सत्यमेवजयते

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**No.** EL/3.6.4/2 **Date:** 03.10.2017

**All Chief Electrical Engineers,**

**SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2017/EL/SMI/0315 (REV.'0'), Dated 03.10.2017**

**1.0 Title:**

Special Maintenance Instruction for water jet test facility in Electric loco sheds/Workshops.

**2.0 Brief History:**

Zonal Railways have been advised about Rain Water Leakage Test Vide Technical Circular No. 4 issued vide letter No. EL/3.6.4/Shed dated 15.05.97 & Technical Circular No. 32 issued vide letter no. EL/3.6.4 dated 28.10.98. The technical details of Rain water leakage facility has not been advised in these Technical Circulars. Therefore, Zonal Railways are following different setup & practices for Rain Water leakage test. Further, the schedule of rain water leakage test has also not been stipulated .Therefore; technical details for Rain water leakage test set up and schedules for test of same is issued in this Special Maintenance Instruction to ensure uniformity of maintenance practices in this regard.

**3.0 Object:**

To provide technical details of Rain Water Leakage Test facility and Schedules for undertaking the Rain Water Leakage Test of Electric Locomotives.

**4.0 Rain Water Leakage Test Setup**

4.1 **Description**

The rain test system shall have the capability to perform the rain test as specified in International Standard IEC 61133 Railway applications- Rolling stock- Testing of rolling stock on completion of construction and before entry into service besides before & after major schedule of the electric locomotives.

4.2 The general layout of Rain Water Leakage Test setup shall be as per enclosed **drawing no. SKEL-5024(Alt '0').**

4.3 The part list provided in **Table- 1** may be used as a reference for suitable parts selection.

**Table-1**

| SN | Name of Items | Quantity/Rating/Details etc. |
|---|---|---|
| 1. | Sump pumps | one, rated 115 lpm@5m head, with ½ hp 230V ac ,single phase ,50Hz motor |
| 2. | Spray Water pump | (i) 2 kW capacity operating on 1-phase power supply(230V,50Hz)<br>(ii) Pump output=240 lpm ,at the head of 15m<br>(iii) Quantity=2 nos. |
| 3. | Water spray points | 88 Nos. each on either side of loco |
| 4. | Nozzle | 56 ea. Spraying System Co. Part # 1/4TT+TG-brass, full cone spray nozzles rated 4.0 lpm @2.75kg/cm$^2$.Each nozzle shall be equipped with a stamped adjustable ball fitting Part #36275-1/4x1/4 brass or equivalent/similar nozzle of other make in accordance to requirement of IEC 60529. |
| 5. | Piping | Piping to be standard Wt. schedule and be Galvanized of various suitable sizes (1", 3/4", 1/2") along with fittings. Alternatively, PVC pipes of suitable sizes may be used.<br>The fixture from which the nozzles are connected may be either fixed or portable as long as the location and relationship of the nozzles to track and operating pressure are maintained.<br>All pipes shall be labeled as to the type of service and direction of flow. Pipe need not be painted in this application. |
| 6. | Electrical installation | All necessary structure to support electrical components shall be provided.<br>All equipment is to be grounded. Bonding & earthing shall meet IS 3043:1987.<br>Tag/Mark all wires at both ends.<br>PLC (Programmable Logic Controller) to auto start & stop the test plant. The PLC shall be designed to auto start/stop the pumps based on water level in respective tanks. The PLC shall operate on 230V, single Phase,50Hz power supply. |
| 7. | Tank | (i) Underground Spray tank of 38500l capacity.<br>(ii) Sump tank of capacity 1400l.<br>Arrangement shall be made for collection & transportation of water to the sump tank & Spray |

| | | |
|---|---|---|
| | | tank. |
| 8. | Pressure gauges | 2 Nos. each in spray line path (0-5kg/cm$^2$) |
| 9. | Float Switches | 2 Nos., extra H.D. float switch. |
| 10. | Filters | At the outlet of sump water<br>1. Particulate filter<br>2. Carbon filter |

## 5.0 Procedure for Rain water leakage test

5.1 The Rain Water test to be done in static condition of locomotive. The locomotive shall be placed at water leakage test line. After placing of locomotive, the OHE supply shall be isolated & in no condition the OHE shall be charged till the test is over. It must be ensured that the loco is well away from live OHE to prevent the water jet coming into contact with live wires.

