DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety & Health
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Circular Letter PV-2017-1

Effective Date: October 18, 2017

Subject: Air Tank Thickness Acceptance

To: All Inspection Agencies and their Inspectors

The purpose of this circular letter is to clarify California Code of Regulation Title 8 §462(a)(1) concerning the use of ultrasonic thickness determination for the suitability of an air tank for continued service.

Air tanks are subject to internal corrosion due to water being entrained during the air compression process. Water in the atmospheric air enters the storage tank and may cause corrosion, especially if the water isn't consistently drained.

Ultrasonic thickness (UT) measurements are made in four locations on the shell and two locations on each head. It is recommended that at least two shell measurements are made on the belly of the tank, preferably near the drain valve and that at least one head reading on each end is made on the straight flange near the weld seam (where moisture often pools due to the joggle joint or backing bar).

The UT readings should be greater than that shown on the air tank nameplate in order for a permit to operate being issued. It is permissible to take a 10% reduction of the nameplate or data report thickness. Compare the reduced value to the UT readings and if the reduced value is greater, a permit to operate is acceptable if the inspector so notes on the inspection report. It is also permissible to reduce the allowable working pressure of the air tank by performing minimum thickness calculations using the manufacturer's data information or values for the allowable stress of 13,800 psi, a joint efficiency E of 0.7 for the shell and 0.85 for seamless heads. This will establish new maximum allowable working pressure and minimum thickness that the inspector shall indicate on the inspection report and stamp near the existing nameplate, crossing out the existing nameplate information.

Air tanks that do not comply with these minimum thickness requirements shall have the rejection mark (a.k.a. "skull & crossbones"; see §462(i)) at the time of inspection by the inspector and indicated on the inspection report. The inspector has the authority to establish a permit length of less than 5 years if there are concerns about continued corrosion.

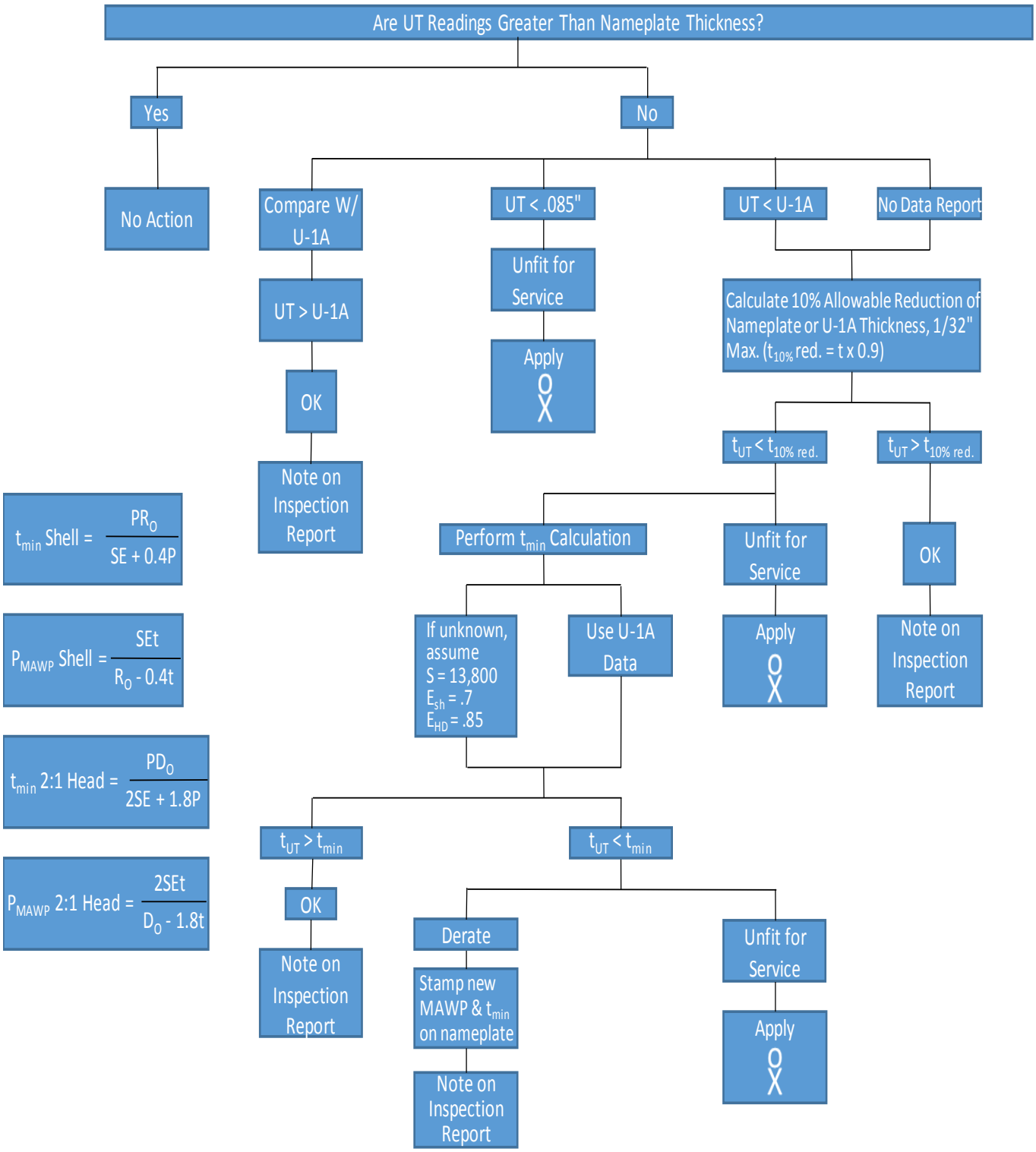
See attached flow chart and sample calculations for clarification.

