

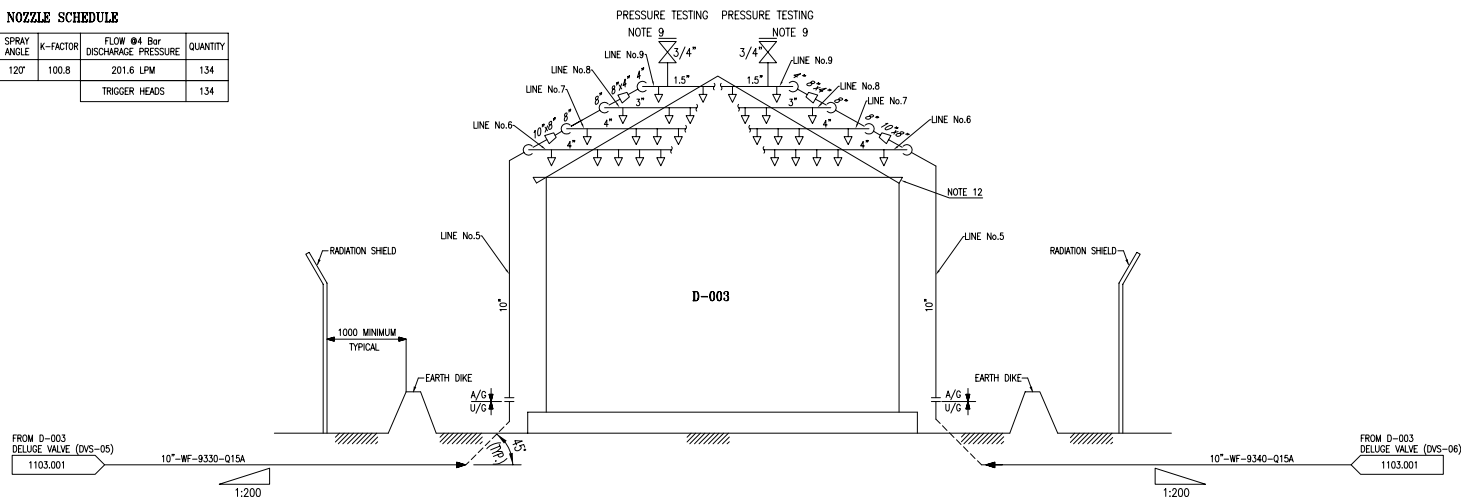
D-003  
(DRY CRUDE STORAGE TANK)  
TYPE : FIXED CONE ROOF TANK  
SIZE m (ft-in) : 39.660 (130'-1") ID x 14.400 (47'-3") H

#### WATER SPRAY NOZZLE ORIENTATION

RING	APPROX DIA (M)	PIPE (INS)	No. NOZZLES (PER HALF TANK)
4TH (TOP)	3.4	1.5	3
3RD	11.6	3	12
2ND	21.2	4	21
1ST	31	4	31

#### WATER SPRAY NOZZLE SCHEDULE

TYPE	SIZE	SPRAY ANGLE	K-FACTOR	FLOW @ 4 bar DISCHARGE PRESSURE	QUANTITY
MV	1/2" NPT MALE	120°	100.8	201.6 LPM	134
TRIGGER HEADS					134



AS-BUILT
KOC APPROVAL
NAME / KOC No:
DESIGNATION :
GROUP / TEAM :
SIGNATURE :
DATE :

AS-BUILT
LARSEN & TOUBRO LIMITED
NAME : VAIBHAV VERMA
DESIGNATION : AGM
SIGNATURE :
DATE : 30-SEP-2018
DEPT/ DIVISION : ENGINEERING

AREA PROTECTED	LINE No. 5	LINE No. 6	LINE No. 7	LINE No. 8	LINE No. 9
D-003 DELUGE EAST	10"-WF-9331-Q15A	4"-WF-9332-Q15A	4"-WF-9333-Q15A	3"-WF-9334-Q15A1	3"-WF-9335-Q15A1
D-003 DELUGE WEST	10"-WF-9341-Q15A	4"-WF-9342-Q15A	4"-WF-9343-Q15A	3"-WF-9344-Q15A1	3"-WF-9345-Q15A1