5.2 All areas of the sides, ends, and roof, including doors and windows, of the locomotives shall be given a complete test for water-tightness. Water shall be sprayed from nozzles which are spaced as per drawing no. SKEL-5024 (Alt- '0') and aimed directly at the surface being tested.

5.3 Besides complete loco body test, individual tests may be used to demonstrate the water tightness of large components such as sides, roof and ends etc. All spray applications shall run for a period of about 30 Minutes to enable inspection to be made to check leakage. The intent of this test to establish the total water tightness integrity of the cab & machine room.

5.4 Connect the spray fixture. Open the valve or valves for spraying at 40psi (2.75bar).The each nozzle deliver 129 l/hr. considering this water is discharged over an area of 5.18x0.91m.This equivalent to a rain fall of 44cm/hr.

5.5 After the water spraying the loco should be inspected thoroughly to detect and attend to leakage points. Special attention should be paid to the following water leakage points –

i) Body joints
ii) Joints of the mounting bases of the roof equipment
iii) Joints of marker lights
iv) Joints of look-out glasses and side glasses
v) Door gaskets
vi) Sand-box joints
vii) Roof gaskets
viii) Head light gaskets

Leakage noticed after rain water test shall be attended and retested for leak proof arrangement.

After the rain water leakage test; following shall also be ensured:

- The wind-screen wipers should be tested and attended to.
- Proper functioning of sanders should be ensured.

The test shall be performed before & after the maintenance/repair activity of locomotives.

6.0 **Application to the Class of Locomotives:**

All types of electric locomotives on Indian Railways

**7.0 Agency of Implementation:**

All Electric Loco Sheds/workshops holding Electric Locomotives.

**8.0 Periodicity of Implementation:**

Major Inspection Schedule (TOH/MOH, IOH & POH) and before starting of monsoon season as monsoon precaution.

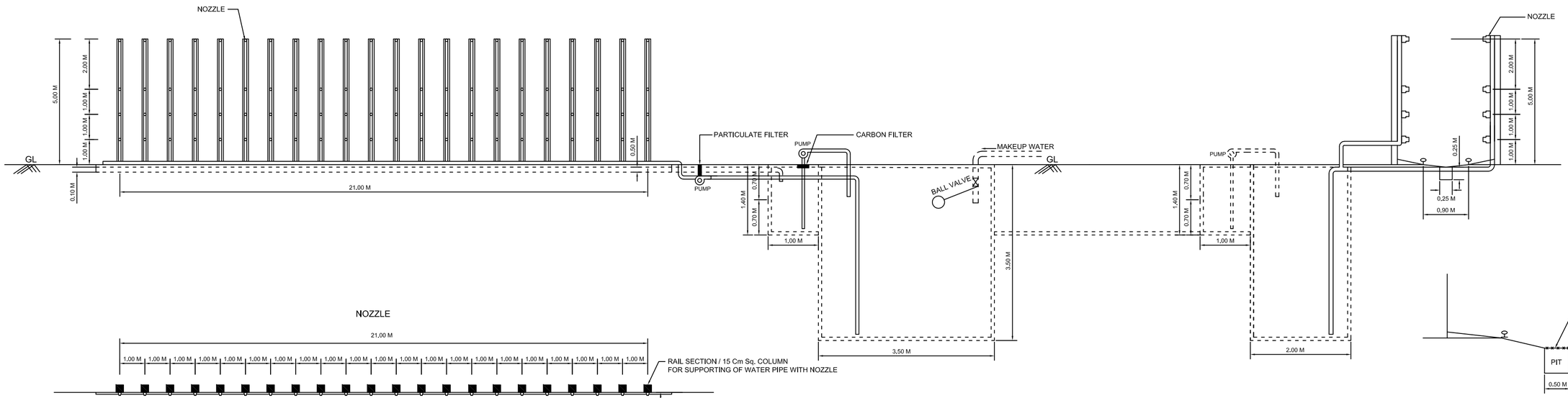
(A.K.Shukla)
**for Director General Std./Elect.**