Please contact our office if you have any questions.

Sincerely,

Donald C. Cook
Principal Safety Engineer

Air Tank Thickness Evaluation



Sample from Manufacturer's Data Report on following page

MAWP: 200 psi
Material: SA 414, G
Allowable Stress: 21400 psi
ID 24"
Tank Nameplate thickness (T): 0.149 head, 0.164 shell
Minimum thickness deduction allowed (.9T) 0.134" head, 0.148" shell

CASE 1
LOWEST UT READING: 0.135" head, 0.153" shell
Comment: UT readings are within the thickness reduction allowed

CASE 2
Shell Joint Efficiency: 0.7
Head Joint Efficiency: 0.85
LOWEST UT READING: 0.100" head, 0.140" shell
HEAD P CALCULATION: 151.1 psi
SHELL P CALCULATION: 173.2 psi
Comment: Revise MAWP to 150 psi
(Note: The pressure of the safety relief valve can be set lower, never higher)

CASE 3
Shell Joint Efficiency: 0.7
Head Joint Efficiency: 0.85
LOWEST UT READING: 0.84" head, 0.110" shell
HEAD P CALCULATION: 126.9 psi
SHELL P CALCULATION: 136 psi
Comment: This air tank is unfit for air pressure service
(Note: Apply the rejection mark)

CASE 4 (NO DATA REPORT MAWP 200 PSI – USE ALLOWABLE STRESS 13800)
Shell Joint Efficiency: 0.7
Head Joint Efficiency: 0.85
LOWEST UT READING: 0.133" head, 0.147" shell
HEAD P CALCULATION: 129.7 psi
SHELL P CALCULATION: 117.3 psi
Comment: Revise the MAWP to 100 psi – note most shop air pressure is about 125 psi
(Note: or you can apply the rejection mark)

1. Manufactured and certified by Steel Fab, A Division of Samuel Pressure Vessel Group, Inc., 17403 Lee Highway, Abingdon, Virginia, 24210-7833
(Name and address of manufacturer)

2. Manufactured for Curtis Toledo
(Name and address of purchaser)

3. Location of Installation Unknown
(Name and address)

4. Type Vertical (Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) 2013 (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010 (year) to A'11 (Addenda, if applicable (Date))

None (Code Case numbers) None (Special Service per UG-120(d))

6. Shell: SA414-G (Material spec. number, grade) .164" (Nominal thickness) None (Corr. allow.) 2' 0" (ID) (Inner diameter) 2' 9" (Length (overall))

7. Seams: Type No. 1 (Long. (welded, dbl., sngl., lap, butt)) None (R.T.(Spot or Full)) 70% (Eff.(%)) N/A (H.T. temp) N/A (Time (hr)) Type No. 6 (Girth. (welded, dbl., sngl., lap, butt)) None (R.T. (spot or full)) 85% (Eff(%)) 1 (No. of Courses)

8. Heads: (a) Material SA414-G (Spec. no., grade) (b) Material SA414-G (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP	.149"	None	N/A	N/A	2:1	N/A	N/A	N/A	Concave
(b)	BOTTOM	.149"	None	N/A	N/A	2:1	N/A	N/A	N/A	Concave

If removable, bolts used (describe other fastenings) None (Material spec. number, grade, size, number)

9. MAWP 200 psi (Internal) N/A (External) at max. temp. 400 °F (Internal) N/A (External)

Min. design metal temp. -20 °F at 200 psi Hydro, pneu., or comb. test pressure HYDRO. at 260 psi

Proof test N/A

10. Nozzles, inspection and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
Inspection	2	2.000"	Threaded Fitting	SA181 CL 70		UG11(a)(1)		Inherent	FigUW16.2(c)		Heads
Inlet	1	0.750"	Threaded Fitting	SA181 CL 70		UG11(a)(1)		Inherent	FigUW16.2(c)		

11. Supports: Skirt Yes (Yes or no) Lugs 0 (Number) Legs 0 (Number) Other (1) - 4GA Thick Top plate (Describe) Attached Heads - Welded (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors, have been furnished for the following items of the report:

N/A
(Name of part, item number, Manufacturer's name and identifying stamp)

Constructed under the provision of UG-90 (c)(2). No safety device provided per UG-125(a). UG-20(f) applies.