MAXIMUM</u>	<u>MINIMUM</u>
Journal Bearings	Journal Bearings
Thrust Shoes	Thrust Shoes
Shaft Packing	Shaft Packing
Diaphragm Packing	Diaphragm Packing
Turbine Rotor	Governor Wearing Parts
High Speed Coupling	Oil Guards (Rotor)
Nozzle Ring	
Guide Bucket Ring	
Diaphragms	
Governor Wearing Parts	
Oil Guards (Rotor)	

If spares have not already been ordered, a quotation for these parts can be obtained from any Transamerica Delaval sales office or by writing directly to:

Transamerica Delaval Inc.
Turbine/Compressor Div.
P.O. Box 8788
Trenton, New Jersey 08650
Attn: Product Service Dept.

RECOMMENDED SPARE PARTS

Centrifugal compressors are special purpose machines incorporating many diverse design features to meet the particular requirements of individual applications. For this reason, it is not practical for the manufacturer to maintain a complete stock of spare parts. It is, therefore, recommended that the user keep the following spare parts on hand to meet emergencies and to minimize down time.

- One (1) complete set, radial bearings
- One (1) set, thrust bearing shoes and collar
- One (1) complete set, impeller labyrinths
- One (1) complete set, diaphragm bushings
- One (1) complete set, balance drum labyrinths
- One (1) complete set, oil guards
- One (1) complete set, shaft seal labyrinths
- One (1) complete set, mechanical seals or carbon rings (where applicable)
- Two (2) complete sets, "O" rings (where applicable)
- One (1) spare coupling
- One (1) spare rotating element
- One (1) complete set, control device wearing parts, such as valve diaphragms, springs, packing, etc., as required for the specific application.

If spares have not already been ordered, a quotation for these parts can be obtained from any Transamerica Delaval sales office or by writing directly to:

Transamerica Delaval Inc.
Turbine/Compressor Div.
P.O. Box 8788
Trenton, New Jersey 08650

ORDERING INSTRUCTIONS

All correspondence pertaining to renewal parts for the equipment must refer to the instruction book number and should be addressed to the nearest TRANSAMERICA DELAVAL representative. See reverse side of page for addresses of sales offices.

The handling of renewal orders will be greatly facilitated if the following directions are carefully observed.

- (1). Give the number of the instruction book.
- (2). Give the serial number of machine for which part is desired. This number appears on the nameplate.
- (3). Designate the desired part by the number and name as listed in this instruction book.
- (4). Give the drawing number or figure number in which the part is shown. (In the event the part is called out on an unnumbered sketch - the page number on which the sketch appears should be used in lieu of the drawing number as the reference.)

For Example:

Instruction Book No. 2144
Serial Number. 706154
Part Number and Name. 49, Valve
Drawing Number (see item 4 above). G-15817

CONVERSION TABLES: METRIC SYSTEM

To convert	Multiply by	To obtain	To convert	Multiply by	To obtain
Units of Length					
mm	0.03937	in.	in.	25.40	mm
cm	0.3937	in.	in.	2.540	cm
meters	39.37	in.	in.	0.0254	meters
meters	3.281	ft	ft	0.3048	meters
meters	1.0936	yd	ft	0.0003048	meters
km	3.281	ft	yd	0.9144	km
km	1,093.6	yd	yd	0.0009144	meters
km	0.6214	miles	miles	1.609	km
microns	0.00003937	in.	in.	25,400	microns
Units of Area					
sq mm	0.00155	sq in.	sq in.	645.2	sq mm
sq cm	0.155	sq in.	sq in.	6.452	sq cm
sq meters	10.764	sq ft	sq ft	0.09290	sq meters
sq meters	1.196	sq yd	sq yd	0.8361	sq meters
sq km	0.3861	sq miles	sq miles	2.590	sq km
hectares	2.471	acres	acres	0.4047	hectares
Units of Volume					
cu cm	0.06102	cu in.	cu in.	16.39	cu cm
cu cm	0.03381	fl oz	cu in.	0.01639	liters
cu meters	35.31	cu ft	cu ft	0.02832	cu meters
cu meters	1.308	cu yd	cu ft	28.317	liters
cu meters	264.2	US gal	cu yd	0.7646	cu meters
liters	61.02	cu in.	fl oz	29.58	cu cm
liters	0.03531	cu ft	US gal	0.003786	cu meters
liters	0.2642	US gal	US gal	3.786	liters
Units of Weight					
grams	15.43	grains	grains	0.0648	grams
grams	0.0353	oz	oz	28.350	grams
kg	35.27	oz	oz	0.02835	kg
kg	2.2046	lb	lb	0.4536	kg
kg	0.001102	US tons	lb	0.000454	tonnes
tonnes	2,204.6	lb	US tons	907.2	kg
tonnes	1.1023	US tons	US tons	0.9072	tonnes
Unit Weight and Pressure					
gr/sq cm	0.01422	psi	lb/ft	1.4881	kg/m
gr/cu cm	0.0361	lb/cu in.	psi	70.31	gr/sq cm
kg/sq cm	14.22	psi	psi	0.07031	kg/sq cm
kg/cu m	0.0624	lb/cu ft	psi	0.7042	meters water
kg/m	0.6720	lb/ft	psi	0.7042/sp gr	meters
meters water	1.42	psi	lb/cu in.	27.68	(any liq.)
meters					gr/cu cm
(any liq.)	1.42 x sp gr	psi	lb/cu ft	16.018	kg/cu m
mm mercury	0.001316	atm	atm	760	mm mercury