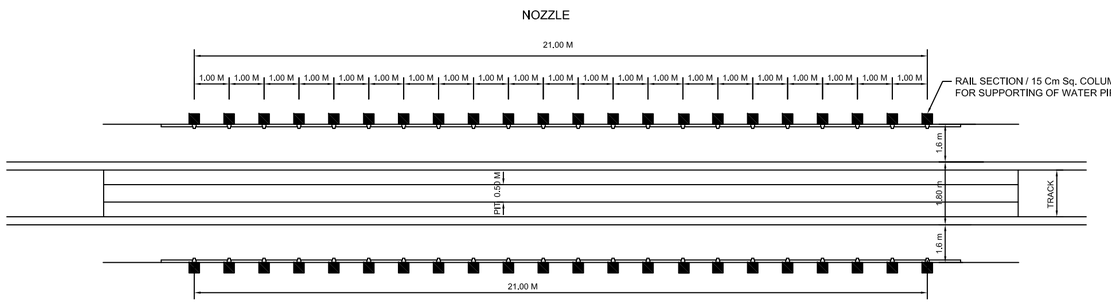
**Encl:** As above

Copy to: As per standard Mailing List No.EL-M-4.2.3-19(latest revision)

(A.K.Shukla)
**for Director General Std./Elect.**

**Encl:** As above




NOTE :-

1. ALL DIMENSIONS ARE IN METERS.
2. DRAIN PIT RUNNING IN CENTRE OF THE TRACK SIZES 28.20 M LENGTH X 0.50 M WIDTH AND ONE END 0.10 M DEPTH AND GRA DUALLY INCREASING TOWARDS OTHER END i.e., 0.50 M DEPTH.
3. UNDER WATER STORAGE TANK PROVISION CAN BE DONE AT SUITABLE LOCATION AS PER SUITABILITY AT SITE.
4. GRILLED MESH LENGTH 28 M , WIDTH 0.50 M & 12 mm THICK SHOULD BE PROVIDED ON TOP OF THE DRAIN PIT FOR PERMITTING ONLY WATER DULY OBSTRUCTING ANY OTHER WASTAGE.

