



Setting the Standard for Automation™

Montréal
Section

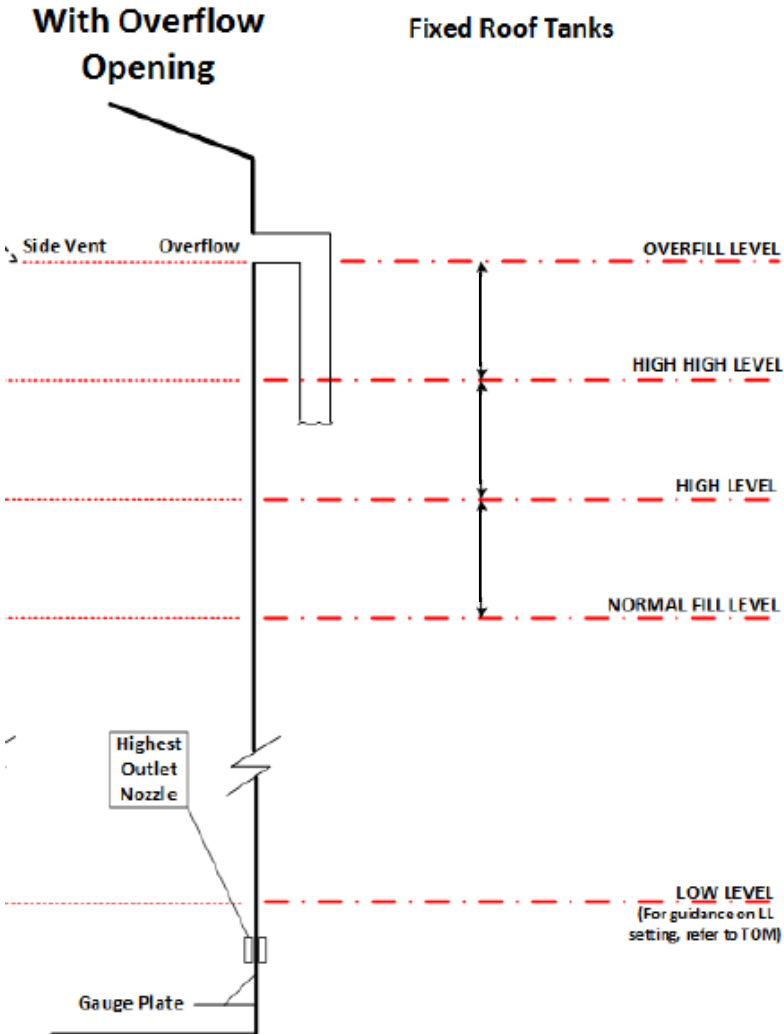
Montréal, Québec, Canada



How to set High-High Level?

