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सत्यमेवजयते

भारतसरकार–रेलमंत्रालय
अनुसंधानअभिकल्पऔरमानकसंगठन
लखनऊ– 226011
Government of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011

No. EL/3.2.19/1

Dated 22.09.2017

Chief Electrical Engineer,

1. Central Railway, Mumbai CST-400 001.
2. Northern Railway, Baroda House, New Delhi-110001.
3. North Central Railway, Subedarganj, Allahabad- 211001
4. North Eastern Railway, Gorakhpur-273 001
5. Eastern Railway, Fairlie Place, Kolkata -700 001.
6. East Central Railway, Hazipur-844101.
7. East Coast Railway, Chandrashekharpur, Bhubaneshwar-751016.
8. Southern Railway, Park Town, Chennai-600 003.
9. South Central Railway, Secunderabad-500 371.
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11. South East Central Railway, Bilaspur-495004
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14. Chittaranjan Locomotive Works, Chittaranjan-713331 (WB)

TECHNICAL CIRCULAR NO. RDSO/2017/EL/TC/0139/Rev. '0' Dated 22.09.2017

SUB: Procedure for Dew Point Depression temperature measurement of compressed air passing through heat less regenerative twin tower type air dryer being used in electric locomotives.

Ref: 1. Railway Board vide letter no. 2017/Elect (TRS)/138/5 dated 31.08.2017(38th MSG decision).
2. Special Maintenance Instruction No. RDSO/2017/EL/SMI/0305 Rev '0', Dated 17.04.2017.
3. Technical Circular NO. RDSO/2011/EL/TC/0108, Rev.'0', Dated 07.03.2011

1.0 OBJECT:

1.1 Zonal Railways have expressed difficulty in conducting tests to check quality of dry air from heat less regenerative twin tower type air dryer which is being used to remove the moisture from the compressed air in electric locomotives.

1.2 The issue of Dew Point Depression measurement was discussed during 38th MSG, consequently Railway Board advised RDSO to study the practice of Dew Point Depression measurement by recording dry bulb & wet bulb temperature as suggested by ELS/TATA/SER and to issue the guidelines. This avoids procurement of separate dew point meters.
(Under "Other important issues" at serial no.9in the letter atabovereference-1).

2.0 Description:

The arrangement made by ELS/TATA was studied and procedure given below may be followed:-

2.1 Install the test setup as shown in Annexure-A, using two nos. of mercury bulb thermometer provided in two chambers made up of insulated material sheet on the test bench for air dryer.

2.2 One chamber with thermometer should be kept dry and readings of this thermometer will be called dry bulb temperature (Tdb). The other chamber should be provided with some water and cotton waste soaked with water and wrapped around the thermometer bulb. The readings of this thermometer will be called wet bulb temperature (Twb).

2.3 These two chambers are to be connected as shown in the schematic diagram (under Annexure-A) of test bench. Pressure reducing valve (PRV) with gauge (eg SMGR reducing valve of conventional locos) should be adjusted to provide pressure of 0.2 Kg/cm^2. This pressure value should be ensured by closing the outlet of PRV by hand.

2.4 Inlet air dew point temperature (T1):

2.4.1 To find Inlet air dew point temperature open cock A1 and keep cock A2 in closed position. Allow the air from PRV to flow into the dry bulb and wet bulb chambers for 15 minutes to get stable readings. Take readings of Tdb&Twb.

2.4.2 Calculate the inlet air wet bulb depression as (Tdb-Twb). Now by using the table as shown in Annexure-B, find the inlet dew point temperature value corresponding to inlet air dry bulb temperature (Tdb) and inlet air wet bulb depression (Tdb-Twb).

2.5 Outlet air dew point temperature (T2):

2.5.1 To find outlet air dew point temperature open cock A2 and keep cock A1 in closed position. Allow the air from PRV to flow into the dry bulb and wet bulb chambers for 15 minutes to get the stable readings. Take readings of Tdb &Twb.

2.5.2 Calculate the outlet air wet bulb depression as (Tdb-Twb). Now by using the table as shown in Annexure-B, find the outlet air dew point temperature value corresponding to outlet air dry bulb temperature (Tdb) and outlet air wet bulb depression (Tdb-Twb).

2.6 Calculation of dew point depression:

Dew Point Depression= T1 – T2

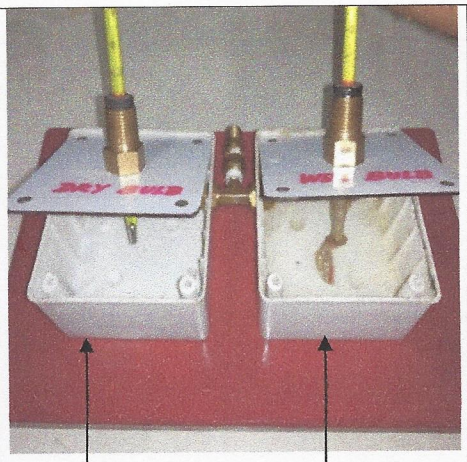
3.0 Standard values of dew point depression:

3.1 As per Special Maintenance Instruction No. RDSO/2017/EL/SMI/0305 Rev '0', Dated 17.04.2017 and Technical Circular NO. RDSO/2011/EL/TC/0108, Rev.'0', Dated 07.03.2011the standard values of dew point depression shall be as under:

(i) For new or overhauled (new desiccant) Air dryer it should be $\geq 30^0$ C.
(ii) For Air Dryers already in service (more than 1 year) it should be $\geq 15^0$C.