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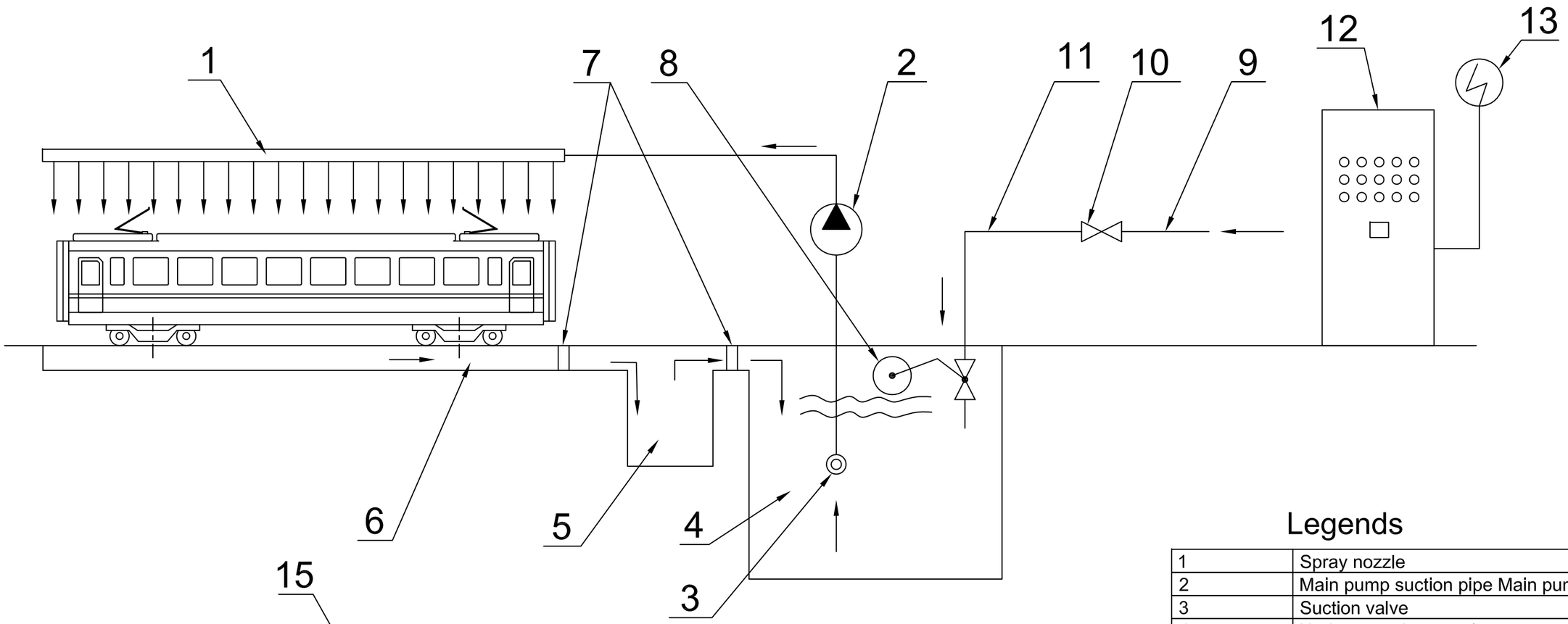
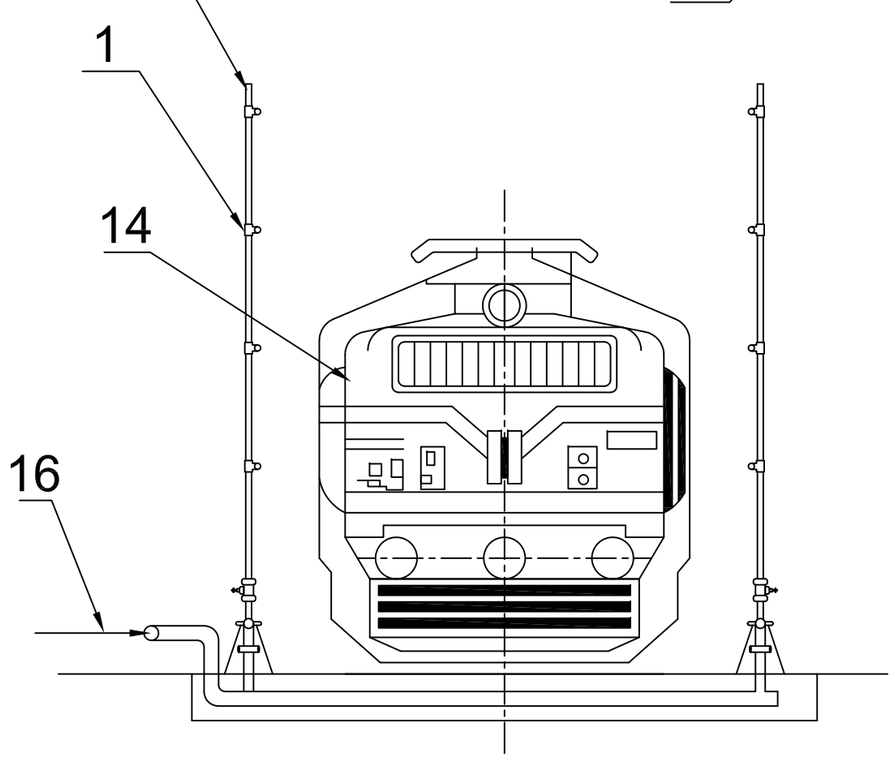
| ELECTRIC LOCO DIRECTORATE<br>RDSO,LUCKNOW | अनुमोदित<br>APPROVED<br>EDSE |
| | LOCO BODY WASHING & CLEANING PLANT CUM RAIN WATER LEAKAGE TESTING PLANT |
| NOT TO SCALE<br>25.08.2017<br>DATE | Drawing No. SKEL - 5024 (Alt-'0') Sheet 1 of 6 |