CONVERSION TABLES: METRIC SYSTEM (Continued)

To convert	Multiply by	To obtain	To convert	Multiply by	To obtain
Volume—Flow Rates					
liters/sec	15.85	US gpm	US gpm	0.0631	liters/sec
liters/min	0.2642	US gpm	US gpm	227.1	liters/hr
liters/min	0.03531	cfm	US gpm	3.785	liters/min
liters/hr	0.0044	US gpm	US gpm	0.003786	cu m/min
cu m/min	35.314	cfm	US gpm	0.2271	cu m/hr
cu m/min	264.17	US gpm	cfm	28.317	liters/min
cu m/hr	0.5883	cfm	cfm	0.02832	cu m/min
cu m/hr	4.4028	US gpm	cfm	1.6992	cu m/hr
Units of Power					
watts	0.7376	ft-lb/sec	ft-lb/sec	1.356	watts
watts	0.001341	hp	hp	745.7	watts
kw	1.3410	hp	hp	0.7457	kw
cheval-vap	0.9863	hp	hp	1.0139	cheval-vap
Units of Heat and Energy					
gr-cal	0.003969	Btu	Btu	252	gr-cal
kg-cal	3.9693	Btu	Btu	0.252	kg-cal
kg-cal/kg	1.800	Btu/lb	Btu/lb	0.5556	kg-cal/kg
gr-cal/sq cm	3.687	Btu/sq ft	Btu/sq ft	0.2713	gr-cal/sq cm
kg-cal/cu m	0.1124	Btu/cu ft	Btu/cu ft	8.896	kg-cal/cu m
joule	0.7376	ft-lb	ft-lb	1.356	joule
meter-kg	7.2330	ft-lb	ft-lb	0.1383	meter kg
gr-cal	3.087	ft-lb	ft-lb	0.3239	gr-cal
kg-cal	3.087	ft-lb	ft-lb	0.000324	kg-cal
hp-hr	1,980,000	ft-lb	ft-lb	0.00000505	hp-hr
kwhr	2,655,000	ft-lb	ft-lb	0.00000377	kwhr
Btu	778.3	ft-lb	ft-lb	0.001285	Btu

TEMPERATURE CONVERSION TABLE

Degrees Fahrenheit to Degrees Centigrade: $^{\circ}\text{F} = \frac{9}{5}^{\circ}\text{C} + 32^{\circ}$ $^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32^{\circ})$

