WWW.MANITEXSABRE.COM

5420 E State Road 8, Knox, IN 46534 **CONTACT: (574) 772 - 5380**

DW-452-41-5121


SABRE

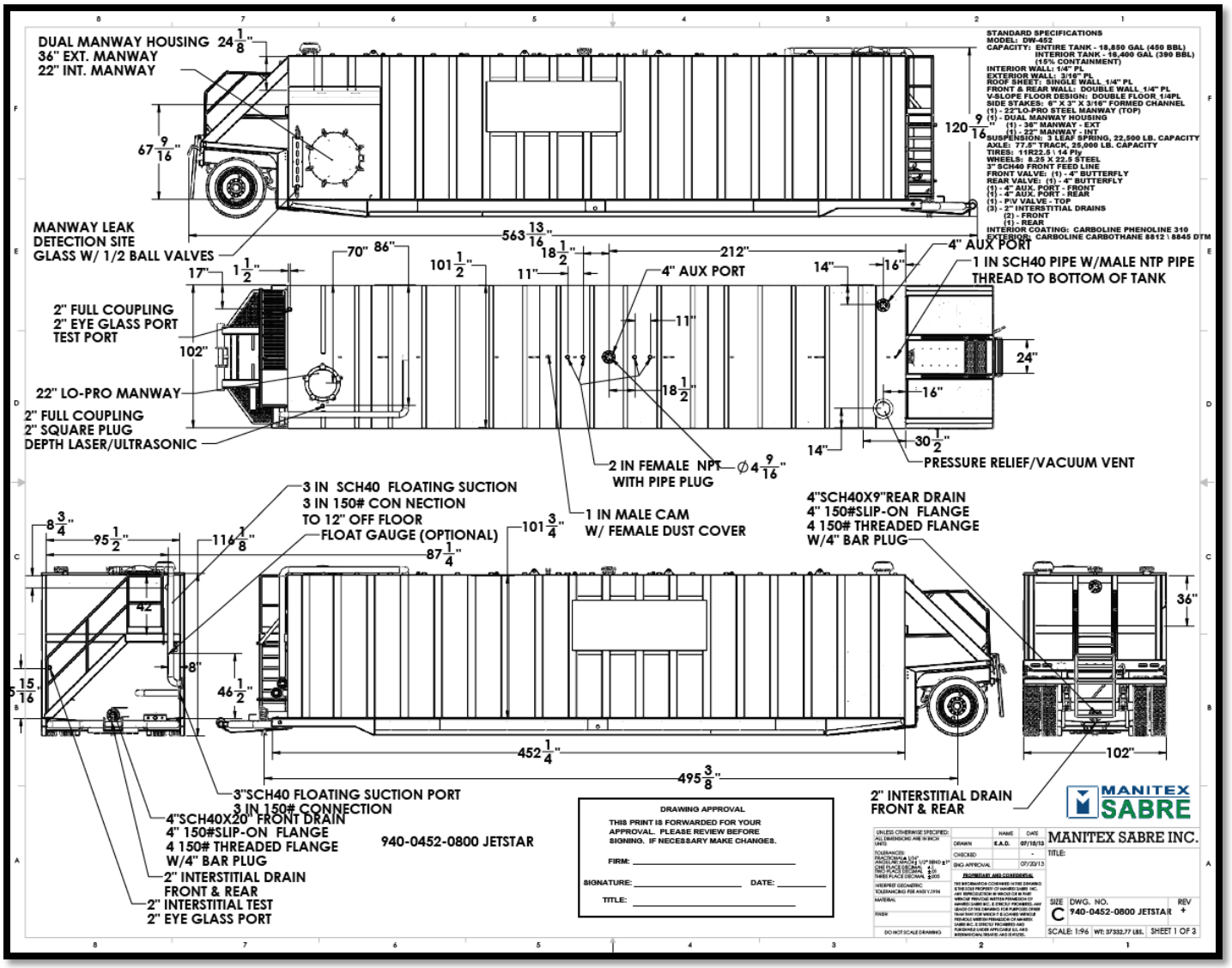
DOUBLE WALL 452 FRAC TANK FABRICATION SPECIFICATION

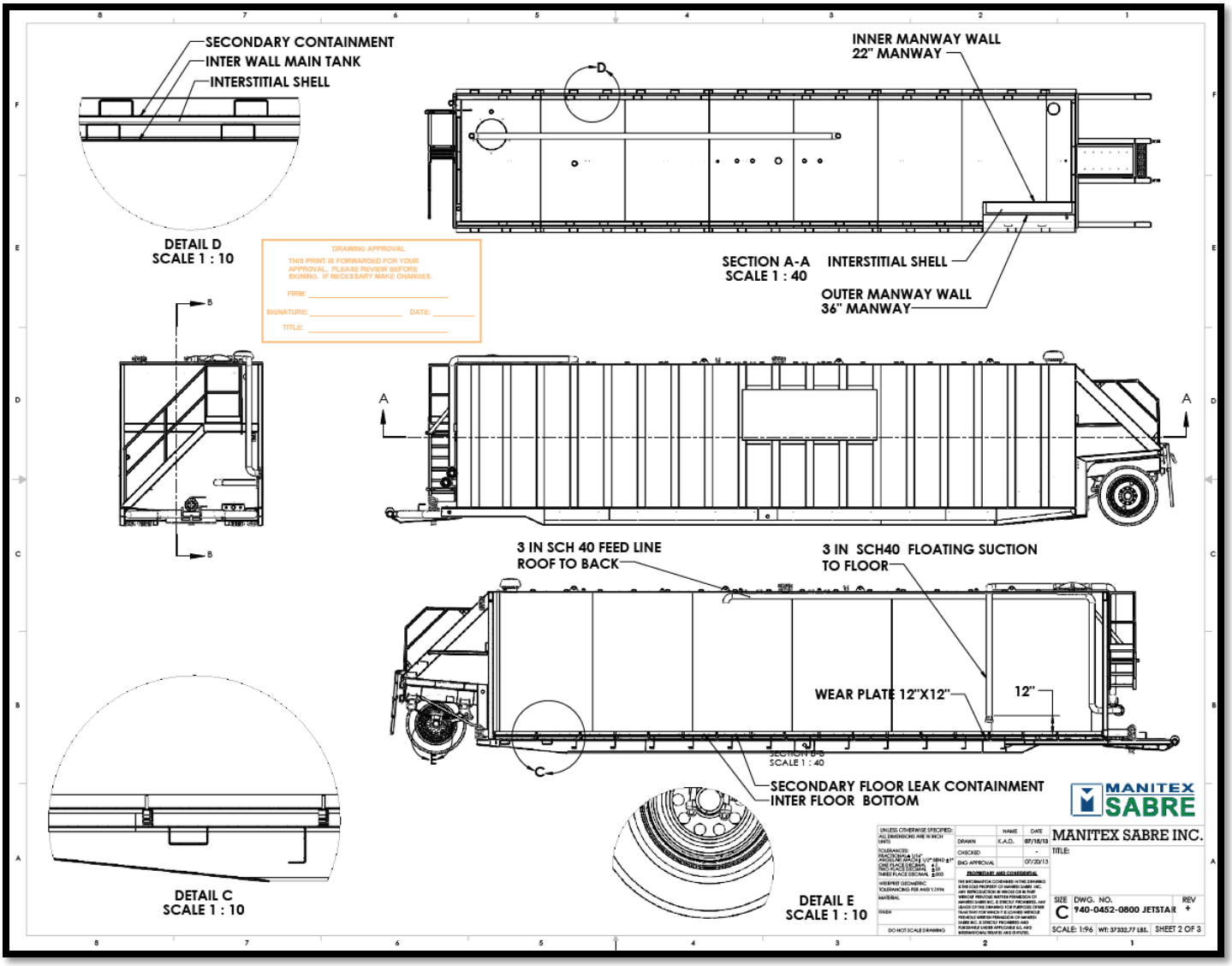
TABLE OF CONTENTS

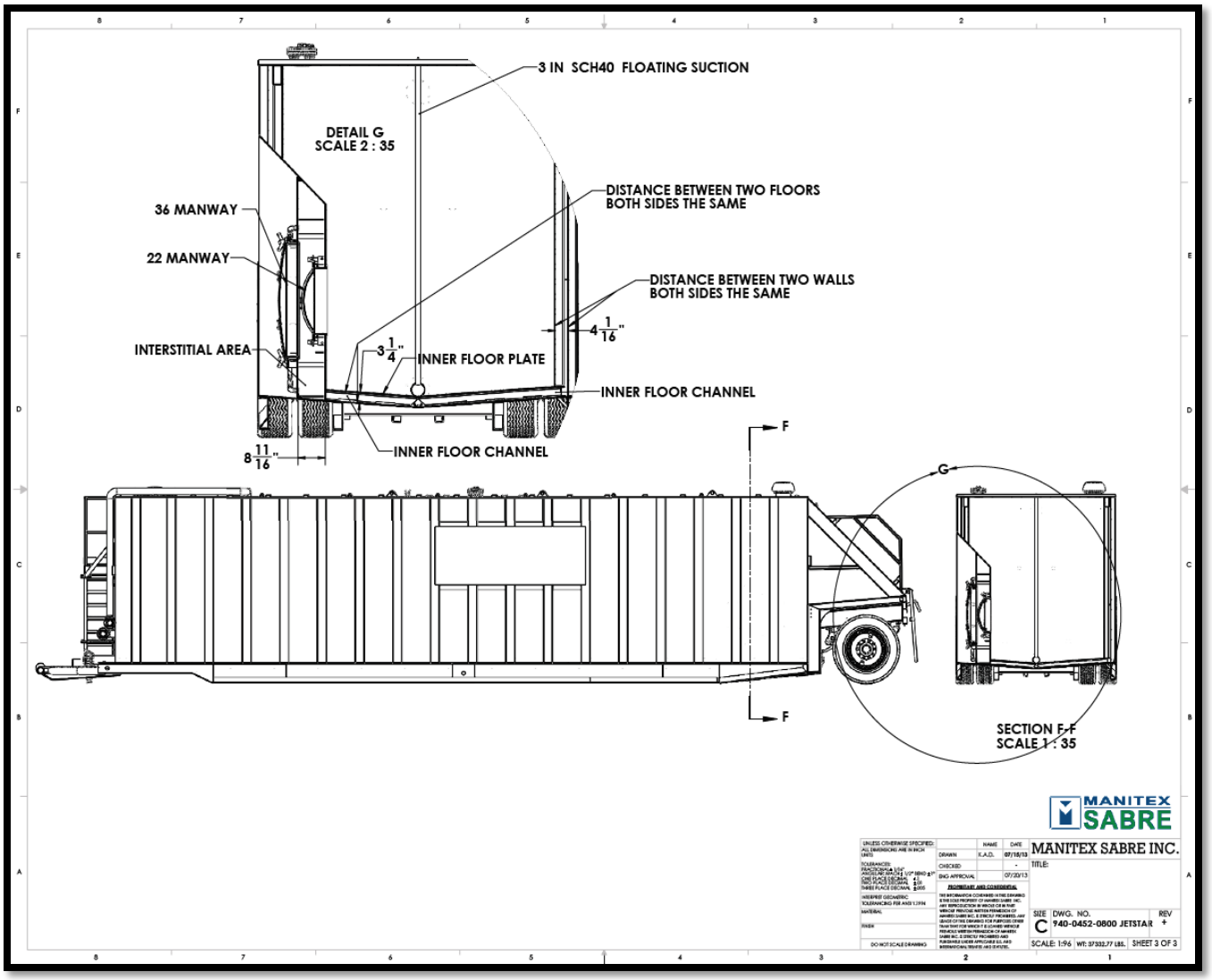
1. INTRODUCTION:

This document is designed to give general notes for fabrication, the rules of operation, welding procedures, of a smooth wall rectangular Double wall frac tank, 450BBL.