## Legends

| | |
|---|---|
| 1 | Spray nozzle |
| 2 | Main pump suction pipe Main pump |
| 3 | Suction valve |
| 4 | Underground reservoir |
| 5 | Sump tank |
| 6 | Sink |
| 7 | Filter |
| 8 | Head drift hoist switch |
| 9 | Water pipe |
| 10 | Drain switch valve |
| 11 | Drain inlet pipe |
| 12 | Push button console |
| 13 | Power supply |
| 14 | Locomotive |
| 15 | Nozzle pipe |
| 16 | Incomeing water pipe |

ELECTRIC LOCO DIRECTORATE

RDSO,LUCKNOW

अनुमोदित
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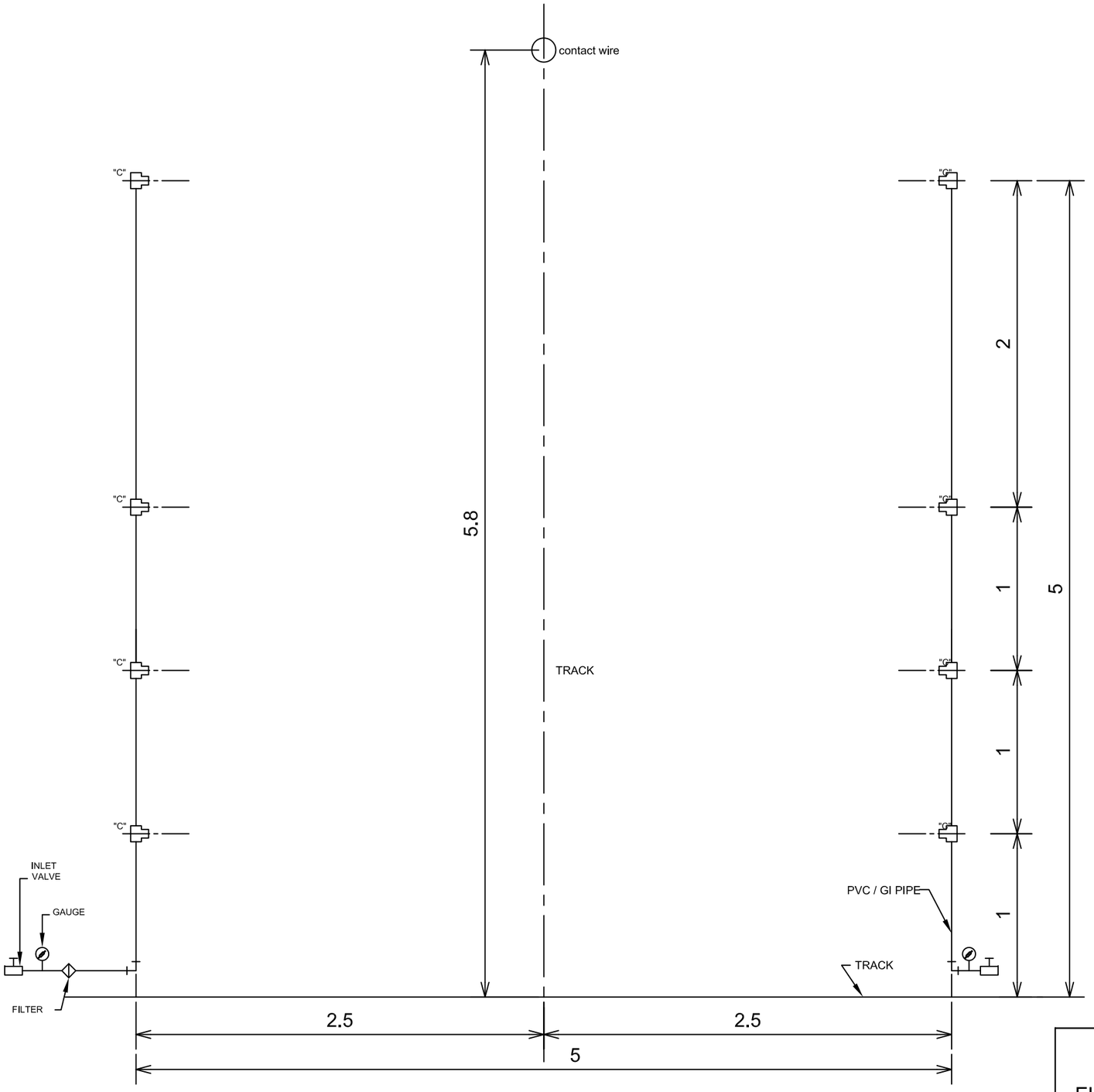
LOCO BODY WASHING & CLEANING PLANT CUM RAIN WATER LEAKAGE TESTING PLANT