Best practice in petro-chemical industry

Definition of Tank Operating Levels

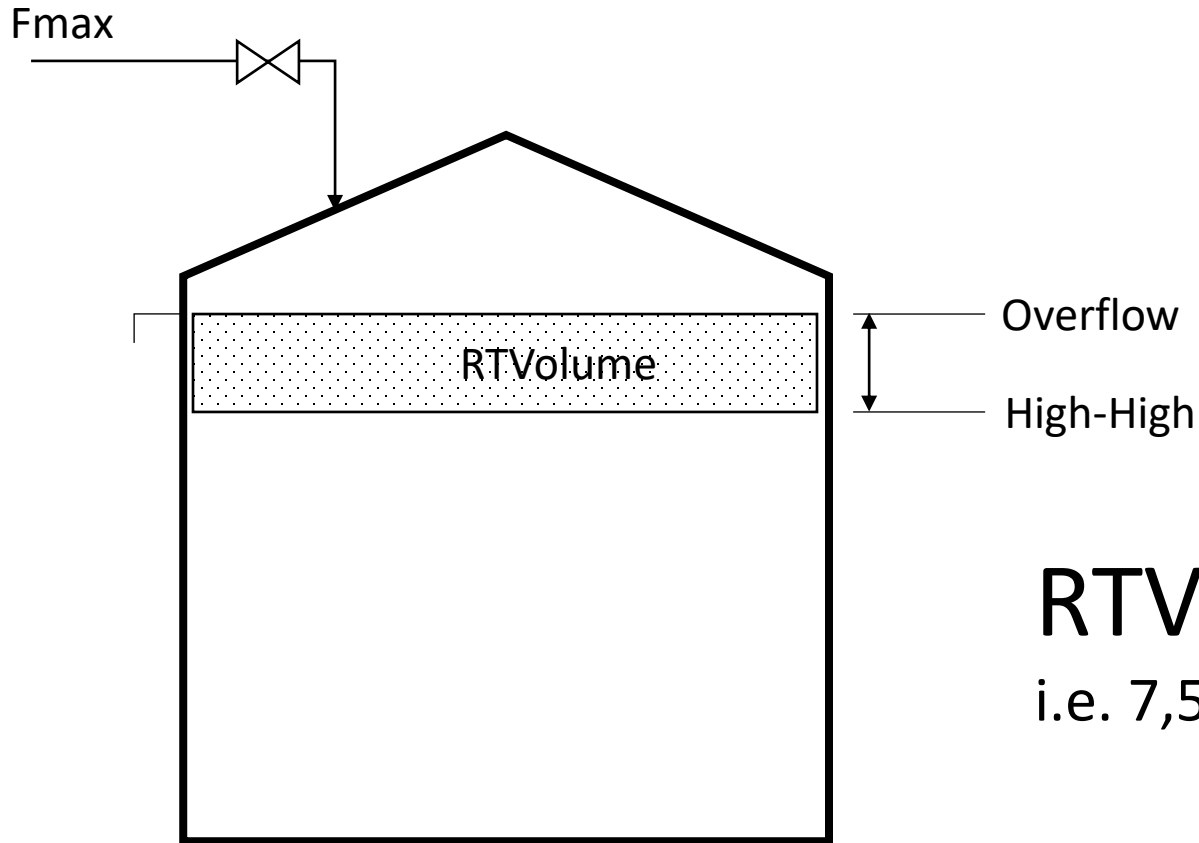


Level	Definition
Overfill Level (OL)	The Overfill Level is the product level at which product will overflow and spill from the tank
High-High Level (HHL)	The High-High Level is the product level at which the second overflow warning alarm is set. The High-High Level Alarm (HHLA) is an independent alarm as specified in API 2350, and is an emergency action alarm level set sufficiently below the Overfill Level / damage point to enable termination of a receipt before the Overfill Level or damage occurs.
High Level (HL)	The High Level is the product level at which the first overflow warning alarm is set. The High Level Alarm (HLA) is either independent or part of the tank gauging system, and is an emergency action alarm level set sufficiently below the HHLA to enable termination of a receipt before the HHLA level is reached.
Normal Fill Level (NFL)	The Normal Fill Level is the highest product level the tank «shall» be filled to during normal operations. Filling the tank to this level is the volume that operations, supply, etc. plan to utilize in the tank. The Normal Fill Level is an operational level set sufficiently below the HLA to enable termination of a receipt before the HLA level is reached.

The intervals between the Normal Fill, High, High-High, and Overfill Levels is dependent on the maximum flow rate into the tank and Response Time (RT).

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- The Response Time (**RT**) is time required to complete a set of responses to a given alarm or alert in order to prevent triggering the next higher alarm or to prevent overfilling or damaging the tank.
 - The Response Time (**RT**) should be determined through actual drills with the following factors considered:
 - Communication time between detection of the alarm and the notification of operations personnel who can respond to the notification and stop or divert flow if necessary. This may include verification time in order to avoid inappropriate response to false alarms.
 - Time for operations personnel to analyze the situation and make appropriate response.
 - System time required to initiate response actions (including a shut down or diversion of flow to the tank if warranted).
 - Time required to verify that all system elements are responding appropriately and to take appropriate action if the system is not responding properly.