The tank is designed for operation at ATMOSPHERIC Pressure and temperatures ranging from 80-140 deg F. The tank is built per the drawing.




SECONDARY CONTAINMENT
INTER WALL MAIN TANK
INTERSTITIAL SHELL
DETAIL D
SCALE 1 : 10
INNER MANWAY WALL
22" MANWAY
SECTION A-A
SCALE 1 : 40
INTERSTITIAL SHELL
OUTER MANWAY WALL
36" MANWAY
DRAWING APPROVAL
THIS PRINT IS FORWARDED FOR YOUR APPROVAL. PLEASE REVIEW BEFORE SIGNING. IF NECESSARY MAKE CHANGES.
FIRM:
SIGNATURE:
DATE:
TITLE:
3 IN SCH 40 FEED LINE
ROOF TO BACK
3 IN SCH40 FLOATING SUCTION
TO FLOOR
WEAR PLATE 12"X12"
12"
SECONDARY FLOOR LEAK CONTAINMENT
INTER FLOOR BOTTOM
DETAIL C
SCALE 1 : 10
DETAIL E
SCALE 1 : 10
MANITEX SABRE
MANITEX SABRE INC.
SIZE C
DWG. NO. 940-0452-0800 JETSTAR
REV +
SCALE: 1:96
SHEET 2 OF 3


3 IN SCH40 FLOATING SUCTION
DETAIL G
SCALE 2 : 35
DISTANCE BETWEEN TWO FLOORS
BOTH SIDES THE SAME
36 MANWAY
22 MANWAY
DISTANCE BETWEEN TWO WALLS
BOTH SIDES THE SAME
4 1/16"
INTERSTITIAL AREA
3 1/4"
INNER FLOOR PLATE
INNER FLOOR CHANNEL
8 11/16"
INNER FLOOR CHANNEL
F
G
F
SECTION F-F
SCALE 1 : 35
MANITEX SABRE
MANITEX SABRE INC.
TITLE:
SIZE C
DWG. NO. 940-0452-0800 JETSTAR
REV +
SCALE: 1:96
WT: 37332.77 LBS.
SHEET 3 OF 3

2. DESCRIPTION AND OPERATION:

2.1 Purpose of the Product

The Tank is designed for storage generally holding oil, chemicals or other industrial materials.

2.2 Specifications:

» Capacity:	450 BBL (18,850 gallons) Entire Tank Capacity 390 BBL (16,400 gallons) Interior Tank Capacity
» Height:	9'-8" (Ground to Top) 8'-6" (Wall / Inside Height)
» Width:	8'-6" (Outside) 7'-2 ½" (Inside)
» Length:	46'-0" (Front Nose to Rear) 37'-0" (Tank Body) 36'-2 7/16" (Internal)
» Weight:	38,000 lbs.

2.3 Composition of the Product:

Our standard double wall tank design consists of exterior structure and interior structure. Both interior and exterior floors are V-bottom design with ¼" thick ASTM A36 carbon steel. Interior walls and roof are made of ¼" thick ASTM A36 carbon steel. The exterior walls are 3/16" thick ASTM A36 carbon steel. Sample of material specs are included in references. The V-bottom floor and smooth wall interior design helps in complete and easy clean out.

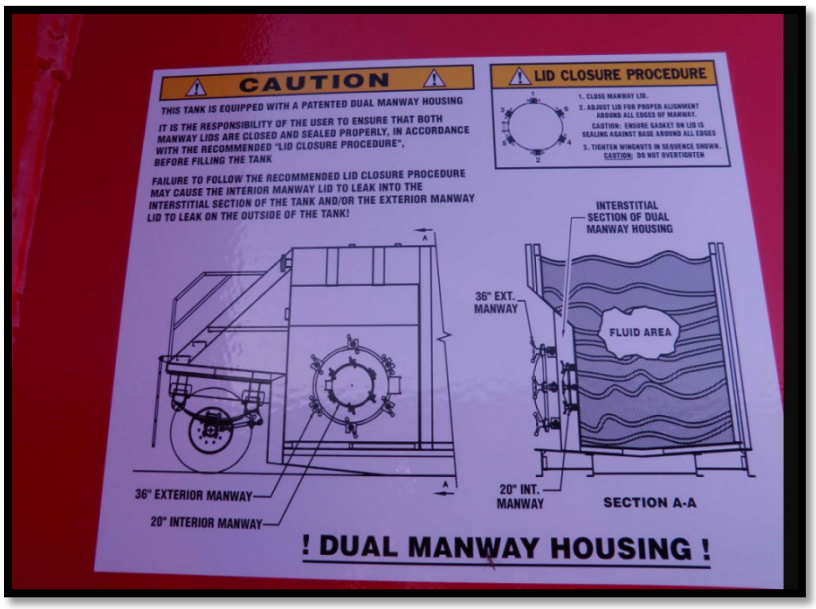
Interstitial tank consists of (2) 2" drain ports with ball valves. The drain and auxiliary ports on the tank has ANSI 150# slip-on and threaded flanges. The butterfly valves are wafer style with Cast iron body, Buna-N seat & seals, 316 SS stem, Nylon coated ductile iron disk w/ plug and chain. The tank consists of one dual manway housing (patented design) to access the interstitial tank with 36" manway and interior with 22" manway. One additional 22" low-profile access manway is located on the roof of the tank.

Roof connections include one 4" vapor recovery port with plug and 8" pressure and vacuum relief valve, 16 oz./in2 pressure setting, 0.4 oz./in2 vacuum setting; Buna-N seal. JAYCO JT-8 (JT8116V)

Rear Stairway: 24” Access to Rear Platform w\ Fold-Up Ladder

Notes:

- All materials shall be ASTM A36, unless otherwise noted.
- Fabrication dimensional tolerances shall be +/- 1/8” unless noted otherwise.
- All sharp edges and corners shall be removed.
- Ladders, handrails and toe boards are fabricated to meet OSHA requirements.
- All leak testing shall be conducted prior to application of linings, coatings etc.
- The outside of the equipment shall be completely dry at the time that leak testing is conducted.
- Hydrostatic test pressure shall be maintained for an adequate period of time to permit a thorough inspection of the equipment.



2.4 Welding Procedure:

Manitex Sabre is in accordance with AWS D1.1. Welding meets sizes of AWS D1.1 table 5.8, except strength welds shall be 3/16” minimum.

All welds are continuous, fillet type, seal welds unless noted otherwise. Welds shall be free of weld spatter, burrs.

Procedure qualification records are included in reference section.

Inspection of work and records

2.4.1 Size, length, and location of welds:

The inspector shall ensure that the size, length, and location of all welds conform to the requirements of this code and to the detail drawings and that no unspecified welds have been added without the approval of engineering.

2.4.2 Scope of examination:

The inspector shall, at suitable intervals, observe joint preparation, assembly practice, the welding techniques, and performance of each welder, welding operator, and tack welder to ensure that the applicable requirements of this code are met.

2.4.3 Extent of examination:

The inspector shall examine the work to ensure that it meets the requirements of this code. Other acceptance criteria, different from those described in the code, may be used when approved by the engineer. Size and contour of welds shall be measured with suitable gages. Visual inspection for cracks in welds and base metal and other discontinuities should be aided by a strong light, magnifiers, or such other devices as may be found helpful.

Table 6.1
Visual Inspection Acceptance Criteria (see 6.9)

Discontinuity Category and Inspection Criteria	Statically Loaded Nontubular Connections	Cyclically Loaded Nontubular Connections	Tubular Connections (All Loads)
(1) Crack Prohibition Any crack shall be unacceptable, regardless of size or location.	X	X	X
(2) Weld/Base-Metal Fusion Thorough fusion shall exist between adjacent layers of weld metal and between weld metal and base metal.	X	X	X
(3) Crater Cross Section All craters shall be filled to provide the specified weld size, except for the ends of intermittent fillet welds outside of their effective length.	X	X	X
(4) Weld Profiles Weld profiles shall be in conformance with 5.24.	X	X	X
(5) Time of Inspection Visual inspection of welds in all steels may begin immediately after the completed welds have cooled to ambient temperature. Acceptance criteria for ASTM A 514, A 517, and A 709 Grade 100 and 100 W steels shall be based on visual inspection performed not less than 48 hours after completion of the weld.	X	X	X
(6) Undersized Welds The size of a fillet weld in any continuous weld may be less than the specified nominal size (L) without correction by the following amounts (U): L, specified nominal weld size, in [mm] / U, allowable decrease from L, in [mm] ≤ 3/16 [5] / ≤ 1/16 [2] 1/4 [6] / ≤ 3/32 [2.5] ≥ 5/16 [8] / ≤ 1/8 [3] In all cases, the undersize portion of the weld shall not exceed 10% of the weld length. On web-to-flange welds on girders, underrun shall be prohibited at the ends for a length equal to twice the width of the flange.	X	X	X
(7) Undercut (A) For material less than 1 in [25 mm] thick, undercut shall not exceed 1/32 in [1 mm], with the following exception: undercut shall not exceed 1/16 in [2 mm] for any accumulated length up to 2 in [50 mm] in any 12 in [300 mm]. For material equal to or greater than 1 in thick, undercut shall not exceed 1/16 in [2 mm] for any length of weld.	X		
(B) In primary members, undercut shall be no more than 0.01 in [0.25 mm] deep when the weld is transverse to tensile stress under any design loading condition. Undercut shall be no more than 1/32 in [1 mm] deep for all other cases.		X	X
(8) Porosity (A) CJP groove welds in butt joints transverse to the direction of computed tensile stress shall have no visible piping porosity. For all other groove welds and for fillet welds, the sum of the visible piping porosity 1/32 in [1 mm] or greater in diameter shall not exceed 3/8 in [10 mm] in any linear inch of weld and shall not exceed 3/4 in [20 mm] in any 12 in [300 mm] length of weld.	X		
(B) The frequency of piping porosity in fillet welds shall not exceed one in each 4 in [100 mm] of weld length and the maximum diameter shall not exceed 3/32 in [2.5 mm]. Exception: for fillet welds connecting stiffeners to web, the sum of the diameters of piping porosity shall not exceed 3/8 in [10 mm] in any linear inch of weld and shall not exceed 3/4 in [20 mm] in any 12 in [300 mm] length of weld.		X	X
(C) CJP groove welds in butt joints transverse to the direction of computed tensile stress shall have no piping porosity. For all other groove welds, the frequency of piping porosity shall not exceed one in 4 in [100 mm] of length and the maximum diameter shall not exceed 3/32 in [2.5 mm].		X	X

Note: An "X" indicates applicability for the connection type; a shaded area indicates non-applicability.

2.5 Blast and Paint:

INTERIOR BLAST: SSPC-SP10 - NEAR WHITE BLAST

EXTERIOR BLAST: SSPC-SP6 - COMMERCIAL BLAST

INT. COATING: CARBOLINE PHENOLINE 310 \ 25 - 30 MILS D.F.T.