#### GENERAL NOTES:

- FOR STANDARD SYMBOLS AND NOMENCLATURE SEE DRAWINGS 50489-530-020-PID-1104.001.
- ALL EQUIPMENT NUMBERS SHOWN ON THIS P&ID ARE PRECEDED BY 530-.
- FOR ESDV, SBOV AND MOV DETAILS SEE DRAWINGS 50489-530-020-PID-1106.001.
- FOR MISCELLANEOUS PIPING DETAILS SEE DRAWING 50489-530-020-PID-1108.001.
- DELETED.

#### NOTES:

- UV/IR FLAME DETECTORS AUTOMATICALLY DETECT FIRE AND WHEN ACTIVATED A SIGNAL IS SENT TO THE F&O PANEL IN THE CCR.
- AIR SET IS FITTED WITH AIR FILTER, REGULATOR AND PI.
- RO SUPPLIED TO GIVE PRESSURE/LOSS CHARACTERISTICS OF THE DELUGE VALVE.
- 4 WAY SUCTION COLLECTION HEAD IS INSTALLED TO ALLOW SECONDARY SUPPLY OF WATER TO DELUGE SYSTEM.
- DELUGE VALVE ARE DIAPHRAGM TYPE, DESIGNED FOR DELUGE OPERATION AND BE UL LISTED AND FM APPROVED
- TRIGGER HEAD CONFIGURATION
- 1/2" FUSIBLE PLUGS OVER PROTECTED EQUIPMENT ON A GENERAL 3 x 3 METRE MATRIX
- 2 VALVES REQUIRED IN BYPASS LINE TO PREVENT UNNECESSARY LOSS OF WATER DUE TO GATE VALVE PASSING.
- ADEQUATE DRAINAGE PROVIDED AROUND DELUGE SYSTEM TO AVOID ACCUMULATION OF WATER AROUND THE EQUIPMENT
- PROVISION SHALL BE MADE FOR PRESSURE TESTING AS PER NFPA 15 CLAUSE NO. 6.4.4 & 6.4.4.3 NEAR THE HYDRAULICAL REMOTEST NOZZLE
- DELUGE VALVES ARE HELD CLOSED BY AIR PRESSURE SUPPLIED FROM THE INSTRUMENT AIR SYSTEM
- DELUGE VALVES SHALL FULLY OPEN WITHIN 10 SECONDS ON REMOVE OF INSTRUMENT AIR BY:  
A. REMOTE OPERATION OF A PUSH BUTTON AT THE MAIN FIRE AND GAS PANEL, LOCATED IN THE CONTROL ROOM, TO ENERGIZE A SOLENOID VALVES IN INSTRUMENT AIR SUPPLY TO DELUGE VALVE  
B. LOCAL OPERATION OF A MECHANICAL AIR RELEASE UNIT OF DELUGE VALVE STATION.
- SPRAY NOZZLE IS CONSTRUCTED FROM MAINE BRASS.
- DELUGE VALVE STATIONS ARE PROTECTED FROM RADIATED HEAT BY THE PROVISION OF METAL RADIATION SHIELDS.
- PIPE WOG (AS PER KOC-L-009):  
3" SIZE AND BELOW : 90-10 COPPER NIKEL TO ASTM B 466 UNS.  
4" SIZE AND ABOVE : CARBON STEEL API 5L GRB WITH PHENOLIC EPOXY COATING.
- FLANGE INSULATION KITS ARE PROVIDED AT DISSIMILAR METAL JUNCTIONS HAVING ELECTROMOTIVE POTENTIAL DIFFERENCE GREATER THAN 0.05V AS PER CLAUSE 7.3.1.17 OF KOC-L-009.
- INTERNALLY COATED UG PIPING ARE FLANGED SPOOLS AS PER KOC-L-009.
- FLUSHING DRAIN PIT IS ACCESSIBLE FROM GROUND LEVEL.
- THE UNDERGROUND SECTION IS EXTERNALLY COATED WITH 3 LAYERS EXTRODED HDPE AS PERKOC-P004 PART 6, REV-2 WITH THE INTERNAL PHENOLIC EPOXY ON THE PIPING SHALL BE AS PER KOC-P-005 REV-1.
- THE ABOVE GROUND PIPING SECTION IS COATED WITH SYSTEM A1-1 OF KOC-P-001 REV 3
- TOP CHAMBER OF DELUGE VALVE IS CONNECTED TO WATER LINE & TO WATER INLET OF ACTUATOR WHEN THE AIR PRESSURE DROPS DUE TO DETECTION OF FIRE THE DIAPHRAGM OF ACTUATOR IS LIFTED AND ALLOWS THE WATER PRESSURIZING DIAPHRAGM OF DELUGE VALVE TOP CHAMBER TO DRAIN. THIS RELEASES THE PRESSURE IN THE TOP CHAMBER OF DELUGE VALVE ALLOWING THE DELUGE VALVE TO OPEN.

