

This Excel workbook includes 5 sheets.
Instructions & Calculator | Image of Firebox Tube Sheet | Image of Cab Arrangement
Lima Locomotive Works Document | DRRY Eng. No. C&O 308

Excel Workbook Produced by Jeffrey G. Hook Revision of September 1, 2025

This Excel workbook is applicable only to a miniature locomotive boiler having a longitudinal level crown sheet or the slope of the crown sheet declining from the point of attachment at the top of the firebox tube sheet or combustion chamber tube sheet.

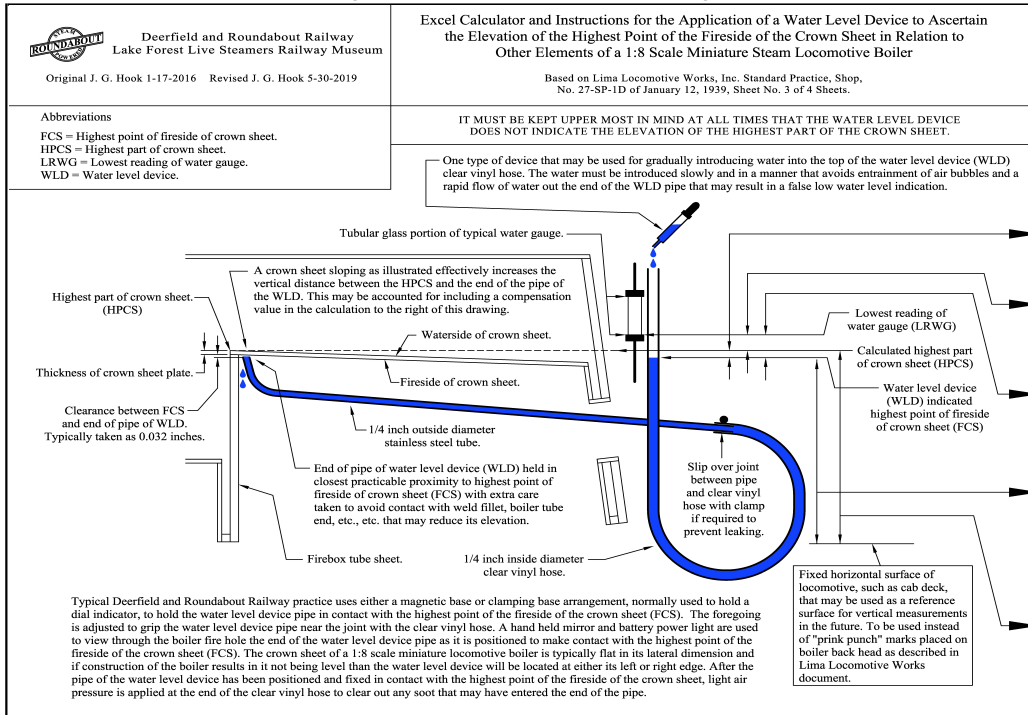
When ascertaining relative elevations by any means the locomotive shall be on level track, the suspension system in condition of normal working order and the weight of the locomotive near that when in normal working order.

When using a pipe and hose water level device to compare elevations extra care must be taken to insure its readings are accurate by seeing to it that the water in the pipe and hose flows freely and does not leak out from between the ends, and air bubbles, air pockets, kinks, dirt, oil, etc., are not present in the pipe or hose.

It must be fully understood that errors in the application or use of the water level device will generally produce results where THE INDICATED ELEVATION IS LOWER THAN THE ELEVATION OF THE END OF THE PIPE IN CONTACT WITH THE FIRESIDE OF THE CROWN SHEET.

See notice below drawing.

See also Excel workbook titled "Water-Gauge-Elevation-Calculator"



THE MINIATURE 1:8 SCALE 7.5 INCH GAGE OF TRACK DEERFIELD AND ROUNDABOUT RAILWAY USES BALDWIN LOCOMOTIVE WORKS STANDARD PRACTICE SHEET 12-1C SKETCH No. 4 PRINCIPLES TO ESTABLISH THE MINIMUM VERTICAL DISTANCE BETWEEN THE LOWEST READING OF A WATER GAUGE AND THE HIGHEST PART OF THE CROWN SHEET AND IN NO CASE SHALL THE DISTANCE BE LESS THAN 0.500 INCHES.

