



Comments: _____



Integrity Testing
SERVICES

P.E. No.: N/S Yr. Blt.: 1973
OIP# 603VP005 Manway: YES
Serial No.: 393508 Size: 2743mm X 20101mm
P.R.N. Ⓐ A601541 Service: SWEET
C.R.N.: N/S PWHT: NO
Code/Div.: N/S RT: FULL
Para: N/S Insulated: NO
C. Stamp: U W CU N.B. No: N/S
Manufacturer: TRINITY INDUSTRIES

Design & Materials Data

HEAD	SHELL
Material: <u>SA-455-B</u>	Material: <u>SA-612-B</u>
Nom.: <u>11.1mm</u>	Nom.: <u>17.1mm</u>
C.A.: <u>0</u>	C.A.: <u>0</u>
BOOT HEAD	BOOT SHELL
Material: _____	Material: _____
Nom.: _____	Nom.: _____
C.A.: _____	C.A.: _____
CHANNEL HEAD	CHANNEL SHELL
Material: _____	Material: _____
Nom.: _____	Nom.: _____
C.A.: _____	C.A.: _____
MAWP Shell Side: <u>1724 KPA</u>	⊗ Temp.: <u>52°C</u>
MAWP Tube Side: _____	⊗ Temp.: _____

CLIENT

TAQA NORTH

FACILITY

CHINCHAGA GAS PLANT

C-032-H/094-H-08

ITEM

PROPANE BULLET

BY: M.J.

DATE: 2008/04

DWG.# 123

FACILITY:	CHINCHAGA GAS PLANT	MANUFACTURER:	TRINITY INDUSTRIES
LSD:	C-032-H/094-H-08	DESIGN PRESSURE:	1724 kPa / 250 psi
ITEM DESC.:	PROPANE BULLET	DESIGN TEMP.:	52 C / 126 F
EQUIP / OIP#:	603VP005		
PROV. REG. #:	A601541	VESSEL CORROSION ALLOWANCE:	
SERIAL #:	393508		
CRN.:	N/S	TOTAL CAUTION / ACTION TML:	1

Item # (123)
COMMENTS:

2008/04 - TML 12.04 TO 12.06 AFTER NOZZLE.

TML No.: 2 2"90L I/L 150 #

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 3.80 mm.

MATERIAL:

MINIMUM THICKNESS MEASURED: 3.60 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
2.01	3.90	0.50	3.40	3.90	N/A	4.00	0.000	0.000	100.00	.	NO
2.02	3.90	0.50	3.40	3.90	N/A	3.80	0.000	0.003	66.67	.	NO *
2.03	3.90	0.50	3.40	3.90	N/A	3.80	0.000	0.003	66.67	.	NO *
2.04	3.90	0.50	3.40	3.90	N/A	3.60	0.000	0.008	13.13	.	CAUTION *
2.05	3.90	0.50	3.40	3.90	N/A	3.80	0.000	0.003	66.67	.	NO *

TML No.: 4 WEST BTM HD T-B

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 11.57 mm.

MATERIAL: SA455-B

MINIMUM THICKNESS MEASURED: 11.50 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
4.01	11.10	0.00	11.10	11.10	N/A	11.50	0.000	0.000	66.67	.	NO *
4.02	11.10	0.00	11.10	11.10	N/A	11.60	0.000	0.000	83.34	.	NO *
4.03	11.10	0.00	11.10	11.10	N/A	11.50	0.000	0.000	66.67	.	NO *
4.04	11.10	0.00	11.10	11.10	N/A	11.60	0.000	0.000	83.34	.	NO *
4.05	11.10	0.00	11.10	11.10	N/A	11.60	0.000	0.000	83.34	.	NO *
4.06	11.10	0.00	11.10	11.10	N/A	11.60	0.000	0.000	83.34	.	NO *

If Baseline (B/L) Survey Thickness Measurement was not taken at the time of Manufacture, then Nominal Thickness is used as Baseline Thickness.
Minimum Thickness is calculated

Design Minimum Thickness = Nom. Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

(*) and GREEN Represent 25% of the last thickness readings, which have the shortest remaining half life.

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Brown if CR >= 0.500mm/yr.).

Calculated T-Min. Thickness - Using UPIPE Mathematics.