EXT. COATING: CARBOLINE CARBOTHANE 8845 DTM \ 3 – 5 MILS D.F.T.

COLOR: CARBOLINE CHART (WHITE)

UNDERCOATING: WATER-BASE ASPHALT EMULSION

See references for interior coating and exterior paint documents

2.6 Safety Equipment:

- Guarded Vertical Ladder.
- Grip Strut steps to prevent slipping
- Handrails and Stairways painted Black
- Attached Strapping Charts

2.7 Marking:

Logo of the company

Date of Manufacture

Max Gross wt.

Safe Operation Decals

3. INTENDED USES:

3.1 Operational Limitations:

The tank should not be filled above its capacity.

4. MAINTENANCE:

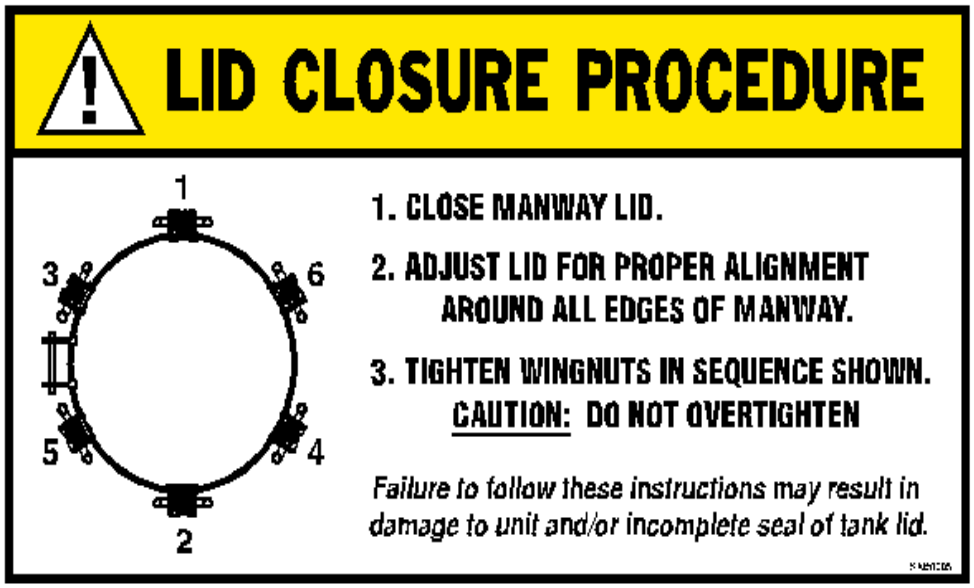
- External and internal examination periodically every year.

4.1 Security Measures:

To ensure safe operation, do not perform repairs or troubleshooting with a filled tank.

The wait staff carrying out the work to silage should be wearing personal protective equipment (goggles, gloves, respirators, protective clothing etc.) and to comply with safety requirements.

CHANDLER MANWAY LID – STANDARD DECAL



The hinge assembly on the manway lid is designed, such that it is possible, to shut the manway lid without properly seating the lid gasket against the rim of the manway neck.

If the lid is not properly closed according to the procedure provided on the “lid closure procedure” decal, the manway will leak.

Manitex Sabre recommends that all manway lids are properly checked before the unit is sent to the field for use.
Manitex Sabre also recommends that the end user re-checks all manway lids prior to filling the tank and\or container.

4.2 Manway Lid Closure Instructions:

The proper procedure for aligning the lid and tightening the wing nuts of a 22” Frac man way is listed below and attached.

1. Ensure when closing the lid the flat lip of the lid is upon the top of the rubber gasket and as central & even as possible.

2. Lightly - with minimum force hand tighten each wing nut so the lid stays centered upon the gasket within the neck.
3. Whenever tightening a wing nut upon a man way the operator must ensure to tighten as you would a tire-rim upon a car – go opposite and across - tightening each as equal as possible and not over tightening all the way on any one wing nut until all are more than hand tight.

4. Once this is achieved and the wing nuts are equally hand tight then it normally takes a cheater bar or rubber mallet to tighten further. Each wing nut will need approximately 75 to 80-foot pounds to torque to achieve closure – this also needs to be done in the manner of going across and opposite instead of in a circular motion.

5. If you tighten the wing nuts of a man way lid in a circular motion you will never achieve a sealed unit and if you do the man way lid will be deformed and will never properly seal again.

6. Please remember to tighten as you would a tire-rim on a car – opposite and across

5. TESTS/CERTIFICATIONS:

Tests Performed: Hydrostatic Water Test

See Sample documents in references.

6. TRANSPORTATION:

The tank can be easily hauled using a roll-off truck or trailer.

Tank should be transported only in the unfilled state.

Support equipment is required for normal install like articulated man lifts, skid steer.

7. WARRANTY:

Manitex Sabre Inc. warrants only products of its manufacture against operational failure caused by defective materials or workmanship, which occur during proper and normal use. Manitex Sabre Inc. reserves the right to determine what is proper and normal use. Manitex Sabre Inc. makes no warranty on any of its equipment used in any way except as it was designed, intended, and sold to perform. These may be restricted and are subject to individual state guidelines.

Manitex Sabre's warranty policy is only effective for products that have been properly maintained and operated in accordance with our requirements.

Coverage Period:
Major Components: Main Structural Components 12 Months

Exterior & Interior Coating 6 Months
Note: Interior Coating Warranty is void if any chemical or fluid is placed inside the tank that is not compatible with the coating or exceeds the maximum operating temperature for which the coating was designed. If any such chemical is in question, contact Manitex Sabre Inc. before using the tank to store such chemical. Any mechanical damage that causes an interior \exterior coating failure is not covered under this warranty.

Manitex Sabre Inc.'s only obligation is to repair or replace, at its election, free of charge, any part of the product that its inspection shows to be defective and, if appropriate, the lowest round trip transportation charges from Manitex Sabre's original customer to our closest facility and return, but excluding all transportation costs from Manitex Sabre's customer to its customer. For defects in the material or workmanship, both parts and labor are at Manitex Sabre's expense. All labor costs allowed shall be in accordance with Manitex Sabre's established rate.

Manitex Sabre Inc. shall not, under any circumstances, be liable for labor for removal and installation expenses, loss of time, manufacturing costs, transportation costs (except as noted above), materials and/or loss of materials, loss of profits, incidental, special or consequential damages, direct or indirect.

A return goods authorization number (RGA) must be obtained from authorized Manitex Sabre personnel prior to returning any products for warranty consideration. All claims must be accompanied by a complete written explanation of claimed defects and the circumstances of operational failure. Products that are returned for warranty consideration shall be shipped to Manitex Sabre Inc., freight prepaid, with the return authorization attached. In the case of emergencies, an authorization number must be obtained the next business day.

THIS WARRANTY IS OUR SOLE WARRANTY IN REGARD TO THE COVERED MANITEX SABRE INC. CONTAINER PRODUCTS. WE MAKE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND.

What is not covered by this warranty?
Manitex Sabre Inc. DOES NOT warrant:
(a) Any product, components, or parts not manufactured by Manitex Sabre Inc.
(b) Damage caused by use of the tank for purposes other than those for which it was designed.
(c) Damage caused by accident or the negligence of the purchaser or any third party or

by disasters such as fire, flood, wind, and lighting.

(d) Damage caused by the purchaser's failure to provide normal maintenance as customarily accepted in the industry or as set forth in maintenance guidelines.

(e) Bearings, bushings, and parts, which are a part of normal maintenance replacement.

(f) Damage caused by unauthorized or improper installation of attachments, repairs, modifications, or alterations.

(g) Damages caused by replacement of original parts or components with unauthorized substitutes.

(h) Damage during shipment.

(i) Any other abuses or misuse by the purchaser.

WARRANTY PROCEDURE

- Customer notifies Manitex Sabre of possible Warranty issue.
- Manitex Sabre will investigate the Claim to determine its validity.
- Manitex Sabre will notify customer of findings & repair/ replacement costs.
- Customer to issue a PO for repairs / replacement (When Applicable)
- Manufacturer issues a Return Goods Authorization (RGA), so that customer can return the product.
- Supplier (3rd party) evaluates returned product to determine cause of failure. (When Applicable)
- If Supplier product (3rd party) is determined to be defective, supplier provides credit to Manufacturer.
- Manufacturer then provides credit to customer.

5420 E State Rd 8 Knox, IN
Ph: (574) 772-5380
Fax: (574) 772-5480
www.manitexinternational.com

Manitex Sabre Inc. **Warranty Information**

TANK PRODUCTS LIMITED WARRANTY — Effective August 20, 2013

Manitex Sabre Inc. warrants only products of its manufacture against operational failure caused by defective materials or workmanship, which occur during proper and normal use. Manitex Sabre Inc. reserves the right to determine what is proper and normal use. Manitex Sabre Inc. makes no warranty on any of its equipment used in any way except as it was designed, intended, and sold to perform. These may be restricted and are subject to individual state guidelines.
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Coverage Period:
Major Components: Main Structural Components **12 Months**

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Manitex Sabre Inc.'s only obligation is to repair or replace, at its election, free of charge, any part of the product that its inspection shows to be defective and, if appropriate, the lowest round trip transportation charges from Manitex Sabre's original customer to our closest facility and return, but excluding all transportation costs from Manitex Sabre's customer to its customer. For defects in the material or workmanship, both parts and labor are at Manitex Sabre's expense. All labor costs allowed shall be in accordance with Manitex Sabre's established rate.
Manitex Sabre Inc. shall not, under any circumstances, be liable for labor for removal and installation expenses, loss of time, manufacturing costs, transportation costs (except as noted above), materials and/or loss of materials, loss of profits, incidental, special or consequential damages, direct or indirect.
A return goods authorization number (RGA) must be obtained from authorized Manitex Sabre personnel prior to returning any products for warranty consideration. All claims must be accompanied by a complete written explanation of claimed defects and the circumstances of operational failure. Products that are returned for warranty consideration shall be shipped to Manitex Sabre Inc., freight prepaid, with the return authorization attached. In the case of emergencies, an authorization number must be obtained the next business day.
THIS WARRANTY IS OUR SOLE WARRANTY IN REGARD TO THE COVERED MANITEX SABRE INC. CONTAINER PRODUCTS. WE MAKE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND.

What is *not* covered by this warranty?
Manitex Sabre Inc. DOES NOT warrant:

(a) Any product, components, or parts not manufactured by Manitex Sabre Inc.
(b) Damage caused by use of the tank for purposes other than those for which it was designed.
(c) Damage caused by accident or the negligence of the purchaser or any third party or by disasters such as fire, flood, wind, and lighting.
(d) Damage caused by the purchaser's failure to provide normal maintenance as customarily accepted in the industry or as set forth in maintenance guidelines.
(e) Bearings, bushings, and parts, which are a part of normal maintenance replacement.
(f) Damage caused by unauthorized or improper installation of attachments, repairs, modifications, or alterations.
(g) Damages caused by replacement of original parts or components with unauthorized substitutes.
(h) Damage during shipment.
(i) Any other abuses or misuse by the purchaser.