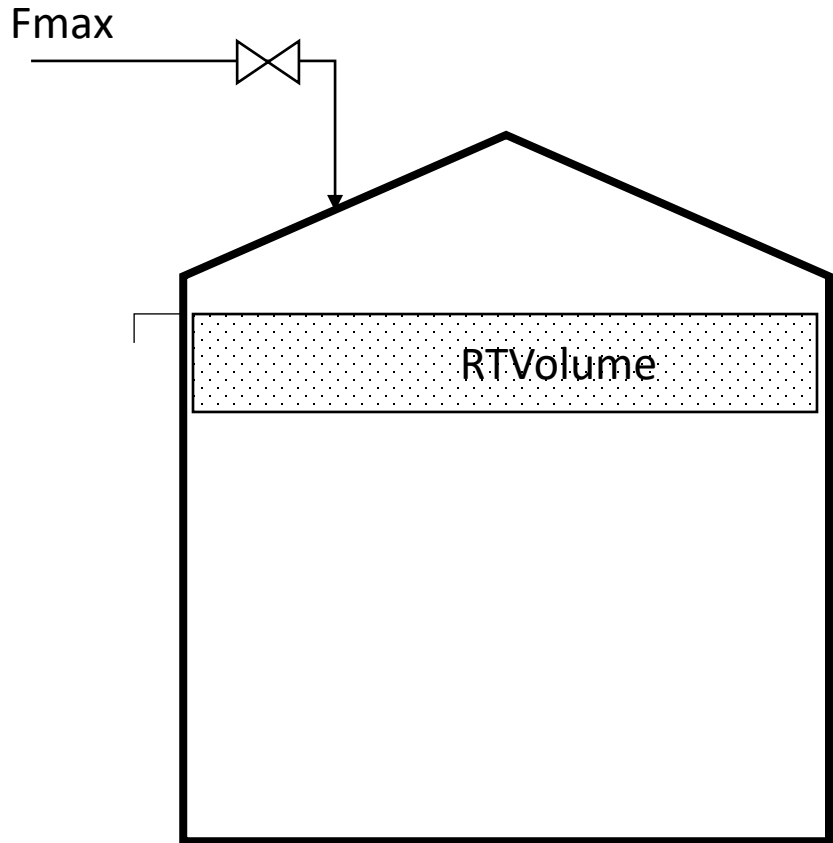
Determine equivalent volume at maximum flow for response time with safety factor