CARL A. PURINTON WRITING IN 1951 SUGGESTED THAT THE MINIMUM VERTICAL DISTANCE BETWEEN THE LOWEST READING OF A WATER GAUGE AND THE HIGHEST PART OF THE CROWN SHEET SHOULD BE NOT LESS THAN 0.250 INCHES. GIVEN THE TIME PERIOD OF C. A. PURINTON'S WRITINGS IT MAY REASONABLY BE ASSUMED THAT THE AUTHOR WAS REFERRING TO MINIATURE STEAM LOCOMOTIVES CONSTRUCTED TO REPRESENT FULL SCALE PRACTICE STANDARD GAUGE EXAMPLES AND NO LARGER THAN THAT WHICH WOULD RESULT FROM EMPLOYING A MINIATURE TO FULL SCALE PRACTICE REDUCTION RATIO OF THREE-QUARTER INCHES EQUALS ONE FOOT OR POSSIBLY ONE INCH EQUALS ONE FOOT.

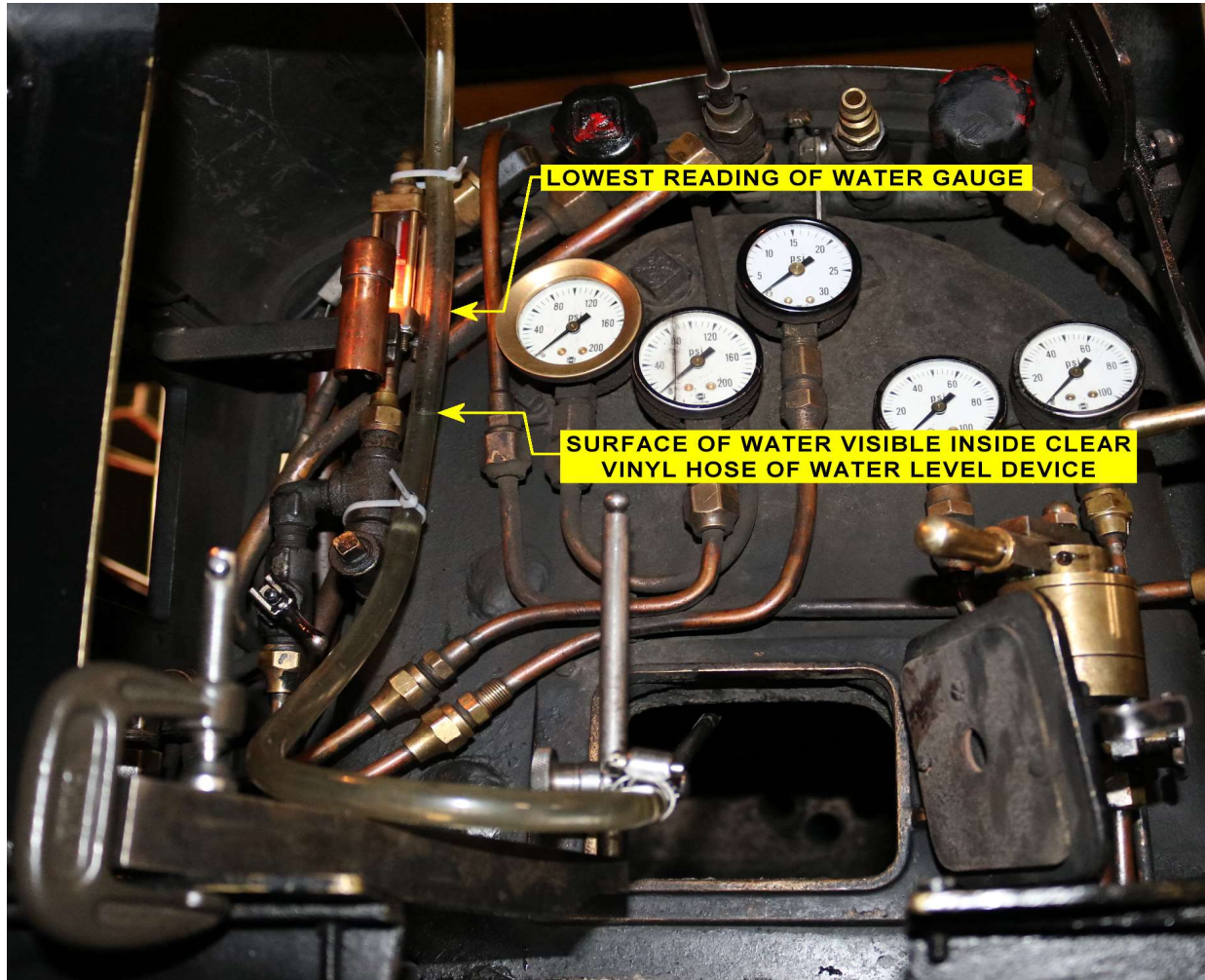
Enter data in gray boxes.	
0.063	Compensation for affect of slope of crown sheet.
0.250	Compensation for thickness of crown sheet plate.
0.032	Compensation for clearance between end of water level device pipe and fireside of crown sheet.
0.345	Calculated vertical distance between highest part of crown sheet (HPCS) and water level device indicated highest point of fireside of crown sheet (FCS).
0.000	Minimum required vertical distance between the lowest reading of the water gauge (LRWG) and the highest part of the crown sheet (HPCS). As specified in other documents and rules related thereto.
	Minimum required vertical distance between the lowest reading of the water gauge (LRWG) and the water level device indicated highest point of fireside of crown sheet (FCS).
0.000	Vertical distance measured between water level device indicated highest point of fireside of crown sheet (FCS) and fixed horizontal reference surface of locomotive.
0.345	Calculated vertical distance between highest part of crown sheet (HPCS) and water level device indicated highest point of fireside of crown sheet (FCS).
	Calculated vertical distance between highest part of crown sheet (HPCS) and fixed horizontal reference surface of locomotive.
Description of identity of locomotive and fixed horizontal reference surface employed on the same.	
Type in here additional pertinent data. Engine No., Date of use of water level device, etc., etc.	