TAQA North

Unit: N-603

FACILITY:	CHINCHAGA GAS PLANT	MANUFACTURER:	TRINITY INDUSTRIES
LSD:	C-032-H/094-H-08	DESIGN PRESSURE:	1724 kPa / 250 psi
ITEM DESC.:	PROPANE BULLET	DESIGN TEMP.:	52 C / 126 F
EQUIP / OIP#:	603VP005	VESSEL CORROSION ALLOWANCE:	
PROV. REG. #:	A601541	TOTAL CAUTION / ACTION TML:	1
SERIAL #:	393508		
CRN.:	N/S		

Item # (123)

COMMENTS:

2008/04 - TML 12.04 TO 12.06 AFTER NOZZLE.

TML No.: 6 TOP SH N-S

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 18.77 mm.

MATERIAL: SA-612-B

MINIMUM THICKNESS MEASURED: 18.70 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
6.01	17.10	0.00	17.10	17.10	N/A	18.80	0.000	0.000	100.00	.	NO
6.02	17.10	0.00	17.10	17.10	N/A	18.80	0.000	0.000	100.00	.	NO
6.03	17.10	0.00	17.10	17.10	N/A	18.70	0.000	0.000	100.00	.	NO
6.04	17.10	0.00	17.10	17.10	N/A	18.70	0.000	0.000	100.00	.	NO
6.05	17.10	0.00	17.10	17.10	N/A	18.80	0.000	0.000	100.00	.	NO
6.06	17.10	0.00	17.10	17.10	N/A	18.80	0.000	0.000	100.00	.	NO

TML No.: 8 SIDE SH T-B

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 18.12 mm.

MATERIAL: SA-612-B

MINIMUM THICKNESS MEASURED: 18.00 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
8.01	17.10	0.00	17.10	17.10	N/A	18.20	0.000	0.000	100.00	.	NO
8.02	17.10	0.00	17.10	17.10	N/A	18.20	0.000	0.000	100.00	.	NO
8.03	17.10	0.00	17.10	17.10	N/A	18.00	0.000	0.000	100.00	.	NO
8.04	17.10	0.00	17.10	17.10	N/A	18.00	0.000	0.000	100.00	.	NO
8.05	17.10	0.00	17.10	17.10	N/A	18.20	0.000	0.000	100.00	.	NO
8.06	17.10	0.00	17.10	17.10	N/A	18.10	0.000	0.000	100.00	.	NO

If Baseline (B/L) Survey Thickness Measurement was not taken at the time of Manufacture, then Nominal Thickness is used as Baseline Thickness.
Minimum Thickness is calculated

Design Minimum Thickness = Nom. Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

(*) and GREEN Represent 25% of the last thickness readings, which have the shortest remaining half life.

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Brown if CR >= 0.500mm/yr.).

Calculated T-Min. Thickness - Using UPipe Mathematics.

TAQA North

Unit: N-603

FACILITY:	CHINCHAGA GAS PLANT	MANUFACTURER:	TRINITY INDUSTRIES
LSD:	C-032-H/094-H-08	DESIGN PRESSURE:	1724 kPa / 250 psi
ITEM DESC.:	PROPANE BULLET	DESIGN TEMP.:	52 C / 126 F
EQUIP / OIP#:	603VP005		
PROV. REG. #:	A601541	VESSEL CORROSION ALLOWANCE:	
SERIAL #:	393508		
CRN.:	N/S	TOTAL CAUTION / ACTION TML:	1

Item # (123)

COMMENTS:

2008/04 - TML 12.04 TO 12.06 AFTER NOZZLE.

TML No.: 10 WEST BTM SH W-E

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 18.00 mm.

MATERIAL: SA-612-B

MINIMUM THICKNESS MEASURED: 17.90 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
10.01	17.10	0.00	17.10	17.10	N/A	18.00	0.000	0.000	100.00	.	NO
10.02	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO
10.03	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO
10.04	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO
10.05	17.10	0.00	17.10	17.10	N/A	18.00	0.000	0.000	100.00	.	NO
10.06	17.10	0.00	17.10	17.10	N/A	18.30	0.000	0.000	100.00	.	NO

TML No.: 12 EAST BTM SH W-E

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 17.82 mm.

MATERIAL: SA-612-B

MINIMUM THICKNESS MEASURED: 17.70 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
12.01	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO
12.02	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO
12.03	17.10	0.00	17.10	17.10	N/A	17.80	0.000	0.000	100.00	.	NO
12.04	17.10	0.00	17.10	17.10	N/A	17.70	0.000	0.000	100.00	.	NO
12.05	17.10	0.00	17.10	17.10	N/A	17.70	0.000	0.000	100.00	.	NO
12.06	17.10	0.00	17.10	17.10	N/A	17.90	0.000	0.000	100.00	.	NO

If Baseline (B/L) Survey Thickness Measurement was not taken at the time of Manufacture, then Nominal Thickness is used as Baseline Thickness.
Minimum Thickness is calculated

Design Minimum Thickness = Nom. Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

(*) and GREEN Represent 25% of the last thickness readings, which have the shortest remaining half life.