$$RTVolume = SF * F_{max} * RT$$

i.e. 7,500 liters = 1.5 * 1,000 l/min * 5 min

Tank Strapping Table



ACUREN
HAUTEUR DE RÉFÉRENCE - 9.427 m LOCALISÉE À 0.450 m DE L'EXTREMITÉ DU TOIT. Page 2 de 3

	4 MÈTRES				5 MÈTRES				6 MÈTRES				7 MÈTRES			
80	39 768	50	44 730	50	49 704	50	54 679	50	59 646	50	64 609	50	69 576	50	74 545	
81	39 865	51	44 834	51	49 805	51	54 774	51	59 745	51	64 707	51	69 670	51	74 635	
82	39 962	52	44 934	52	49 903	52	54 874	52	59 840	52	64 802	52	69 765	52	74 735	
83	40 064	53	45 033	53	50 002	53	54 973	53	59 945	53	64 906	53	69 868	53	74 835	
84	40 164	54	45 133	54	50 102	54	55 073	54	59 045	54	65 009	54	70 008	54	74 935	
85	40 263	55	45 232	55	50 201	55	55 172	55	60 144	55	65 108	55	70 106	55	75 095	
86	40 362	56	45 331	56	50 301	56	55 272	56	60 244	56	65 208	56	70 207	56	75 194	
87	40 462	57	45 431	57	50 400	57	55 371	57	60 343	57	65 307	57	70 307	57	75 294	
88	40 561	58	45 530	58	50 499	58	55 470	58	60 443	58	65 405	58	70 407	58	75 394	
89	40 660	59	45 629	59	50 599	59	55 570	59	60 543	59	65 504	59	70 507	59	75 494	
90	40 760	60	45 729	60	50 698	60	55 669	60	60 642	60	65 604	60	70 606	60	75 593	
91	40 859	61	45 828	61	50 798	61	55 769	61	60 742	61	65 703	61	70 706	61	75 693	
92	40 959	62	45 928	62	50 897	62	55 868	62	60 842	62	65 803	62	70 806	62	75 793	
93	41 058	63	46 027	63	50 996	63	55 967	63	60 941	63	65 903	63	70 906	63	75 893	
94	41 157	64	46 126	64	51 096	64	56 067	64	61 041	64	66 002	64	71 005	64	75 993	
95	41 257	65	46 226	65	51 195	65	56 166	65	61 140	65	66 102	65	71 105	65	76 093	
96	41 356	66	46 325	66	51 295	66	56 266	66	61 240	66	66 202	66	71 205	66	76 193	
97	41 456	67	46 424	67	51 394	67	56 365	67	61 340	67	66 301	67	71 305	67	76 293	
98	41 555	68	46 524	68	51 494	68	56 465	68	61 439	68	66 401	68	71 404	68	76 393	
99	41 654	69	46 623	69	51 593	69	56 564	69	61 539	69	66 500	69	71 504	69	76 493	
100	41 754	70	46 723	70	51 693	70	56 663	70	61 638	70	66 600	70	71 604	70	76 593	
101	41 853	71	46 822	71	51 792	71	56 763	71	61 738	71	66 700	71	71 704	71	76 693	
102	41 952	72	46 921	72	51 891	72	56 862	72	61 838	72	66 800	72	71 803	72	76 793	
103	42 052	73	47 021	73	51 991	73	56 962	73	61 937	73	66 900	73	71 903	73	76 893	
104	42 151	74	47 120	74	52 090	74	57 061	74	62 037	74	67 000	74	72 003	74	76 993	
105	42 251	75	47 220	75	52 190	75	57 161	75	62 137	75	67 100	75	72 103	75	77 093	
106	42 350	76	47 319	76	52 289	76	57 260	76	62 236	76	67 200	76	72 202	76	77 193	
107	42 449	77	47 418	77	52 388	77	57 359	77	62 336	77	67 300	77	72 302	77	77 293	
108	42 549	78	47 518	78	52 488	78	57 458	78	62 436	78	67 400	78	72 402	78	77 393	
109	42 648	79	47 617	79	52 587	79	57 558	79	62 536	79	67 500	79	72 501	79	77 493	
110	42 747	80	47 716	80	52 687	80	57 658	80	62 636	80	67 600	80	72 601	80	77 593	
111	42 847	81	47 816	81	52 786	81	57 757	81	62 735	81	67 700	81	72 701	81	77 693	
112	42 946	82	47 915	82	52 885	82	57 856	82	62 834	82	67 800	82	72 801	82	77 793	
113	43 046	83	48 015	83	52 985	83	57 956	83	62 934	83	67 900	83	72 901	83	77 893	
114	43 145	84	48 114	84	53 084	84	58 055	84	63 033	84	68 000	84	73 001	84	77 993	
115	43 244	85	48 213	85	53 184	85	58 155	85	63 133	85	68 100	85	73 101	85	78 093	
116	43 344	86	48 313	86	53 283	86	58 254	86	63 232	86	68 200	86	73 201	86	78 193	
117	43 443	87	48 412	87	53 383	87	58 354	87	63 332	87	68 300	87	73 301	87	78 293	
118	43 542	88	48 511	88	53 482	88	58 453	88	63 431	88	68 400	88	73 401	88	78 393	
119	43 642	89	48 611	89	53 581	89	58 552	89	63 531	89	68 500	89	73 501	89	78 493	
120	43 741	90	48 710	90	53 681	90	58 652	90	63 631	90	68 600	90	73 601	90	78 593	
121	43 841	91	48 810	91	53 780	91	58 751	91	63 731	91	68 700	91	73 701	91	78 693	
122	43 940	92	48 909	92	53 880	92	58 851	92	63 830	92	68 800	92	73 801	92	78 793	
123	44 039	93	49 009	93	53 979	93	58 950	93	63 930	93	68 900	93	73 901	93	78 893	
124	44 139	94	49 108	94	54 079	94	59 049	94	64 030	94	69 000	94	74 001	94	78 993	
125	44 238	95	49 207	95	54 179	95	59 149	95	64 129	95	69 100	95	74 101	95	79 093	
126	44 337	96	49 306	96	54 277	96	59 248	96	64 229	96	69 200	96	74 201	96	79 193	
127	44 437	97	49 406	97	54 377	97	59 348	97	64 328	97	69 300	97	74 301	97	79 293	
128	44 536	98	49 505	98	54 476	98	59 447	98	64 428	98	69 400	98	74 401	98	79 393	
129	44 636	99	49 605	99	54 576	99	59 547	99	64 528	99	69 500	99	74 501	99	79 493	