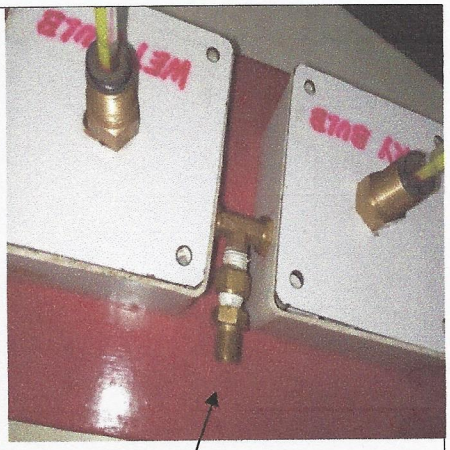
3.2 However, it is noticed that readings of dew point depression may be different during different seasons and in different regions. Hence permissible values as mentioned above may be reviewed after observing data taken from various electric loco sheds and workshops over duration of one complete year.

0-150°C mercury bulb thermometer- 2 Nos. in separate chamber

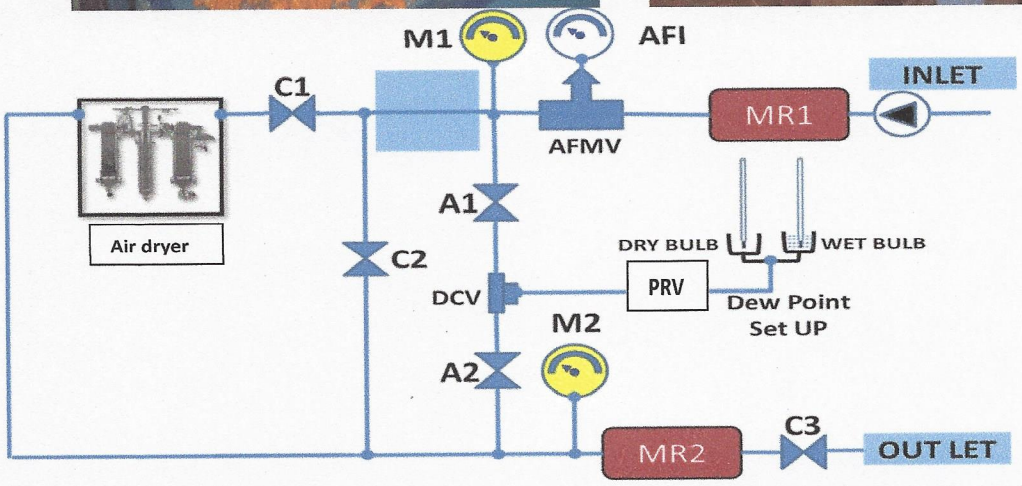


Dry bulb chamber

Wet bulb chamber with water and wet cloth



Common port for sample air to be tested



Schematic diagram

Dry Bulb (°C)	Wet Bulb Depression, °C (Dry Bulb Temperature Minus Wet Bulb Temperature = Wet Bulb Depression)																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
−20	−33																					
−18	−28																					
−16	−24																					
−14	−21	−36																				
−12	−18	−28																				
−10	−14	−22																				
−8	−12	−18	−29																			
−6	−10	−14	−22																			
−4	−7	−22	−17	−29																		
−2	−5	−8	−13	−20																		
0	−3	−6	−9	−15	−24																	
2	−1	−3	−6	−11	−17																	
4	1	−1	−4	−7	−11	−19																
6	4	1	−1	−4	−7	−13	−21															
8	6	3	1	−2	−5	−9	−14															
10	8	6	4	1	−2	−5	−9	−14	−28													
12	10	8	6	4	1	−2	−5	−9	−16													
14	12	11	9	6	4	1	−2	−5	−10	−17												
16	14	13	11	9	7	4	1	−1	−6	−10	−17											
18	16	15	13	11	9	7	4	2	−2	−5	−10	−19										
20	19	17	15	14	12	10	7	4	2	−2	−5	−10	−19									
22	21	19	17	16	14	12	10	8	5	3	−1	−5	−10	−19								
24	23	21	20	18	16	14	12	10	8	6	2	−1	−5	−10	−18							
26	25	23	22	20	18	17	15	13	11	9	6	3	0	−4	−9	−18						
28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	−3	−9	−16					
30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1	−2	−8	−15				
32	31	29	28	27	25	24	22	21	19	17	15	13	11	8	5	2	−2	−7	−14			
34	33	31	30	29	27	26	24	23	21	20	18	16	14	12	9	6	3	−1	−5	−12	−29	
36	35	33	32	31	29	28	27	25	24	22	20	19	17	15	13	10	7	4	0	−4	−10	
38	37	35	34	33	32	30	29	28	26	25	23	21	19	17	15	13	11	8	5	1	−3	−9
40	39	37	36	35	34	32	31	30	28	27	25	24	22	20	18	16	14	12	9	6	2	−2

Wet bulb depression

Dew point temperatures

Dry Bulb (Air) Temperature