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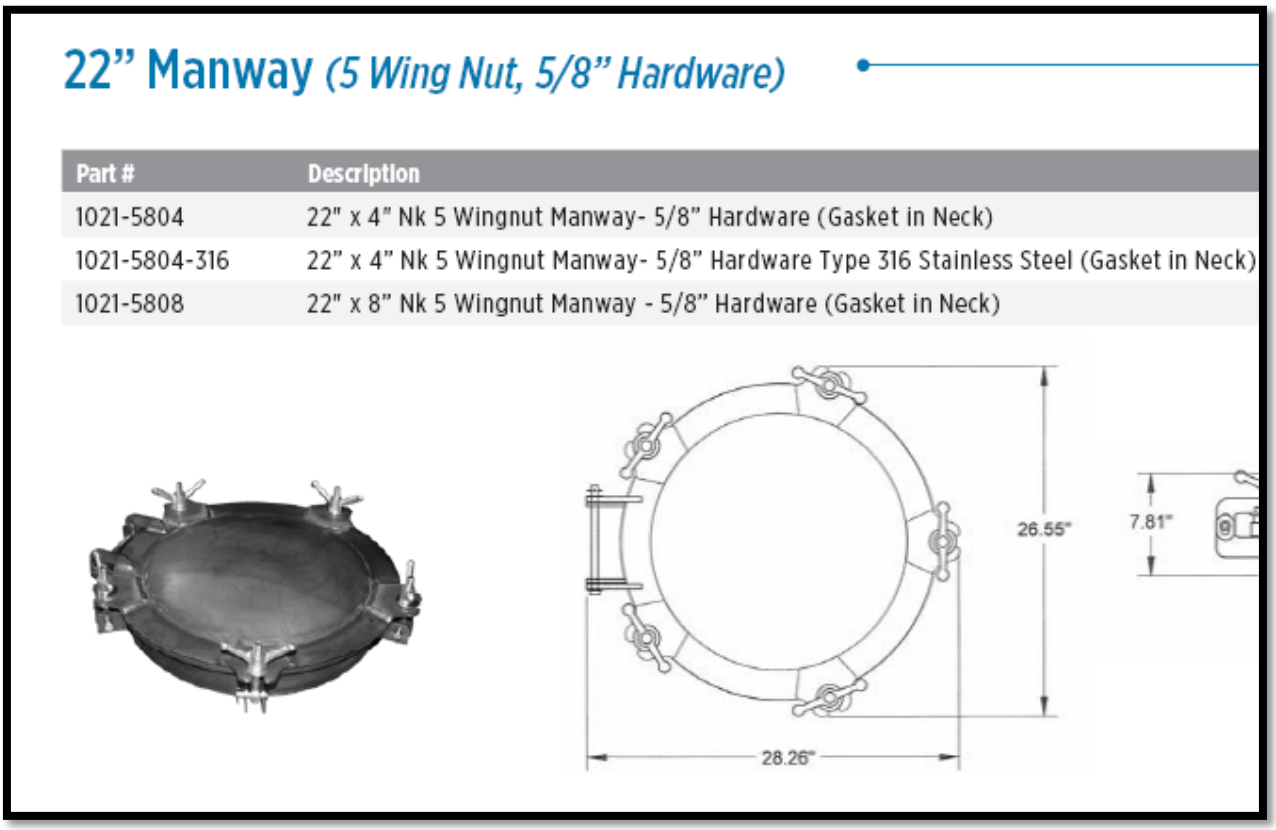
- Supplier (3rd party) evaluates returned product to determine cause of failure. (When Applicable)
- If Supplier product (3rd party) is determined to be defective, supplier provides credit to Manufacturer.
- Manufacturer then provides credit to customer.

8. PARTS AND THEIR SPECIFICATIONS:

MANWAY:

22” MANWAY SPECIFICATION:



- Gasket in Neck
- Robotically Welded
- Weldable 1/4" A36 Carbon Steel Base
- 5/8" Buna Gasket
- MATERIAL – STEEL
- WINGNUTS- 6

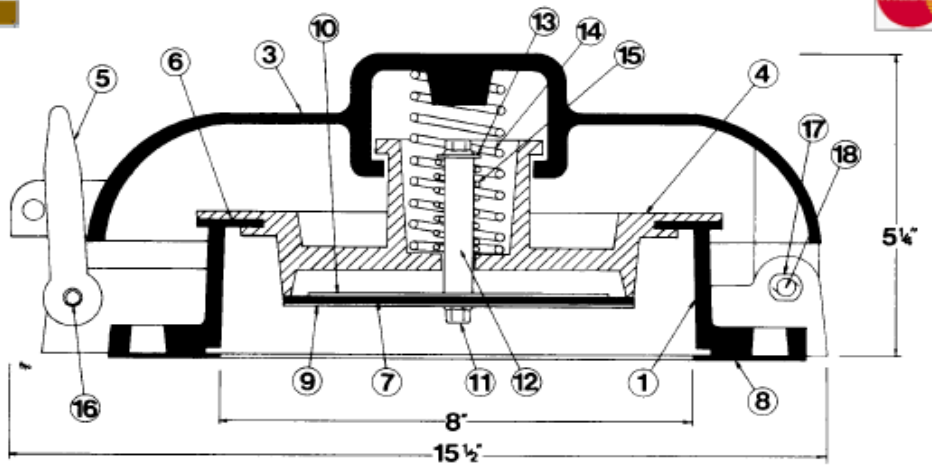
36” MANWAY SPECIFICATION:

- Gasket in Neck
- Robotically Welded
- Weldable 1/4" A36 Carbon Steel Base
- Made in the USA
- 5/8" Buna Gasket
- MATERIAL – STEEL
- WINGNUTS- 8
- NECK – 6”

THIEF HATCH:

JAYCO

JAY COURTNEY COMPANY, INC



Parts List for Jayco JT-8 Thief Hatch

①	Base	JT82	$43.26	Aluminum
③	Lid	80	40.59	Aluminum
④	Pressure/Vacuum Valve	84	32.55	Aluminum
⑤	Latch	86	6.60	Aluminum
** ⑥	Pressure Gasket	815	6.60	Buna N
	Pressure Gasket (Sour Service)	815V	37.29	Viton®
** ⑦	Vacuum Gasket	820	4.74	Buna N
	Vacuum Gasket (Sour Service)	820V	23.59	Viton®
⑧	Base Gasket	810	5.57	Buna N
	Base Gasket (Sour Service)	810V	46.05	Viton®
⑨	Washer (Lower)	865	7.11	Aluminum
⑩	Washer (Upper)	860	4.64	Aluminum
⑪	Screw HHTL 1/4-20 x 3/4	870	.62	Stainless
⑫	Stem 1/2 x 2 1/2	850	4.43	Aluminum
⑬	Washer 1/4	855	1.14	Plated or Stainless
⑭	Spring, Pressure 4 oz (Plain) (Standard)	835	6.60	Plated or Stainless
	2 oz (Black)	830	6.60	Plated
	6 oz	837	7.63	Stainless
	8 oz (Orange)	845	7.63	Plated or Stainless
	16 oz (Blue)	847	7.63	Plated or Stainless
** ⑬	Spring, Vacuum	825	4.43	Stainless
⑮	Latch Roll Pin	JV130	.42	
⑰	Push Nut, 1/4	JT885	.52	
⑲	Hinge Pin (Short)	875	2.79	

IN KEEPING WITH, AND FOR THE PURPOSE OF PRODUCT IMPROVEMENT, JAYCO RESERVES THE RIGHT TO MAKE DESIGN CHANGES WITHOUT PRIOR NOTICE.

** Repair Kit

Bulletin Number 1015 03

JAYCO

JAY COURTNEY COMPANY, INC

JAYCO
THIEF HATCHES

MODEL JT-8

BASE AND LID SIZE:	NOMINAL 8" ROUND
BOLT PATTERN:	16 HOLES AT 10 3/8" CIRCLE (API)
CONSTRUCTION:	ALL ALUMINUM
SYSTEM OPERATIONS:	SPRING LOADED PRESSURE AND VACUUM
STANDARD SETTINGS:	4 oz. PRESSURE 0.4 oz. VACUUM
BASE GASKET:	INCLUDED

APPROXIMATE SHIPPING WEIGHT: 12#

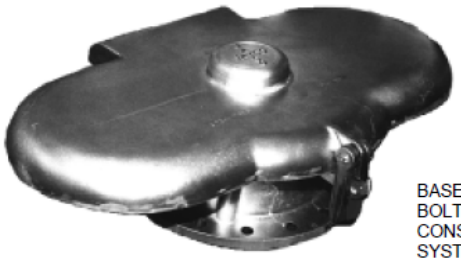
The purpose of the thief hatch is to work in tandem with the vent valve to minimize the escape of light ends of crude in lease storage by maintaining a pressure on the tank. A vacuum relief function is also standard to prevent a suction or draw down from collapsing the tank. The thief hatch permits access to the contents of the tank for sampling and gaging. The vent valve should be set to vent pressure before the thief hatch.

Jayco thief hatches are designed for optimum performance and easy cleaning and maintenance, and are available in 8 inch round and 20 inch long pan, with standard settings of 4.0 ounce pressure and 0.4 ounce vacuum with opptional springs for 2, 6, 8 and 16 ounce pressure settings. Base gasket standard with hatch. Jayco Hatches come standard with Buna N gaskets designed to work in normal (sweet crude) operation of tank systems in the oilfield. Other gasket materials available for your application.

OPTIONS:

BOLTS AND NUTS

*SOUR SERVICE TRIM & PLASTIC COATING



MODEL JT-20

BASE AND LID SIZE:	NOMINAL 8" ROUND WITH 20" LONG PAN
BOLT PATTERN:	16 HOLES AT 10 3/8" CIRCLE (API)
CONSTRUCTION:	ALL ALUMINUM
SYSTEM OPERATIONS:	SPRING LOADED PRESSURE AND VACUUM
STANDARD SETTINGS:	4 oz. PRESSURE 0.4 oz. VACUUM
BASE GASKET:	INCLUDED

APPROXIMATE SHIPPING WEIGHT: 18#

Bulletin Number 1013

Post Office Box 20026 *9412 Nichols Road* *Oklahoma City, OK 73156*
800-654-9263 *405-751-6903* *http://www.jayco.org* *24 hour Fax 405-755-7940*

BUTTERFLY VALVE:

200# WOG WAFER STYLE BUTTERFLY VALVE – Lever Handle

Figure: BW-4000 Series

Valves meet MSS-SP67 & API 609
Flange drilling to: ANSI B16.1 Class 125/150
Testing to: API 598

Options:
Seats: Buna-N, EPDM, Hypalon, Viton, Neoprene, PTFE.
Disc: *Nickel Plated Ductile iron, Nylon 11 Encapsulated ductile iron, EPDM Encapsulated Ductile iron, Aluminum bronze, 304 & 316 Stainless steel.
Body: Cast iron, Ductile iron & Stainless steel.
Stem: 410SS, 416SS, 304SS, 316SS.
Note:
**All seats are a cartridge style with the "rubber" bonded to a phenolic backing ring for support.

Please refer to the Numbering System guide, 4000 series, to establish a figure number for ordering.

Note: Seat materials are capable of withstanding lower temperatures without damage. However, the elastomer becomes hard and torques increase. Some flow media may further restrict the published temperature limits and/or significantly reduce seat life.

