

# PENNSYLVANIA RAILROAD

## LINES EAST OF PITTSBURGH

### Locomotive Maintenance Instruction No. L-13

ISSUED ALTOONA, PA.  
JUNE 1, 1914

### REPAIRING AND TESTING LOCOMOTIVE AIR COMPRESSORS

In order to establish a uniform practice at our various shops in reboring air and steam cylinders of the 9½" air compressor and the 8½" cross-compound compressor, also a uniform method for testing, the following instructions must be followed:

The calibre of the air and steam cylinders should be determined, and if worn ¼ of an inch or more, must be rebored. When cylinders have been rebored to the sizes given in the following table, new piston heads and rings of increased diameter must be applied.

KIND OF PUMP.	CYLINDERS TO BE REBORED.	DIAMETER WHEN NEW. INCHES.	DIAMETER AFTER FIRST REBORE. INCHES.	DIAMETER AFTER SECOND OR FINAL REBORE. INCHES.
9½"	Steam Cylinder	9½	9⅝	9¾
9½"	Air Cylinder	9½	9⅝	9¾
8½" C. C.	High Pressure Steam Cylinder	8½	8⅝	8¾
8½" C. C.	Low Pressure Air Cylinder	14½	14⅝	14¾
8½" C. C.	Low Pressure Steam Cylinder	14½	14⅝	14¾
8½" C. C.	High Pressure Air Cylinder	9	9⅝	9¾

On the final reboring of the cylinders to 9¾", the counterbore at the ends of the cylinders should not exceed 9⅛", especially for the steam cylinder where the margin is small for making a tight joint between the steam ports and the bore of the cylinder. To insure making a steam tight joint at this point for the top head, the face of the cylinder should be turned off to insure a perfectly uniform surface for the top head gasket.

When piston heads of larger diameter are applied to a compressor, the size to which the cylinder has been bored must be stenciled with ⅜" letters on the top of the steam piston head and the bottom of the air piston head so that it will be visible on the removal of the top head of the steam cylinder or the bottom head of the air cylinder. This same information must also be stenciled on the top of the upper right hand bolting lug on the cylinder which has been rebored.

From the above it must be understood that this information is only to be placed on the piston head and bolting lugs of the cylinder which has been rebored.

All compressors after being repaired and before being placed in service must be tested on a special rack designed for the purpose as shown on tracings Nos. 46919 and 46920, in accordance with the following instructions:

After the compressor is placed on the testing rack, the steam and air end must be well lubricated and the compressor run continuously for 3 hours, in order that the various new parts may find a bearing before the test is conducted. Before making the test of the compressor, the main reservoir and its connections should be tested by stopping the compressor after reaching a predetermined air pressure, say 100 lbs., and note the amount of leakage, which must be less than 2 lbs. per minute.

For determining the condition of the air end of the compressor, a disc with an orifice suitable for the type of compressor to be tested as given in the table below should be inserted in pipe leading from main reservoir to atmosphere as shown on tracings Nos. 46919 and 46920. The compressor to be tested should then be started and the steam supply throttled to make the specified number of strokes per minute, and when the pressure in the main reservoir has been raised to *within 10 lbs. of that specified*, the cock holding the disc should be opened to the atmosphere. The compressor being tested must raise the pressure in the reservoir with the disc valve open to that shown in the table with the specified number of strokes per minute.

#### TEST SPECIFICATIONS FOR AIR END OF COMPRESSORS.

TYPE OF COMPRESSOR.	BOILER PRESSURE NOT LESS THAN	SPEED OF PUMP, SINGLE STROKES PER MINUTE.	AIR PRESSURE TO BE MAINTAINED IN MAIN RESERVOIR.	DIAMETER OF ORIFICE.
9½"	100 lbs.	120	59 lbs.	⅜"
8½" C. C.	130 lbs.	100	53 lbs.	⅜"

#### TEST OF STEAM END OF COMPRESSOR.

The compressor steam throttle should be opened wide and the main reservoir pressure should be regulated by the cock in the main reservoir leading to the atmosphere, until the pressure in the reservoir agrees with that shown in the following table, corresponding to the compressor under test. When these conditions have been established, the steam pressure and compressor speed in single strokes per minute should be observed and compared with that shown in the following table, which represents what the performance of the compressor must be if the steam end is in good average condition.

In testing steam end of compressor, main reservoir pressure must be regulated to 59 lbs. for 9½" compressor and 53 lbs. for 8½" cross-compound compressor. Under these conditions the speed of the compressor must not be less than the number of single strokes shown in the following table for the given steam pressure:

POUNDS STEAM PRESSURE.	SINGLE STROKES PER MINUTE.	
	9½"	8½" C. C.
100	150	50
110	160	74
120	170	100
130	180	120
140	188	134
150	192	146
160	200	158
170	204	166
180	208	174
190	212	178
200	216	182

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Gauges for Checking Air Compressor Parts and Where Used.

In order to establish a uniform practice of reclaiming air compressor parts, the following gauges have been designed. The introduction of these gauges is necessary when the process system of repairing air compressors is followed.

Gauge No.	Tracing No.	Where Used
1	---	Standard inside micrometers for determining the wear of steam and air cylinders.
11	---	Standard outside micrometers for determining the wear of piston rods.
22	---	Standard feeler gauge used for checking the tolerance between packing ring and ring groove.
20	E-60535	Gauge for checking reversing valve stems, $8\frac{1}{2}$ " cross compound compressors.
23	(E-89822 (E-89823	Ring gauge used for selecting the proper size air valves, $8\frac{1}{2}$ " cross compound compressors.
24	(E-89822 (E-89823	Plug gauges used for selecting the proper size air valve cages and seats, $8\frac{1}{2}$ " cross compound compressors.
2	F-89233	Gauge for determining lift of upper inlet and discharge valves, $8\frac{1}{2}$ " cross compound compressors.

Gauge No.	Tracing No.	Where Used
21	F-89231	Condemning and checking gauge for air valves, seats and cages, 8½" cross compound compressors.

In order to properly protect the gauges when not in use and have them located convenient for the Inspector checking the various parts, a case has been designed, as shown on standard tracing F-90778.

It will be the duty of the Inspector to see that the gauges are properly handled and cared for, and are kept in the case when not in use.

The Shop Foreman and Inspector will be jointly responsible for the condition of these gauges, to know that they are in accordance with the standard tracings above referred to.

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