



Automatic Tank Dewatering (ATD) System Hyundai Heavy Industries CO. (HHI), LTD – Kuwait



The Agar Automatic Tank Dewatering System has responded with an excellent performance on the tank dewatering application at HHI - Kuwait on the "Crude Export Facilities at NTF, STF & MAA Project".

The Agar ID-201 oil/water interface detector is used as the Control Probe for dewatering the crude storage tanks and is located at the top of drain sump just below the tank floor. When clean water is detected, the water drain valve opens and remains open until low concentration of oil is detected. Only clean oil free water is discharged from the bottom of the sump.

An Alarm Probe is inserted deeper into the vessel, 50 cm below the Control Probe in the sump. This Alarm probe is supposed to be in 100% clean water all times. If there is an upset in the vessel or the water draw-off valve does not close properly, oily water will be detected at this lower elevation. The alarm probe will then send an alarm the Control Room to close a secondary back-up drain valve.

As an extra precaution K.O.C. requires a second alarm probe outside the tank, see Fig. 1 & 2.

No preventative maintenance is required on these probes because they still function even when coated with heavy oil or paraffin. Since they are located in the water draw-off sumps, there will not be any sludge or solids build-up to effect their performance.

There are several advantages to this unique control system:

- 1. No oil is discharged with the waste water (less than 30ppm)**
- 2. Water quality is controlled in the sumps; below the tank's floor. This eliminates corrosion at the floor's plates.**
- 3. Maximum utilization of the tank capacity for drying oil, since the only place water is accumulated is the sump. This leaves 100% for oil only in the tank, avoiding the chance of Water Boilover in case of fire. This causes the oil to shootout and spread the fire.**

See attached pictures and installation drawing.

The attached table shows the Site Acceptance Test (SAT) result of 4 tanks, achieving less than **15 ppm oil discharge and zero water at the tank bottom.**



Fig. 2. Outside Tank



Fig. 3. View of the sump and the control probe



Fig. 4. View of the sump, control probe and alarm probe



Fig. 5. Saab Ulage Radar Detector



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EM-1089 Project - Portion 1

Tank Dewatering Details (ADS)

Date	Tank No.	Duration		Radar Reading (MTR)		Volume (BBLs)		Water Level (Saab) in MM		Water Level (Manual) in MM		Volume of Water (BBLs) Based on Column 9 Value	Volume of Water Displaced (BBLs) Column 7~8	Volume of Water Displaced (BBLs) Column 5~6	Balance Vol. of Water Left in Tank (BBLs)	Balance Water Level in MM	Lab Test Result (ppm)	Balance %
		Start Time	Finish Time	Start (meters)	Finish (meters)	Before Dewatering	After Dewatering	Before Dewatering	After Dewatering	Before Dewatering	After Dewatering							
23-Apr-08	TK #76	13:05 Hrs.	17:00 Hrs.	16.757	16.743	686863	686281	64	64		0	2275	582	14	0	0	11	0%
24-Apr-08	TK #77	10:19 Hrs.	15:15 Hrs.	16.836	16.821	690326	689743	62	62	0		2170	583	15	0	0	10	0%
26-Apr-08	TK #78	11:00 Hrs.	16:00 Hrs.	16.862	16.848	691804	691263	176	173	35	0	6160	541	14	0	0	3.8	0%
26-Apr-08	TK #79	15:30 Hrs.	21:30 Hrs.	16.827	16.814	689808	689266	81	81	0		2835	542	13	0	0	15	0%
30-Apr-08	TK #76	16:30 Hrs.	20:00 Hrs.	16.565	16.55	678870	678245	69	68	35	0	2415	625	15	0	0	8.1	0%

Notes: High probe setting (tank bottom)
The volumes are taken from the calibration chart of the respective tanks

% balance of water (Balance volume of water (Column 13) / Crude Volume 6) x 100:

Crude % available = 100 - % Balance of Water:

Tank 76 Tank 77
Tank 78 Tank 79



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Fig. 6. Tank Farm without Agar ATD



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AGAR OW-202 INSTALLED AT PDVSA BACHAQUERO TANK FARM, FISCALIZATION 0-1% WATERCUT RANGE

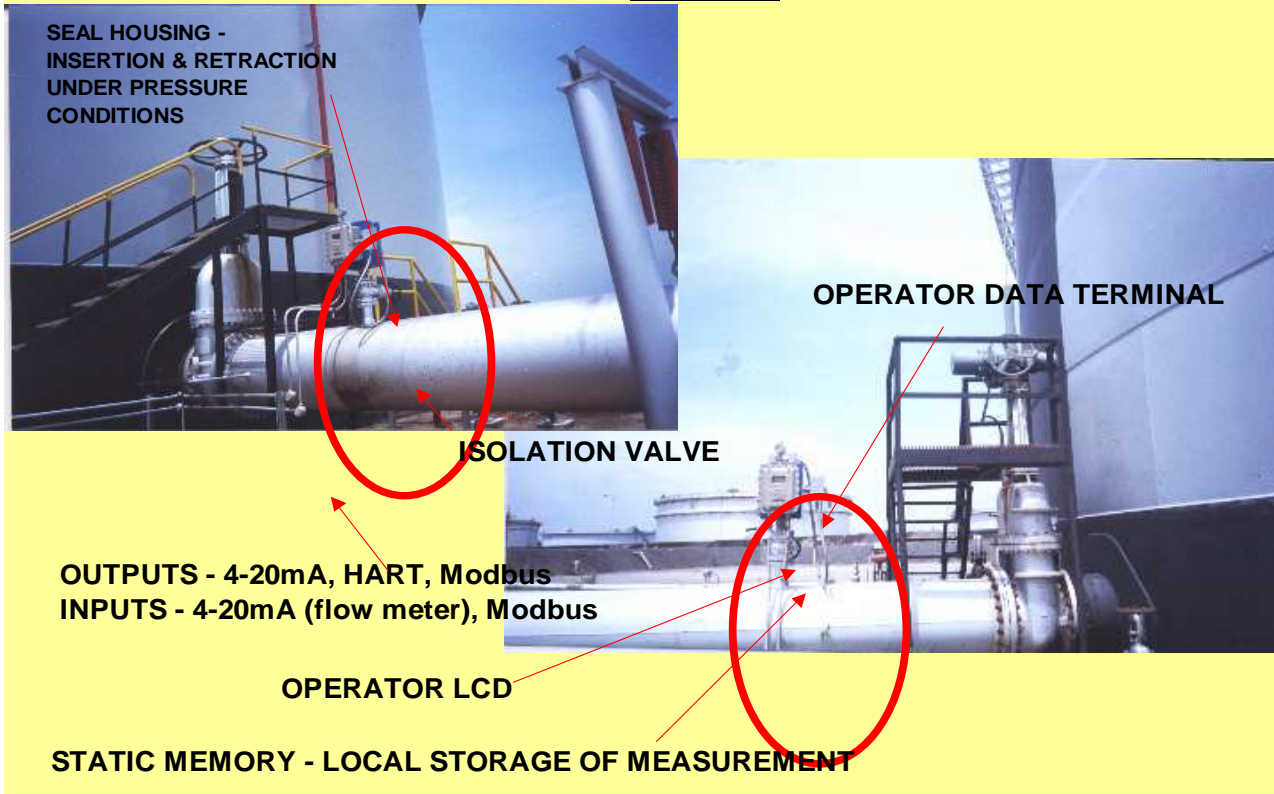


Fig. 7: Watercut Meter on the Oil Discharge