NOTICE: Any and all information, data, images or drawings published as part of this Excel workbook have been prepared solely for the non-commercial amateur engineering use of designers, builders, maintainers or operators of one-eighth scale miniature railway track, locomotives or rolling stock. It has been compiled from information sources believed by Lake Forest Live Steamers Railway Museum Incorporated and any author credited to be competent. However, recognizing that each component of any system must be designed and installed to meet the particular circumstances, Lake Forest Live Steamers Railway Museum Incorporated and any author credited assumes no responsibility or liability of any kind in connection with the information, data, images or drawings published as part of this document that are used in any way by any person or organization and makes no representations or warranties of any kind hereby.

Image of typical 1:8 scale miniature locomotive boiler firebox tube sheet illustrating placement of end of water level device pipe near to the highest point of fireside of crown sheet.



Image of typical 1:8 scale miniature locomotive boiler back head illustrating mounting of water level device pipe by means of clamping arrangement and placement of the clear vinyl hose vertically and near to the water gauge.



LIMA LOCOMOTIVE WORKS, INC.

STANDARD PRACTICE

SHOP

FOUR SHEETS
SHEET NO. 3

LIMA, OHIO. JAN. 12, 1939.

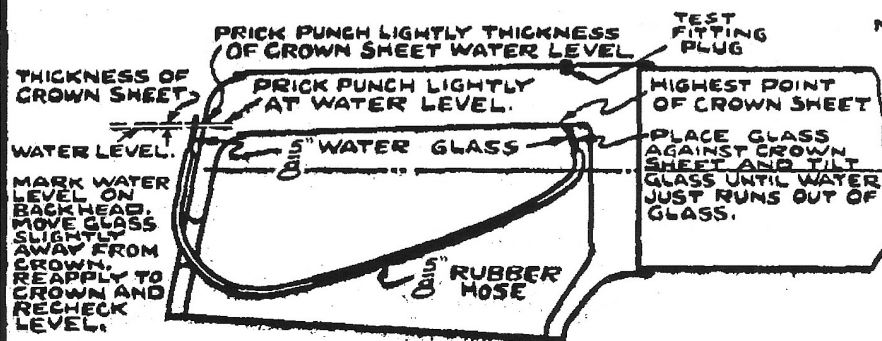
MADE BY W.H.S. CHECKED BY E.P.P.

NO. 27-SP-1D

METHOD OF LOCATING WATER COLUMNS, WATER
SUBJECT GAUGES & GAUGE COCKS, - DIRECT LOCO'S ONLY

SUPERSEDING 27-SP-1C

LIMA LOCOMOTIVE WORKS STANDARD PRACTICE No. 27-SP-1D EXCERPT PRODUCED BY J6H 3-10-2019



NOTE 1 -

FILL HOSE WITH WATER AND OBTAIN LEVELS AS INDICATED. BLOW OUT HOSE BEFORE STARTING AND SEE THAT THE WATER IS KEPT FREE OF DIRT AND GREASE OR OIL; THAT GLASSES ARE CLEAN WITH WATER CLEARLY VISIBLE IN GLASS; THAT HOSE IS FREE FROM KINKS AND AIR POCKETS AND THAT WATER FLOWS FREELY IN HOSE.