NOT TO SCALE

25.08.2017
DATE

Drawing No. SKEL - 5024 (Alt-'0') Sheet 2 of 6

# NOZZLE ARRANGEMENT

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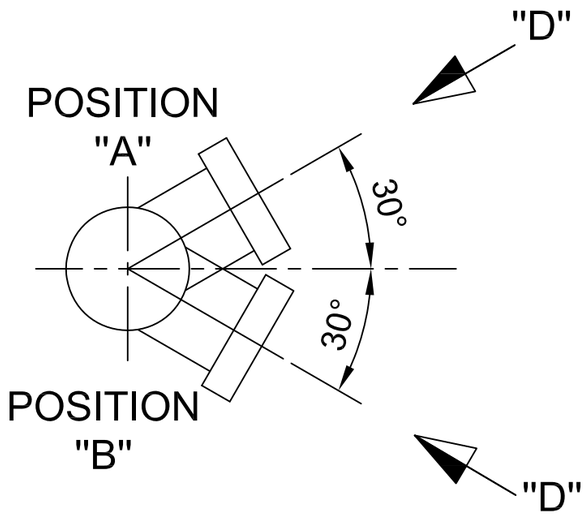
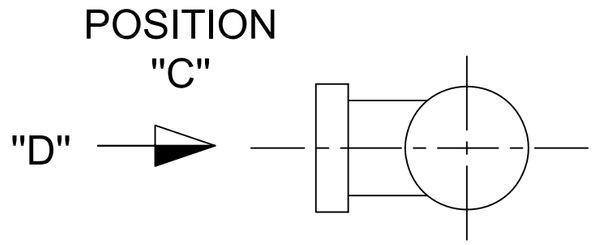
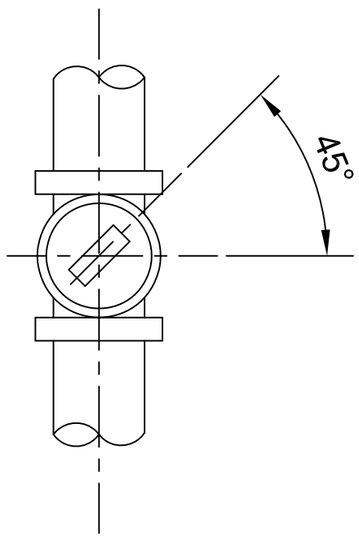
# SETTING ANGLES OF NOZZLES




POSITION OF TEE'S
AS SHOWN FROM TOP




VIEW AT "D"