Materials:

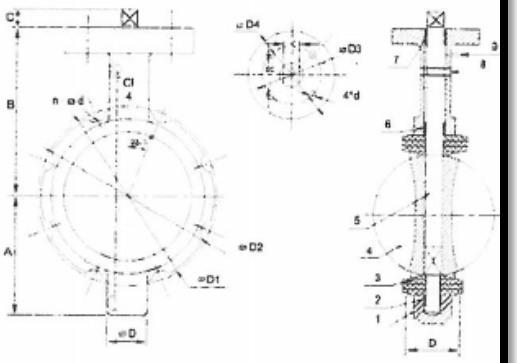
No.	Part Name	Specifications
1	Body	A126 Class B Cast Iron
2	Bushing (long)	PTFE
3	Seat **	Buna-N
4	Disc	A 536 Ductile Iron*
5	Stem	A433 410 Stainless Steel
6	Bushing (short)	PTFE
7	O-Ring	Buna-N
8	Spring pin	65 Mn Carbon steel
9	Grease fitting	B16 Brass

*Nickel plated

Test Pressures	Shell: 300 psi
	Seat: 220 psi

Temperature range of seats	
Material	Range
Buna-N	-12°C ~ +93°C
EPDM	-30°C ~ +140°C
Neoprene	-7°C ~ +107°C
Hypalon	-18°C ~ +149°C
Viton	-12°C ~ +140°C
PTFE	-20°C ~ +121°C

Size		do	K
in	mm	mm	mm
2	50	12.6±0.025	10
2½	65	12.6±0.025	10
3	80	12.6±0.025	10
4	100	15.77±0.025	12
5	125	18.92±0.025	14
6	150	18.92±0.025	14
8	200	22.10±0.025	17
10	250	28.45±0.025	22
12	300	31.60±0.051	24



Dimensions:

Size		D		ØD		A		B		C		Flange					ØD3		ØD4		4*d		Weight	
												ØD1		ØD2		n-Ød								
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	lb	kg
2	50	1.65	42	1.38	36	2.87	73	3.94	100	1.26	32	4.75	120.6	4.13	105	4 - ¾"	2.76	70	3.54	90	.39	10	7.7	3.5
2½	65	1.77	45	1.38	36	3.13	79.5	4.47	113.5	1.26	32	5.5	139.7	4.92	125	4 - ¾"	2.76	70	3.54	90	.39	10	8.8	4.0
3	80	1.78	45.2	1.38	36	3.43	87	4.86	123.5	1.26	32	6.0	152.4	5.39	137	4 - ¾"	2.76	70	3.54	90	.39	10	9.24	4.2
4	100	2.05	52	1.57	40	4.04	102.5	5.98	152	1.26	32	7.5	190.5	7.01	178	8 - ¾"	2.76	70	3.54	90	.39	10	12.3	5.69
5	125	2.19	55.5	1.61	41	4.27	108.4	5.87	149	1.26	32	8.5	215.9	7.59	192.7	8 - ⅞"	2.76	70	3.54	90	.39	10	13.2	6.0
6	150	2.19	55.75	1.77	45	5.12	130	6.54	166	1.26	32	9.5	241.3	8.82	224	8 - ⅞"	2.76	70	3.54	90	.39	10	18.7	8.5
8	200	2.39	60.58	1.90	48	6.22	158	8.03	204	1.57	40	11.76	298.4	11.1	282	8 - ⅞"	4.02	102	4.92	125	.47	12	30.8	14.0
10	250	2.68	68	2.09	53	7.57	192.2	10.15	257.8	1.57	40	14.25	361.9	13.3	338.4	12 – 1"	4.02	102	4.92	125	.47	12	50.6	23.0
12	300	3.02	76.8	2.16	55	9.59	243.6	10.96	278.4	1.57	40	17.0	431.8	16.6	422.4	12 – 1"	4.02	102	4.92	125	.47	12	71.5	32.5

INTERIOR PAINT:

product data carboline® **Phenoline® 310**

Selection & Specification Data

Generic Type	Polyamine Epoxy
Description	Single-coat, plural-component applied, ultra-high build coating for use on steel and concrete substrates where rapid cure characteristics are required. Phenoline® 310 is applied by plural component spray equipment and offers the same high performance properties of Phenoline® 309, yet in a quick-curing formulation.
Features	▪ Rapid cure-to-handle and cure-to-service characteristics ▪ Low temperature (35°F) cure capabilities ▪ Single coat application reduces labor costs ▪ Ultra-high build capabilities provides a void-free film and excellent edge protection ▪ Wide chemical resistance to acids, caustics and aliphatic solvents ▪ Exceptional bond strength ▪ Can be mat reinforced where exposure conditions dictate ▪ VOC compliant to current AIM regulations
Color	White (0800), Gray (F744)
Finish	Eggshell
Primers	Self-priming
Dry Film Thickness	1 coat system: 20-30 mils (500-750 microns) 2 coat system: 20-25 mils (500-625 microns) per coat. Millages of up to 50 mils (1250 microns) in a single coat can be achieved if fresh material is used.
Solids Content	By Volume: 100%
Theoretical Coverage Rate	1604 mil ft² (39 m²/l at 25 microns) Allow for loss in mixing and application.
VOC Values	As supplied: 0.0 lbs/gal (0 g/l) These are nominal values and may vary slightly with color.
Dry Temp. Resistance	Continuous: 140°F (60°C) Non-Continuous: 180°F (82°C) Discoloration and loss of gloss is observed above 140°F (60°C).
Limitations	Epoxies lose gloss, discolor and eventually chalk in sunlight exposure. This coating commonly develops an *amine-blush* during cure. While this condition will not adversely affect performance of the coating, this blush must be removed before applying additional coats and may require removal before placing into service.

Substrates & Surface Preparation

General	Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.
Steel	SSPC-SP10 Surface Profile: 2-4 mils (50-100 microns).
Concrete	Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing.

April 2008 replaces November 2004 S310

Phenoline® 310

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.
General Guidelines:

Spray Application (Plural Component) — Recommended for application by plural component airless spray. This is a high solids coating and may require adjustments in spray techniques. Wet film thickness is easily and quickly achieved. Contact Carboline Technical Service for plural component equipment recommendations.

Conventional or Airless Spray — Not recommended

Brush or Roller — Not recommended

Mixing & Thinning

Mixing — Power mix each component separately. Phenoline 310 is applied with two-component, heated, airless spray.

Material Temperature — Part A: 110-140°F
Part B: 90-110°F
Difference between Part A and B should be within 20°F

Ratio — 4:1 Ratio (A to B)

Thinning — Not recommended. Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Pot Life — 25 minutes at 75°F (24°C). Pot life ends when material begins to thicken and starts to heat up. Pot life times will be less at higher temperatures.

Cleanup & Safety

Cleanup — Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety — Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation — Spray mist may cause explosion. When used as a tank lining or in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. In addition to ensuring proper ventilation, appropriate respirators must be used by all application personnel.

Caution — This product contains flammable materials. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Surface	Ambient	Humidity
Normal	60°-85°F (16°-29°C)	60°-90°F (16°-32°C)	0-80%
Minimum	35°F (2°C)	35°F (2°C)	0%
Maximum	125°F (52°C)	110°F (43°C)	90%

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions. To reduce outgassing when applying to concrete substrates, do not apply in direct sunlight or when surface temperatures are increasing. Best results are obtained when ambient and surface temperatures are decreasing or constant.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Minimum Recoat Time	Maximum Recoat Time	Final Cure
35°F (2°C)	16 Hours	36 Hours	36 Hours
60°F (16°C)	8 Hours	16 Hours	16 Hours
75°F (24°C)	4 Hours	8 Hours	8 Hours
90°F (32°C)	2 Hours	6 Hours	6 Hours

These times are based on a 20.0 mil (500 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times. Condensation on the surface or humidity above 25% during application and curing will result in a surface haze or blush. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. If the maximum recoat time is exceeded, the surface must be washed with detergent and water, then abraded by sweep blasting prior to the application of additional coats. For force curing, contact Carboline Technical Service for specific requirements.

Packaging, Handling & Storage

Shipping Weight (Approximate) — 1 Gallon Kit: 12 lbs. (5 kg); 20 Gallon Kit: 165 lbs. (75 kg)

Flash Point (Setaflash) — Part A: >205°F (96°C)
Part B: >205°F (96°C)

Storage (General) — Store Indoors, out of direct sunlight.

Storage Temperature & Humidity — 50°- 85°F (11°-30°C)
0-100% Relative Humidity

Shelf Life — Part A & B: 6 months if stored at 50°-85°F. To ensure maximum film build, Phenoline 310 is best if applied within three (3) months of the manufactured date.

***Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.**

carboline
350 Hanley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com
An RPM Company

April 2008 replaces November 2004

EXTERIOR PAINT:

carboline®

Carbothane® 8845

OEM ENGINEERED FINISHES product data

Selection & Specification Data

Generic Type Two component, acrylic, aliphatic polyurethane.

Description Carbothane 8845 is a fast dry, high solids, low VOC, high gloss, high build, two component polyurethane coating. Carbothane 8845 exhibits the excellent dry times and handling characteristics required by Original Equipment Manufacturers. This coating has outstanding hardness, adhesion and resistance to: impact, marring, abrasion, chemicals and staining. Carbothane 8845 is recommended as a direct to metal finish coat or as a finish coat over properly primed substrates. Typical applications include air compressors, propane tanks, trailer chassis and frames, valves, pumps, waste water treatment plant equipment, agricultural equipment, hazardous material storage buildings and general industrial equipment. Not recommended for continuous immersion service.

Features
- VOC compliant – 1.9 lbs/ gal as supplied
- Direct-To-Metal (DTM)
- Fast Dry – 7-8 hours to handle at 75°F
- High solids, high build, high gloss
- Excellent abrasion resistance
- Application by conventional, airless spray, HVLP or electrostatic
- Excellent chemical resistance
- Ambient air or force cure with conventional or infrared ovens

Color Wide variety of custom colors

Finish High Gloss

Primers Self-priming, epoxy, zinc rich epoxy or as recommended by Carboline

Dry Film Thickness 3 – 5 mils per coat (75-125 microns).

Solids Content By Volume: 71% ± 2%

Theoretical Coverage Rate per Gallon
379 ft² at 3 mils (75 microns)
284 ft² at 4 mils (100 microns)
227 ft² at 5 mils (125 microns)
Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

HAPS Value 0.54 lbs/solid gallon

VOC Values
As supplied: 1.9 lbs/gal (228 g/l)
Thinned:
6 oz/gal w/ #76: 2.1 lbs/gal (252 g/l)
These are nominal values.

Ratio By Volume
4:1 Ratio
4 parts Carbothane 8845 Part A
1 part Carbothane 8843 Converter Part B

Pot Life
90 min at 75°F (24°C) unthinned
Pot life decreases at higher temperatures. Pot life ends when coating becomes too viscous to use. This product is moisture sensitive. Avoid moisture contamination.

Dry Temp. Resistance
Continuous: 200°F (93°C)
Non-Continuous: 250°F (121°C)
Discoloration is observed above 180°F (82°C).

Substrates & Surface Preparation

General Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

Steel Abrasive blast to a commercial finish in accordance with SSPC-SP6 and obtain a 1½ - 2 mil (35-50 micron) blast profile.

Phosphatize Apply 8845 directly to dry, properly phosphatized substrate. Perform adhesion tests to insure proper, uniform and acceptable adhesion of 8845 direct to phosphatized metal substrate.

Primed Surfaces Remove any oil or grease from the surface to be coated with Thinner #2 or Carboline Surface Cleaner #3 (Refer to Data Sheet) in accordance with SSPC-SP1.