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Brown if CR >= 0.500mm/yr.).

Calculated T-Min. Thickness - Using UPipe Mathematics.

CALCULATE PRESSURE VESSEL TMIN or DESIGN PRESSURE

FACILITY: Chinchaga Gas Plant--32-H/94-H-8
DESCRIPTION: Propane Bullet
ITEM NO.: 123
TML: 14
MATERIAL: SA234WPB
PRN #: A601541
RT: N/S
TYPE: 2"90°

PRESSURE VESSEL TMIN CALCS (Cylindrical shells INSIDE RADIUS)

$t = PR/SE - 0.6P$ Minimum Required Thickness, inches

P=	250	Design Pressure, psi
R=	0.997	INSIDE Radius of shell, inches
S=	17100	Maximum Allowable Stress, psi
E=	1.00	Joint Efficiency

T= 125°F

t=	0.015	inches, per ASME Sect 8 UG-27(c)1
t=	0.38	mm

$$t = 0.0147" + C/A .0625" = 0.0775"$$

Use the UG - 16 Rule not less than 1/16"

TAQA North

Unit: N-603

FACILITY:	CHINCHAGA GAS PLANT	MANUFACTURER:	TRINITY INDUSTRIES
LSD:	C-032-H/094-H-08	DESIGN PRESSURE:	1724 kPa / 250 psi
ITEM DESC.:	PROPANE BULLET	DESIGN TEMP.:	52 C / 126 F
EQUIP / OIP#:	603VP005		
PROV. REG. #:	A601541	VESSEL CORROSION ALLOWANCE:	
SERIAL #:	393508		
CRN.:	N/S	TOTAL CAUTION / ACTION TML:	1

Item # (123)

COMMENTS:

2008/04 - TML 12.04 TO 12.06 AFTER NOZZLE.

TML No.: 14 NOZ 2"90L 150

DATE BUILT: 01/1973

AVERAGE THICKNESS MEASURED: 5.54 mm.

MATERIAL:

MINIMUM THICKNESS MEASURED: 5.10 mm.

Pts.	Nom. Thick. mm	CA + Steel Mfg.Tol. mm	Nom. -CA -Toll. mm	B/L Survey Thick. mm	Prev. Survey Thick. mm	Last Survey Thick. mm	Short Term CR mm/yr	Long Term CR mm/yr	Rem. Half Life yr	Future UT Reading mm/yy	Action/Caution Required Item
				01/1973		04/2008					
14.01	5.50	3.53	1.97	5.50	N/A	5.60	0.000	0.000	100.00	.	NO
14.02	5.50	3.53	1.97	5.50	N/A	5.70	0.000	0.000	100.00	.	NO
14.03	5.50	3.53	1.97	5.50	N/A	5.10	0.000	0.010	100.00	.	NO
14.04	5.50	3.53	1.97	5.50	N/A	5.70	0.000	0.000	100.00	.	NO
14.05	5.50	3.53	1.97	5.50	N/A	5.60	0.000	0.000	100.00	.	NO

If Baseline (B/L) Survey Thickness Measurement was not taken at the time of Manufacture, then Nominal Thickness is used as Baseline Thickness.
Minimum Thickness is calculated

Design Minimum Thickness = Nom. Thick. - CA - Manufacturing Steel Tolerance.

Manufacturing Tolerance of pipe and forged fittings is + or - 12.5% (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

Manufacturing Tolerance of plate is + or - 0.25mm (0.010") (May or may not apply dependent upon the Client's Owner-User Integrity Management System).

(*) and GREEN Represent 25% of the last thickness readings, which have the shortest remaining half life.

BLUE (Caution TML Point) - if Corrosion Rate exceed a 0.250mm / 0.009 in. per yr. or Half Life is less than 15 years.

RED (Action TML Point) - If Remaining Half Life is 0 and Last Survey Thickness is below Nominal-CA-Tolerance Thickness.

CA - Corrosion Allowance, CR - Corrosion Rate (Brown if CR >= 0.500mm/yr.).

Calculated T-Min. Thickness - Using UPipe Mathematics.