SET NOZZLE TO GIVE
SPRAY PATTERN AS SHOWN

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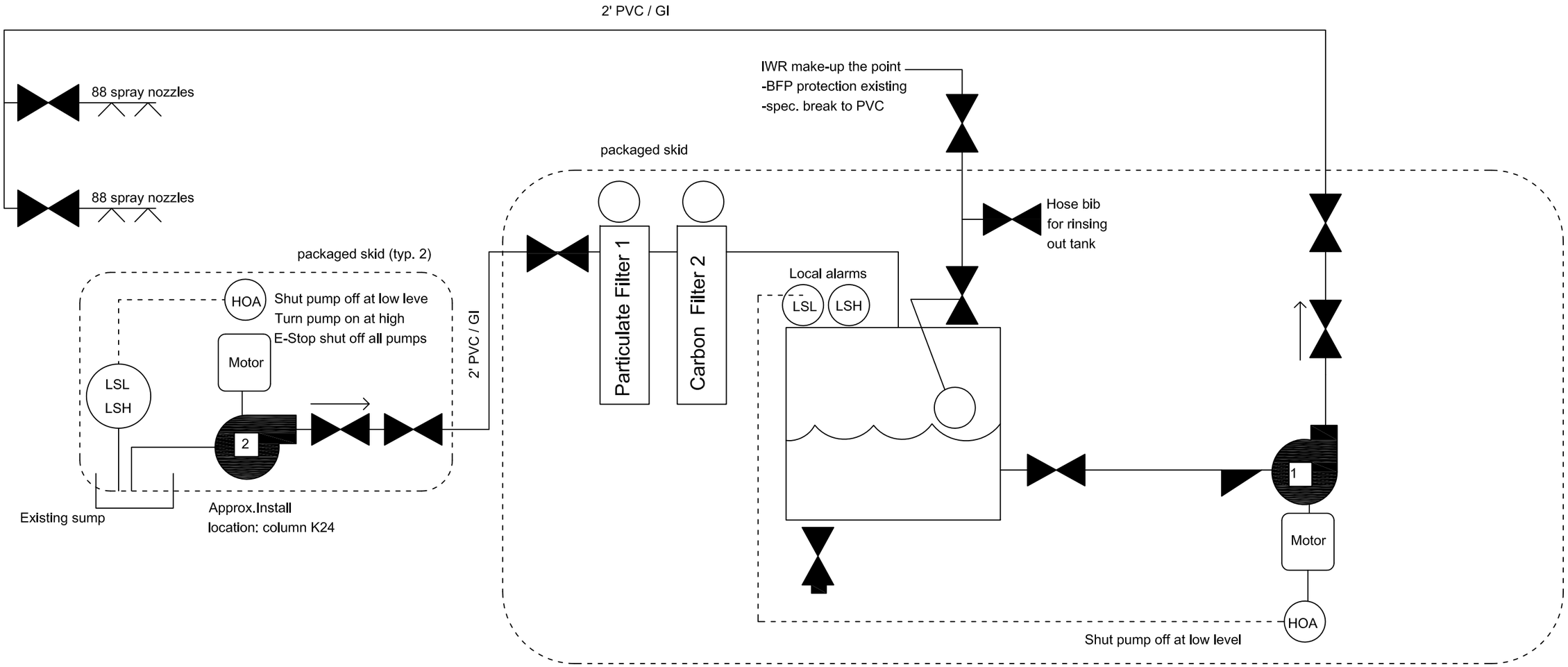
| NOT TO SCALE | 25.08.2017<br>DATE | Drawing No. SKEL - 5024 (Alt-'0') Sheet 4 of 6 |

# WATER CIRCULATION FOR RAIN WATER TEST SETUP




Equipment List

1. Pump 1 : 240 lpm at 15m head.
2. Pump 2 :115 lpm at 5m head.
3. Tank: (i) Spray tank = 38500 L
   (ii) sump tank = 1400 L
4. Particulate Filter 1: 10 micron
5. Carbon Filter 2 : intended to remove Oil and grime
6. Spray nozzles: 88 ea. total, Spraying systems Co. Part # 1/4 TT+TG 5 brass, full cone spray nozzles rated 4.0 lpm @ 2.75 kg./cm$^2$ Each nozzle shall be equlpped with a stamped adjustable ball fitting.
7. All piping valves are PVC/GI