Typical Chemical Resistance

Exposure	Splash & Spillage	Fumes
Acids	Very Good[1]	Excellent
Alkalies	Very Good[1]	Excellent
Solvents	Very Good[2]	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

1. Certain colors may discolor.
2. Resistance may vary dependent on the type of solvent involved.

Curing Schedule

Ambient, Material & Surface Temp	Dry to Touch	Dry to Handle or Assemble	Dry to Full Cure
75°F (24°C)	90-120 minutes	7-8 hours	7-14 days

These times are based on a 4.0 mil (100 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. Note: Product may be force cured.

FORCE CURE INFORMATION

Oven Temperature at 150°F (66°C)		
Flash Time is 20 minutes.	Oven Dwell Time 45 minutes.	Cool Down is 10 minutes.
Oven Temperature at 180°F (82°C)		
Flash Time is 20 minutes.	Oven Dwell Time 30 minutes.	Cool Down is 10 minutes.

August 2007 N 8845

Carbothane® 8845

Carboline 8000 Series has been specifically designed for OEM applications.

For specific product requirements or process painting recommendations contact Carboline OEM Engineered Finishes Division.

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

General Guidelines:

Spray Application (General) — The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional Spray — Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

Airless Spray

Pump Ratio:	30:1 (min.)
GPM Output:	3.0 (min.)
Material Hose:	3/8" I.D. (min.)
Tip Size:	.013-.017"
Output PSI:	2500-3500
Filter Size:	60 mesh

Teflon packings are recommended and available from the pump manufacturer.

Electrostatic — Contact Carboline for specific equipment recommendations.

HVLP — Contact Carboline for specific equipment recommendations.

Touch Up — Respray or brush. Brushing recommended only for touchup of small areas. Use natural bristle brush applying with full strokes.

Mixing & Thinning

Mixing — For plural component application equipment follow the equipment manufacturer's instructions. For batch mixing, power mix part A separately, then combine and power mix thoroughly in the following proportions:
THIS PRODUCT IS MOISTURE SENSITIVE. AVOID MOISTURE CONTAMINATION. DO NOT MIX PARTIAL KITS.

Ratio — 4:1 Ratio (A to B)

	1 Gallon Kit	5 Gallon Kit
8845 Part A	.8 gallons (in 1 gallon can)	4 gallons (in 5 gallon can)
Urethane Converter 8843	25.6 fluid ozs.	1 gallon

Thinning — Normally not required. May be thinned up to 6 oz/gal (5%) with #76. Thinner #97 used when applying 8845 in very hot conditions. Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Pot Life — 90 minutes at 75°F (24°C).

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	60°-85°F (16°-29°C)	60°-85°F (16°-29°C)	60°-85°F (16°-29°C)	40-60%
Minimum	50°F (10°C)	35°F (2°C)	35°F (2°C)	10%
Maximum	130°F (54°C)	120°F (50°C)	95°F (35°C)	80%

Industry standards are for substrate temperatures to be 5°F (3°C) above the dew point.

August 2007 N

Application Conditions Cont.

Caution: This product is moisture sensitive in the liquid stage and until fully cured. Protect from high humidity, dew and direct moisture contact until fully cured. Application and/or curing in humidities above maximum, or exposure to moisture from rain or dew may result in loss of gloss and/or microbubbling of the product.

Cleanup & Safety

Cleanup — Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety — Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation — When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved supplied air respirator.

Caution — This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Packaging, Handling & Storage

Shipping Weight 8845 (Approximate)	1 Gallon Kit	5 Gallon Kit
	15 lbs. (6 kg)	58 lbs. (22 kg)
Thinner 76	8 lbs. (4 kg)	41 lbs. (19kg)
Thinner 97	8 lbs. (4 kg)	41 lbs. (19kg)

Carbothane 8845 is also available in drum quantities.

Flash Point (Setaflash)

Part A:	63°F (17°C)
Part B:	62°F (17°C)
Thinner 76:	21°F (-6°C)

Storage (General) — Store Indoors.

Storage Temperature & Humidity — 40° - 110°F (4-43°C)
0-80% Relative Humidity

Shelf Life — Part A: Min. 36 months at 75°F (24°C)
Part B: Min. 24 months at 75°F (24°C)

***Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.**

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350 Hanley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com
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KINGPIN:

2 Inch Forged SAE Trailer King Pins With 1/2 Inch Bolster Plate - Weld On

King Pins are forged, heat-treated steel construction for ultimate durability.

- Strong forged steel construction.
- Heat-treated for toughness.
- All kingpins are 100% inspected and tested.
- Made in the USA.

SPECIFICATIONS:

Bolster Plate Thickness	0.500"	**Brinell Hardness**	302-363 BHN
Color	None	**Finish**	Plain
Material	Forged Steel	**Shipping Weight**	13.2 lb

BALL VALVE SPECIFICATION:

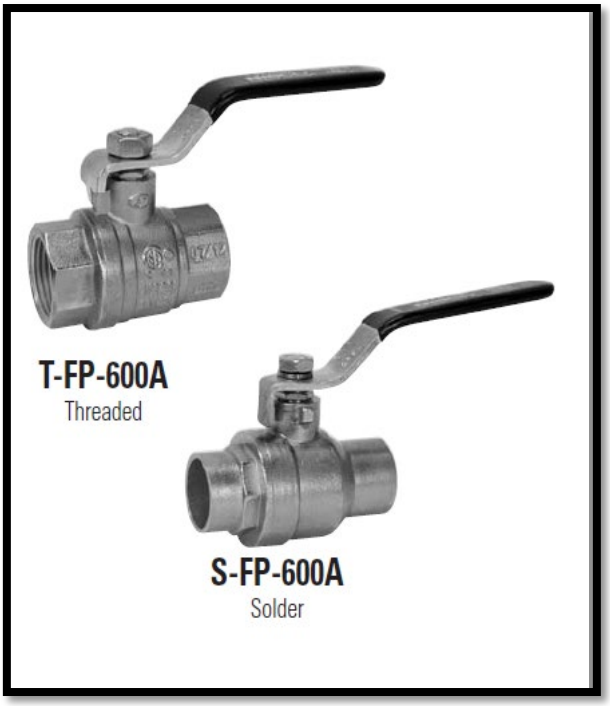
Brass Ball Valves
Two-Piece Body • Full Port

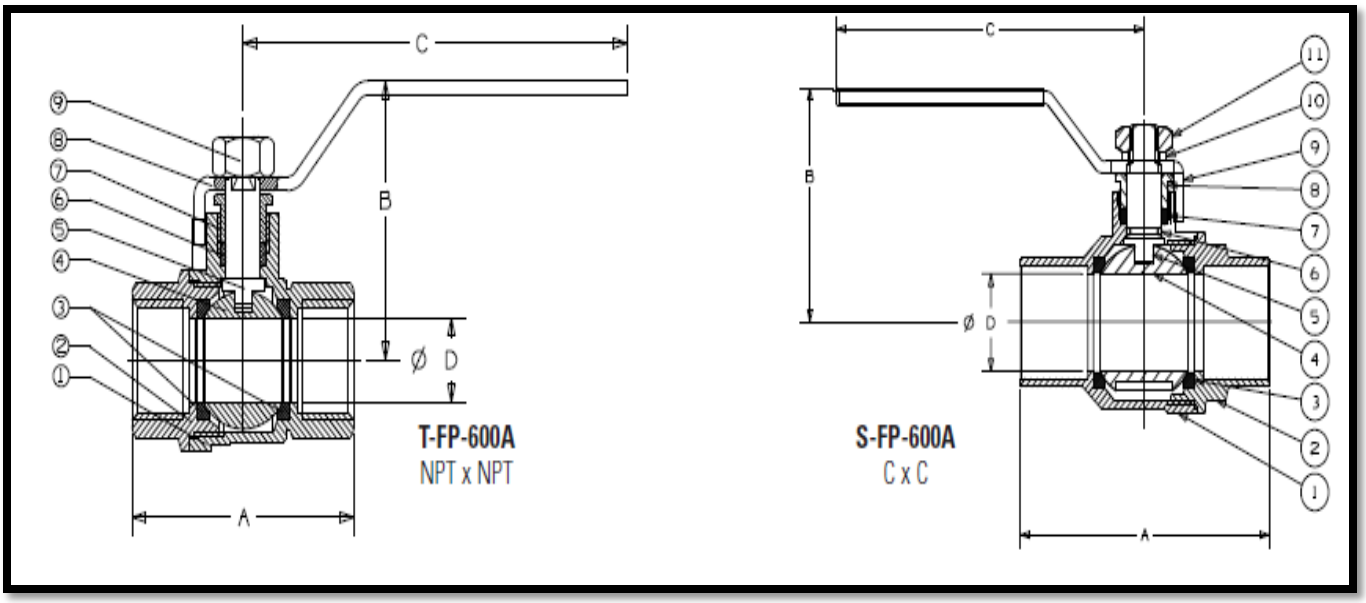
¼"-2" 600 PSI/41.4 Bar Non-Shock Cold Working Pressure

2½"-4" 400 PSI/27.6 Bar Non-Shock Cold Working Pressure

- CONFORMS TO MSS SP-110
- CSA CERTIFIED to ASME B16.44 and CR91-002 (THREADED 1/4"- 4")
- UL Listed (THREADED 1/4"-4")
- IAPMO LISTED TO NSF/ANSI 61-8

MATERIAL LIST	
PART	**SPECIFICATION**
1. Body	Forged Brass[2] CU > 57%
2. End Cap	Forged Brass[2] CU > 57%
3. Ball Seat	PTFE
4. Ball	Brass, Chrome Plated
5. Stem	Brass
6. O-Ring (Stem Seal)*	Fluorocarbon (FKM)
7. Stem Packing	PTFE
8. Packing Nut	Brass
9. Lever Handle[1]	Steel, Plated
10. Lock Washer*	Stainless Steel
11. Handle Nut[1]	Stainless Steel





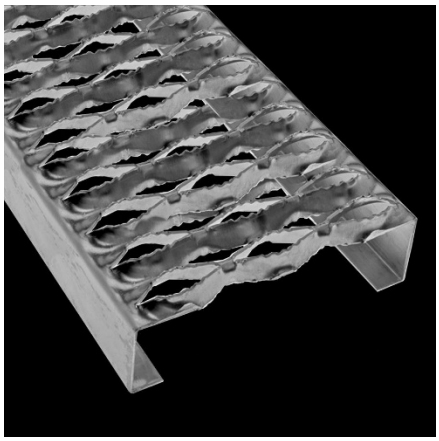
DIMENSIONS—WEIGHTS—QUANTITIES

Size		Dimensions															
		T-FP-600A A		S-FP-600A A		T-FP-600A B		S-FP-600A B		T-FP-600A C		S-FP-600A C		Port D			
In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	T-FP-600A Lbs. Kg.	S-FP-600A Lbs. Kg.	T-FP-600A Ctn. Qty.	S-FP-600N Ctn. Qty.
¼	8	1.76	45	—	—	1.73	44	—	—	3.54	90	—	—	.39	10	.33 .15	— —	18	—
⅜	10	1.76	45	1.75	44	1.73	44	1.58	40	3.54	90	3.78	96	.39	10	.30 .14	.38 .17	18	18
½	15	2.05	52	2.01	51	1.92	49	1.78	45	3.54	90	3.78	96	.59	15	.44 .20	.40 .18	18	18
¾	20	2.36	60	2.74	70	2.09	53	2.13	54	3.78	96	3.98	101	.75	19	.66 .30	.67 .30	12	12
1	25	2.76	70	3.35	85	2.56	65	2.52	64	4.53	115	4.41	112	.98	25	1.10 .50	1.12 .51	6	6
1¼	32	3.31	84	3.78	96	2.95	75	2.65	67	4.53	115	5.04	128	1.26	32	1.57 .71	1.49 .67	4	4
1½	40	3.66	93	4.42	112	3.35	85	3.12	79	5.51	140	6.22	158	1.57	40	2.40 1.09	2.38 1.08	2	2
2	50	4.18	106	5.34	136	3.68	93	3.41	87	5.51	140	6.22	158	1.97	50	3.37 1.53	3.62 1.64	2	2
2½	65	5.38	137	6.28	160	4.76	121	4.76	121	8.66	220	8.66	220	2.56	65	7.60 3.45	6.36 2.88	3	3
3	75	6.04	153	7.15	182	5.08	129	5.08	129	8.66	220	8.66	220	2.95	75	9.36 4.24	8.32 3.77	2	2
4	100	7.39	188	—	—	5.87	149	—	—	9.61	244	—	—	3.89	99	16.85 7.64	— —	1	—