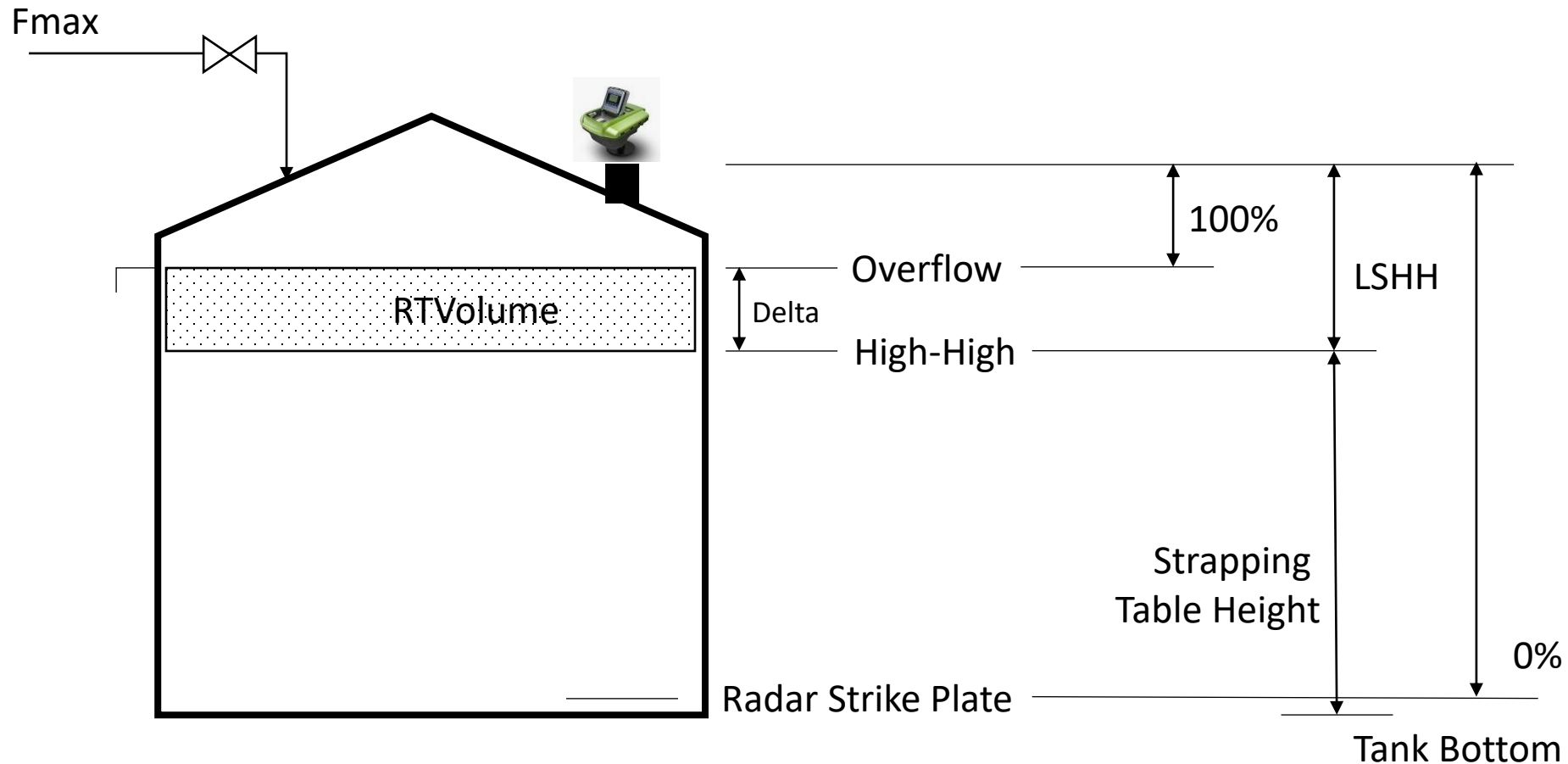
CAPACITÉ EN LITRES
Pression du liquide calculée pour une densité de 0.7950.
Quantité corrigée pour l'acier à une température de 15 °C.
Diamètre - 3.6 m. Hauteur - 9.1 m.
Les volumes et l'information du réservoir sont basés sur le tableau d'analyse soumis le 29 Apr 1996.
La charte a été mise à jour en Avril 2008 dû au changement de la hauteur de trop plein (débordement).
Trop plein (débordement) jusqu'au sommet de la ligne à vue - 9.427 m.

1	10	4	40	7	70
2	20	5	50	8	80
3	30	6	60	9	90

Find the height and the volume at overflow then subtract the RTVolume to determine the high-high level

- e.g. overflow = 150,000 liters @ 6.3 meters
- RTVolume = 7,500 liters
- Volume at High-High Level = 150,000 – 7,500 = 142,500 liters
- from strapping table 142,500 liters -> 5.8 meters = High-High Level
- Delta = 6.3 – 5.8 = 0.5 meters (minimum is 0.2 meters)

Radar Level Gauge



QUESTION?