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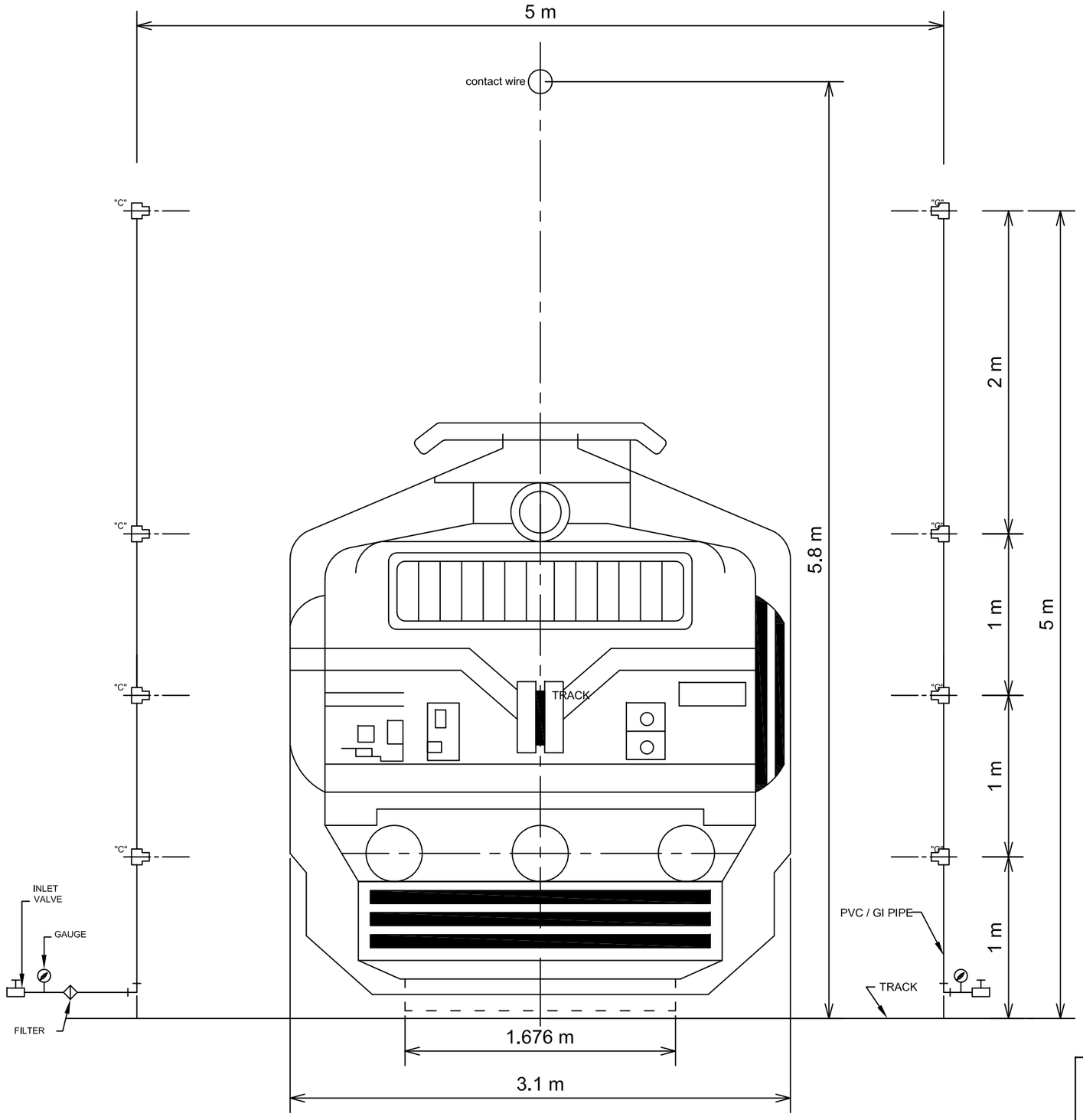


FRONT VIEW

LOCOMOTIVE

LENGTH = 21 m. MAX. COUPLER TO COUPLER

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