#### LEGENDS:

SYMBOL	DESCRIPTION
FW	FIRE WATER PIPING
SPRAY NOZZLE	SPRAY NOZZLE
REDUCER	REDUCER
GATE VALVE	GATE VALVE
END CAP	END CAP

#### REFERENCE DRAWINGS:

50489-530-000-CAL-1010	HYDRAULIC CALCULATION FOR WATER SPRAY SYSTEM FOR DRY CRUDE STORAGE TANK
KOC-L-009	KOC STANDARD FOR FIRE PROTECTION SYSTEMS
50489-530-000-LAD-1065	FIRE WATER NETWORK LAYOUT
50489-530-000-LAD-1073	FIRE WATER DETAIL ARRANGEMENT DRAWING FOR WATER SPRAY SYSTEM FOR DRY CRUDE STORAGE TANK

Z1	ISSUED FOR AS-BUILT	PAK/DEU	NIL	SRA	RAK	30.09.18
Z0	ISSUED FOR AS-BUILT	PAK/DEU	NIL	SRA	RAK	05.08.18
01	ISSUED FOR CONSTRUCTION	PAK/DEU	NIL	SRA	RAK	27.07.16
0	ISSUED FOR CONSTRUCTION	PAK/DEU	NIL	SRA	RAK	13.05.16
C	ISSUED "INCORPORATED CLIENT COMMENTS"	PAK/DEU	NIL	SRA	RAK	15.10.15
B	ISSUED FOR APPROVAL	PAK/DEU	NIL	SRA	RAK	10.04.15
A	ISSUED FOR APPROVAL	PAK/ASA	NIL	SRA	RAK	06.01.15
REV.	DESCRIPTION	DRAWN	CHECKED	HOD	PEM	DATE

#### CONTRACTOR REVISION

<b>KUWAIT OIL CO.</b> <b>K. S. C.</b>	 <b>شركة نفط الكويت</b> <b>ش.م.ك.</b>
--	--

CONTRACTOR DETAILS:-	 <b>LARSEN &amp; TOUBRO LIMITED</b> <b>FARIDABAD</b>
----------------------	--

PROJECT TITLE:-	<b>NEW GATHERING CENTRE GC-30 IN NORTH KUWAIT</b>
-----------------	---

DOCUMENT TITLE:-	<b>PIPING &amp; INSTRUMENTATION DIAGRAM DELUGE WATER SPRAY SYSTEM FOR DRY CRUDE STORAGE TANK (D-003)</b>
------------------	--

PROJECT NO.	CONTRACTOR DRG. NO.	REV.	KOC DRG. NO.	REV.
EF1902	50489-530-000-PID-1103.002	Z1		
	SHEET NO. 2 OF 2		SHEET NO.	
	COMPANY DRG. NO.			
	SHEET NO.			