*** S-FP-600A ⅜" - 2" (S1), 2 ½" - 3" (S2)**

*** T-FP-600A ¼" - 4" (S2)**

PLANK GRATING:



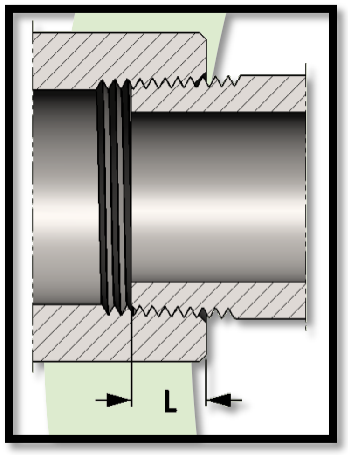
Plank, GRIP STRUT®, Galvanized, ASTM A-653 G90, 12 Gauge (.1084" Thick), 3-Diamond (7" Width), 2" Channel Depth, Serrated Surface, 37% Open Area

Plank Grating, Plank, GRIP STRUT®, Galvanized, ASTM A- 653 G90, Mill Finish, 12 Gauge (.1084" Thick), 3-Diamond (7" Width), 2'' Channel Depth, Serrated Surface, Long Way of Opening (LWO) Parallel to Width of Plank, 37% Open Area

ITEM 2403201210 - 7" x 120"

ITEM SPECIFICATIONS	
Item Number	2403201210
Product Line	Plank Grating
Construction Type	Plank
Series Type & Name	Plank - GRIP STRUT®
Primary Material	Galvanized (GV)
Alloy, Grade or Type	ASTM A-653 G90 (A653G90)
Material Finish	Mill Finish
Gauge/Thickness	12 Gauge (.1084" Thick)
Surface Profile	3-Diamond (7" Width) GRIP STRUT® Plank
Surface Width	7"
Channel Depth	2"
Product Surface	Serrated
Percent Open Area	37%
Weight	4.50 Lbs./Linear Foot
Product Form	Plank
Sizes (Width x Length)	7" x 120"; 7" x 144"

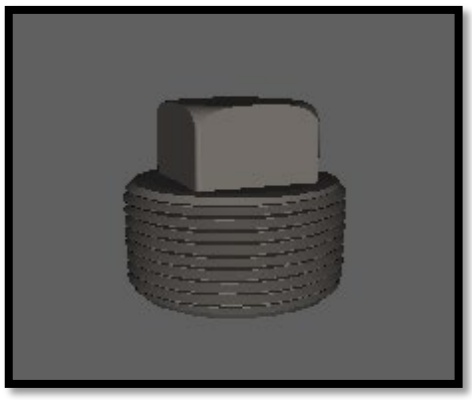
SQUARE HEAD PLUG:



SIZE	L
1/8	0.273
1/4	0.395
3/8	0.407
1/2	0.534
3/4	0.553
1	0.661
1-1/4	0.681
1-1/2	0.681

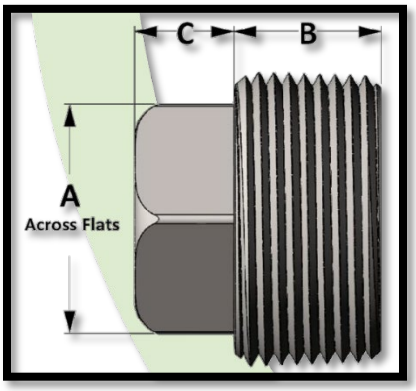
SIZE	L
2	0.697
2-1/2	0.933
3	1.016
3-1/2	1.071
4	1.094
5	1.187
6	1.208
8	1.313

Length of thread screwed into fitting



Specification: ASME B16.11 for 1/8” - 4” only

PIPE SIZE	Figure No. 06013														
	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6
A	0.281	0.380	0.440	0.563	0.625	0.813	0.940	1.125	1.313	1.500	1.690	1.875	2.500	3.250	4.250
B	0.380	0.440	0.500	0.563	0.625	0.750	0.813	0.813	0.880	1.063	1.125	1.187	1.250	1.875	2.000
C	0.250	0.250	0.313	0.380	0.440	0.500	0.563	0.625	0.690	0.750	0.813	0.875	1.000	1.625	1.875
LBS	0.02	0.03	0.06	0.11	0.18	0.35	0.60	0.82	1.36	2.21	3.47	4.73	8.64	17.12	28.41



Material: Available in a complete range of Carbon Steels, Stainless Steels, Alloy Steels and Non-

ferrous metals certified to ASTM, ASME, and Military standards.

Sizes: 1/8”- 8”

Threads: American National Standard Taper Pipe Threads

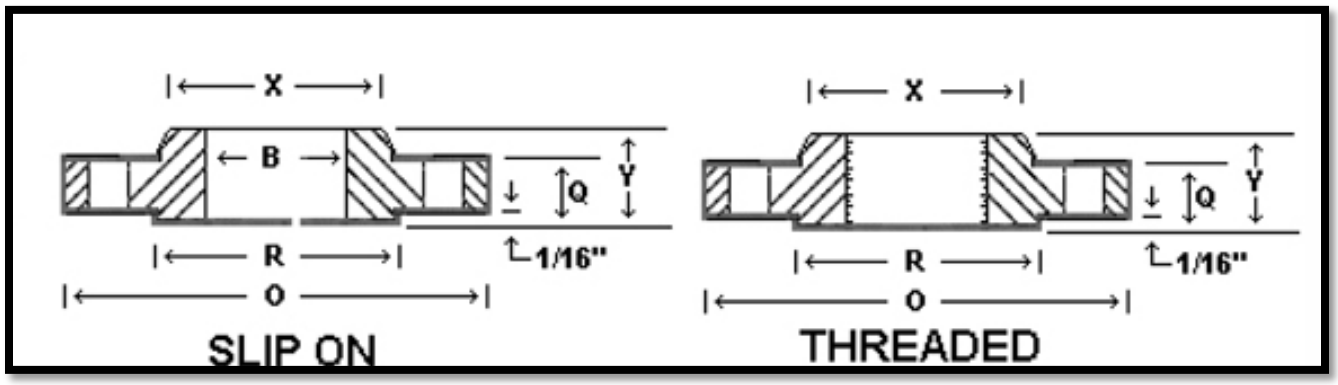
NPT (ANSI/ASME B1.20.1-1983)

Also available in other thread forms: NPTF, NPSC, NPSM, BSPT, BSPP

All dimensions are in inches • Weights are based in Carbon Steel

FLANGES:

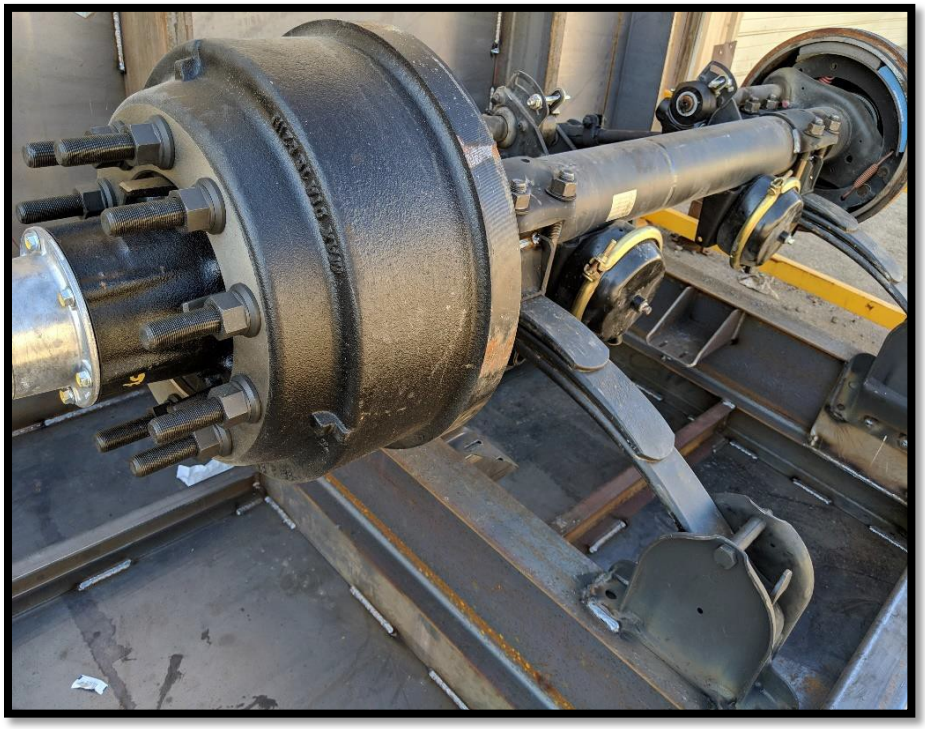
These flanges ANSI B 16.5 Class 150, high pressure flanges can be easily assembled into any pipe without welding. Threaded Pipe Flanges, Flange ANSI B 16.5 Class 150, Class 150 ANSI B 16.5 can be used in extremely high-pressure services, particularly at or near atmospheric temperature.