F	C	F	C	F	C	F	C	F	C	F	C
-40	-40.00	+30	-1.11	+80	+26.67	+250	+121.11	+500	+260.00	+900	+482.22
-38	-38.89	31	-0.56	81	27.22	255	123.89	505	262.78	910	487.78
-36	-37.78	32	0.00	82	27.78	260	126.67	510	265.56	920	493.33
-34	-36.67	33	+0.56	83	28.33	265	129.44	515	268.33	930	498.89
-32	-35.56	34	1.11	84	28.89	270	132.22	520	271.11	940	504.44
-30	-34.44	35	1.67	85	29.44	275	135.00	525	273.89	950	510.00
-28	-33.33	36	2.22	86	30.00	280	137.78	530	276.67	960	515.56
-26	-32.22	37	2.78	87	30.56	285	140.55	535	279.44	970	521.11
-24	-31.11	38	3.33	88	31.11	290	143.33	540	282.22	980	526.67
-22	-30.00	39	3.89	89	31.67	295	146.11	545	285.00	990	532.22
-20	-28.89	40	4.44	90	32.22	300	148.89	550	287.78	1000	537.78
-18	-27.78	41	5.00	91	32.78	305	151.67	555	290.55	1050	565.56
-16	-26.67	42	5.56	92	33.33	310	154.44	560	293.33	1100	593.33
-14	-25.56	43	6.11	93	33.89	315	157.22	565	296.11	1150	621.11
-12	-24.44	44	6.67	94	34.44	320	160.00	570	298.89	1200	648.89
-10	-23.33	45	7.22	95	35.00	325	162.78	575	301.67	1250	676.67
-8	-22.22	46	7.78	96	35.56	330	165.56	580	304.44	1300	704.44
-6	-21.11	47	8.33	97	36.11	335	168.33	585	307.22	1350	732.22
-4	-20.00	48	8.89	98	36.67	340	171.11	590	310.00	1400	760.00
-2	-18.89	49	9.44	99	37.22	345	173.89	595	312.78	1450	787.78
0	-17.78	50	10.00	100	37.78	350	176.67	600	315.56	1500	815.56
+1	-17.22	51	10.56	105	40.55	355	179.44	610	321.11	1550	843.33
2	-16.67	52	11.11	110	43.33	360	182.22	620	326.67	1600	871.11
3	-16.11	53	11.67	115	46.11	365	185.00	630	332.22	1650	898.89
4	-15.56	54	12.22	120	48.89	370	187.78	640	337.78	1700	926.67
5	-15.00	55	12.78	125	51.67	375	190.55	650	343.33	1750	954.44
6	-14.44	56	13.33	130	54.44	380	193.33	660	348.89	1800	982.22
7	-13.89	57	13.89	135	57.22	385	196.11	670	354.44	1850	1010.00
8	-13.33	58	14.44	140	60.00	390	198.89	680	360.00	1900	1037.78
9	-12.78	59	15.00	145	62.78	395	201.67	690	365.56	1950	1065.56
10	-12.22	60	15.56	150	65.56	400	204.44	700	371.11	2000	1093.33
11	-11.67	61	16.11	155	68.33	405	207.22	710	376.67	2050	1121.11
12	-11.11	62	16.67	160	71.11	410	210.00	720	382.22	2100	1148.89
13	-10.56	63	17.22	165	73.89	415	212.78	730	387.78	2150	1176.67
14	-10.00	64	17.78	170	76.67	420	215.56	740	393.33	2200	1204.44
15	-9.44	65	18.33	175	79.44	425	218.33	750	398.89	2250	1232.22
16	-8.89	66	18.89	180	82.22	430	221.11	760	404.44	2300	1260.00
17	-8.33	67	19.44	185	85.00	435	223.89	770	410.00	2350	1287.78
18	-7.78	68	20.00	190	87.78	440	226.67	780	415.56	2400	1315.56
19	-7.22	69	20.56	195	90.55	445	229.44	790	421.11	2450	1343.33
20	-6.67	70	21.11	200	93.33	450	232.22	800	426.67	2500	1371.11
21	-6.11	71	21.67	205	96.11	455	235.00	810	432.22	2550	1398.89
22	-5.56	72	22.22	210	98.89	460	237.78	820	437.78	2600	1426.67
23	-5.00	73	22.78	215	101.67	465	240.55	830	443.33	2650	1454.44
24	-4.44	74	23.33	220	104.44	470	243.33	840	448.89	2700	1482.22
25	-3.89	75	23.89	225	107.22	475	246.11	850	454.44	2750	1510.00
26	-3.33	76	24.44	230	110.00	480	248.89	860	460.00	2800	1537.78
27	-2.78	77	25.00	235	112.78	485	251.67	870	465.56	2850	1565.56
28	-2.22	78	25.56	240	115.56	490	254.44	880	471.11	2900	1593.33
29	-1.67	79	26.11	245	118.33	495	257.22	890	476.67	2950	1621.11