Nom. Pipe Size (inches)	O	Q	R	X	No. and** Dia. of Bolt Holes	Bolt Circle Dia	YY	H	J	Y	B	R	YY	BB	Z
1/2	3.50	.44	1.38	1.19	4-0.62	2.38	1.88	.84	.62	.62	.88	.12	.62	.90	.38
3/4	3.88	.50	1.69	1.50	4-0.62	2.75	2.06	1.05	.82	.62	1.09	.12	.62	1.11	.44
1	4.25	.56	2.00	1.94	4-0.62	3.12	2.19	1.32	1.05	.69	1.36	.12	.69	1.38	.50
11/4	4.62	.62	2.50	2.31	4-0.62	3.50	2.25	1.66	1.38	.81	1.70	.19	.81	1.72	.56
11/2	5.00	.68	2.88	2.56	4-0.62	3.88	2.44	1.90	1.61	.88	1.95	.25	.88	1.97	.62
2	6.00	.75	3.62	3.06	4-0.75	4.75	2.50	2.38	2.07	1.00	2.44	.31	1.00	2.46	.69
21/2	7.00	.88	4.12	3.56	4-0.75	5.50	2.75	2.88	2.47	1.12	2.94	.31	1.12	2.97	.75
3	7.50	.94	5.00	4.25	4-0.75	6.00	2.75	3.50	3.07	1.19	3.57	.38	1.19	3.60	.81
31/2	8.50	.94	5.50	4.81	8-0.75	7.00	2.81	4.00	3.55	1.25	40.70	.38	1.25	4.10	
4	9.00	.94	6.19	5.31	8-0.75	7.50	3.00	4.50	4.03	1.31	4.57	.44	1.31	4.60	
5	10.00	.94	7.31	6.44	8-0.88	8.50	3.50	5.56	5.05	1.44	5.66	.44	1.44	5.69	
6	11.00	1.00	8.50	7.56	8-0.88	9.50	3.50	6.63	6.07	1.56	6.72	.50	1.56	6.75	
8	13.50	1.12	10.62	9.69	8-0.88	11.75	4.00	8.63	7.98	1.75	8.72	.50	1.75	8.75	
10	16.00	1.19	12.75	12.00	12-1.00	14.25	4.00	10.75	10.02	1.94	10.88	.50	1.94	10.92	
12	19.00	1.25	15.00	14.38	12-1.00	17.00	4.50	12.75	12.00	2.19	12.88	.50	2.19	12.92	
14	21.00	1.38	16.25	15.75	12-1.12	18.75	5.00	14.00	To Be Specified by Purchaser	2.25	14.14	.50	3.12	14.18	
16	23.50	1.44	18.50	18.00	16-1.12	21.25	5.00	16.00		2.50	16.16	.50	3.44	16.19	
18	25.00	1.56	21.00	19.88	16-1.25	22.75	5.50	18.00		2.69	18.18	.50	3.81	18.20	
20	27.50	1.69	23.00	22.00	20-1.25	25.00	5.69	20.00		2.88	20.2	.50	4.06	20.25	
24	32.00	1.88	27.25	26.12	20-1.38	29.50	6.00	24.00		3.25	24.25	.50	4.38	24.25	

AXLE:

Figure shows the Standard 22,500 Pounds axle. Based on the weight and requirements a heavy- duty axle and tandem axle options are available.



Standard

M 2AXL00458	77.5IN TRACK AXLE ASSY NON-ABS
2HUBN-125LT	HUB/DRUM ASSY, 10 STD, HP, 16.5X7, ABS
2BRKEV30	SERVICE BRAKE, TYPE 30, WITH CLEVIS
2BRKRB10211	AUTO SLACK, W/BRCKT, 28 SPLINE 5.5 IN
2VANHM212049	OUTER BEARING CONE
2VANHM218248	INNER BEARING CONE
2OIL00001	GUARDIAN SEAL WHEEL SET 307-0743
2WHL3009	HUBCAP GASKET 6 HOLE
2WHL340	6 HOLE HUBCAP BULK 340-4009
2BLT00081	BOLT 5/16-18-3/4 FLG SERRATED HEAD GR5
2GRS00010	OIL; WHEEL END 80/90 (BULK)
2KIC001-00115	FLANGE NUT M22 179933

TIRE:

SPECIFICATION: 11R225 14 PLY

Tire Size: 11R22.5
Ply Rating: 14
Weight: 102 lbs
Recommended Rim: 8.25 Inches
Overall Width: 10.8 Inches
Overall Width Loaded: 11.8 Inches
Overall Diameter: 41.3 Inches
Static Loaded Radius: 19.3 lbs
Tread Depth: 19 (32nds)
Max. Tire Load Single: 6175 lbs / 2800 KG
Max. Tire Load Dual: 5840 lbs / 2650 KG
Inflation Pressure: 105 psi at 750 kpa
Max. Speed: 75 mph
Revolutions Per Mile: 503

HUB PILOTED WHEELS \ FLANGED NUT

TORQUE SPECIFICATION: 450 – 500 FT.-LBS.

RETORQUE SPECIFICATION: 50 – 100 MILES AFTER INSTALLATION PERODICALLY THEREAFTER (EVERY SCHEDULED MAINTENANCE OR AT 10,000 MILE INTERVALS)

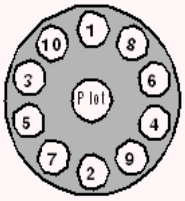
DESCRIPTION	OILED (FT-LBS)	DRY (FT-LBS)
1 1/8 – 7 ROCKER BOLT	590	790
1 – 14 OR 1 – 8 RADIUS ROD BOLT	540	720
7/8 – 14 AXLE U-BOLTS \ 9600 RADIUS ROD BOLT	350	470
¾ - 16 AXLE U-BOLTS	310	420
5/8 – 18 RADIUS ROD CLAMP BOLT	130	170
5/8 – 18 SPRING RETAINER BOLT	35	50

TORQUE SPECIFICATION CHART:

DANGER

WHEEL MOUNTING TORQUE SPECIFICATIONS

THIS VEHICLE IS EQUIPPED WITH HUB PILOTED WHEEL SYSTEM



10-HOLE SEQUENCE

WHEEL INSTALLATION

1.) AVOID WHEEL OR BRAKE DRUM BINDING ON HUB
2.) USE 2-PIECE FLANGE NUTS, RIGHT HAND THREAD
3.) BEFORE INSTALLING NUTS, APPLY OIL TO THREADS OF STUDS AND BETWEEN NUT BODY & FLANGE
4.) TORQUE SEQUENCE PER 10 HOLE DIAGRAM
5.) TIGHTEN NUTS FIRST TO 50 FT-LB. THEN TO 450-500 FT-LB TORQUE
6.) RETORQUE 50 TO 100 MILES AFTER INSTALLATION, AND CHECK TORQUE PERIODICALLY THEREAFTER

Wheel and tire servicing can be dangerous. ALWAYS REMOVE ALL AIR FIRST BEFORE DEMOUNTING TIRES.
Follow properprocedures as required by OSHA Regulation 1910, 177 for tire and rim / wheel serviceing.

SUSPENSION TORQUE SPECIFICATIONS

SAFTEY ALERT! (1) FOLLOW ALL TORQUE REQUIREMENTS. (2) DO NOT USE ANY COMPONENT WITH VISIBLY WORN OR DAMAGED THREADS. FAILURE TO FOLLOW THESE SAFETY ALERTS CAN LEAD TO LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, SERIOUS PERSONAL INJURY OR DEATH.

Hutchens Suspension Torque Requirements 9600-9700 Series (Decal Part Number 16086-01 Rev.J)

After an initial break in period, approximately 1000 miles, and at least every 4 months periodically thereafter. ALL bolts and nuts should be checked to insure that recommended torque values are being maintained. Oiled torque values listed are for new fasteners with lubricated threads. It is recommended that new installations be performed with oiled fasteners. For dry threads which have been in service, use the higher torque values which are noted below.

	OILED	DRY
1 1/8-7 (9600 / 9700 Rocker Bolt)	590 lb-ft	790 lb-ft
1 -14 or 1 -8 (9700 Radius Rod Bolt)	540 lb-ft	720 lb-ft
7/8 - 14 (Axle U-Bolts & 9600 Radius Rod Bolt)	350 lb-ft	470 lb-ft
3/4 - 16 (Axle U-Bolts)	310 lb-ft	420 lb-ft
5/8 - 18 (Radius Rod Clamp Bolt)	130 lb-ft	170 lb-ft
5/8 - 18 (Spring Retainer Bolt)	35 lb-ft	50 lb-ft

GASKETS:

Nitrile (Buna-N) Gasket Material specifications:

Polymer: Nitrile-Butadiene
ISO/ASTM Designations: NBR
Durometer Rating (hardness): 60
Temperature Range: -30°F to +200°F
Elongation: 350%
Tensile Strength: 1000 PSI
Finish: Plate
Widths: 36", 48"
Gauge (thickness): 1/32", 1/16", 3/32", 1/8", 3/16", 3/8", ¼", ½"
Pressure Sensitive Adhesive (PSA): available upon request
Grades: commercial, food grade, high strength

FLANGE & FULL-FACE GASKETS:

A flange gasket is used to join or fit between two sections of pipe; each pipe section typically has a flared area that provides a surface for the gasket to attach to. Types of flange gaskets used are full- face gaskets.

STRAPPING CHART:

MANITEX SABRE INC.

Tank Measurement Chart
(+\- 3% Accuracy)
Measurements taken from top manway location @ Center Line of Tank
Model: DW-452 (DOUBLE WALL FRAC TANK)
Note: 1 BBL = 42 U.S. Gal.

Height (in.)	Capacity (Gal.)	Capacity (BBL)		Height (in.)	Capacity (Gal.)	Capacity (BBL)		Height (in.)	Capacity (Gal.)	Capacity (BBL)
1	27.9	0.7		49	7754.8	184.6		97	15584.9	371.1
2	111.6	2.7		50	7917.9	188.5		98	15748.1	375.0
3	251.0	6.0		51	8081.1	192.4		99	15911.2	378.8
4	414.1	9.9		52	8244.2	196.3	1/2FULL	100	16074.3	382.7
5	577.2	13.7		53	8407.3	200.2		101	16237.4	386.6
6	740.3	17.6		54	8570.5	204.1		102	16400.6	390.5
7	903.5	21.5		55	8733.6	207.9				
8	1066.6	25.4		56	8896.7	211.8				
9	1229.7	29.3		57	9059.8	215.7				
10	1392.8	33.2		58	9223.0	219.6				
11	1556.0	37.0		59	9386.1	223.5				
12	1719.1	40.9		60	9549.2	227.4				
13	1882.2	44.8		61	9712.3	231.2				
14	2045.4	48.7		62	9875.5	235.1				
15	2208.5	52.6		63	10038.6	239.0				
16	2371.6	56.5		64	10201.7	242.9				
17	2534.7	60.4		65	10364.9	246.8				
18	2697.9	64.2		66	10528.0	250.7				
19	2861.0	68.1		67	10691.1	254.6				
20	3024.1	72.0		68	10854.2	258.4				
21	3187.2	75.9		69	11017.4	262.3				
22	3350.4	79.8		70	11180.5	266.2				
23	3513.5	83.7		71	11343.6	270.1				
24	3676.6	87.5		72	11506.7	274.0				
25	3839.8	91.4		73	11669.9	277.9				
26	4002.9	95.3	1/4FULL	74	11833.0	281.7				
27	4166.0	99.2		75	11996.1	285.6				
28	4329.1	103.1		76	12159.3	289.5				
29	4492.3	107.0		77	12322.4	293.4	3/4FULL			
30	4655.4	110.8		78	12485.5	297.3				
31	4818.5	114.7		79	12648.6	301.2				
32	4981.7	118.6		80	12811.8	305.0				
33	5144.8	122.5		81	12974.9	308.9				
34	5307.9	126.4		82	13138.0	312.8				
35	5471.0	130.3		83	13301.2	316.7				
36	5634.2	134.1		84	13464.3	320.6				
37	5797.3	138.0		85	13627.4	324.5				
38	5960.4	141.9		86	13790.5	328.3				
39	6123.5	145.8		87	13953.7	332.2				
40	6286.7	149.7		88	14116.8	336.1				
41	6449.8	153.6		89	14279.9	340.0				
42	6612.9	157.5		90	14443.0	343.9				
43	6776.1	161.3		91	14606.2	347.8				
44	6939.2	165.2		92	14769.3	351.6				
45	7102.3	169.1		93	14932.4	355.5				
46	7265.4	173.0		94	15095.6	359.4				
47	7428.6	176.9		95	15258.7	363.3				
48	7591.7	180.8		96	15421.8	367.2				