...towards a better mechanical design of TOF(r')...

w.j. llope
rice TOFr' design meeting
8/28/03 → *9/03/03*

- reminder about TOFr design & construction techniques...

- introduction to proposed new approach...
  - vastly simpler/cheaper to build
  - better RF suppression
  - easier to gas-seal completely

  well along the path to the final design for TOF

- remaining open questions...

timeline:
- finish body, feet, and top design by tomorrow... **Done 09/01/2003**
- submit to Oaks for quote and CADD QA... **Done 09/02/2003**
- parts here ~2-3 weeks after Oaks order placed...

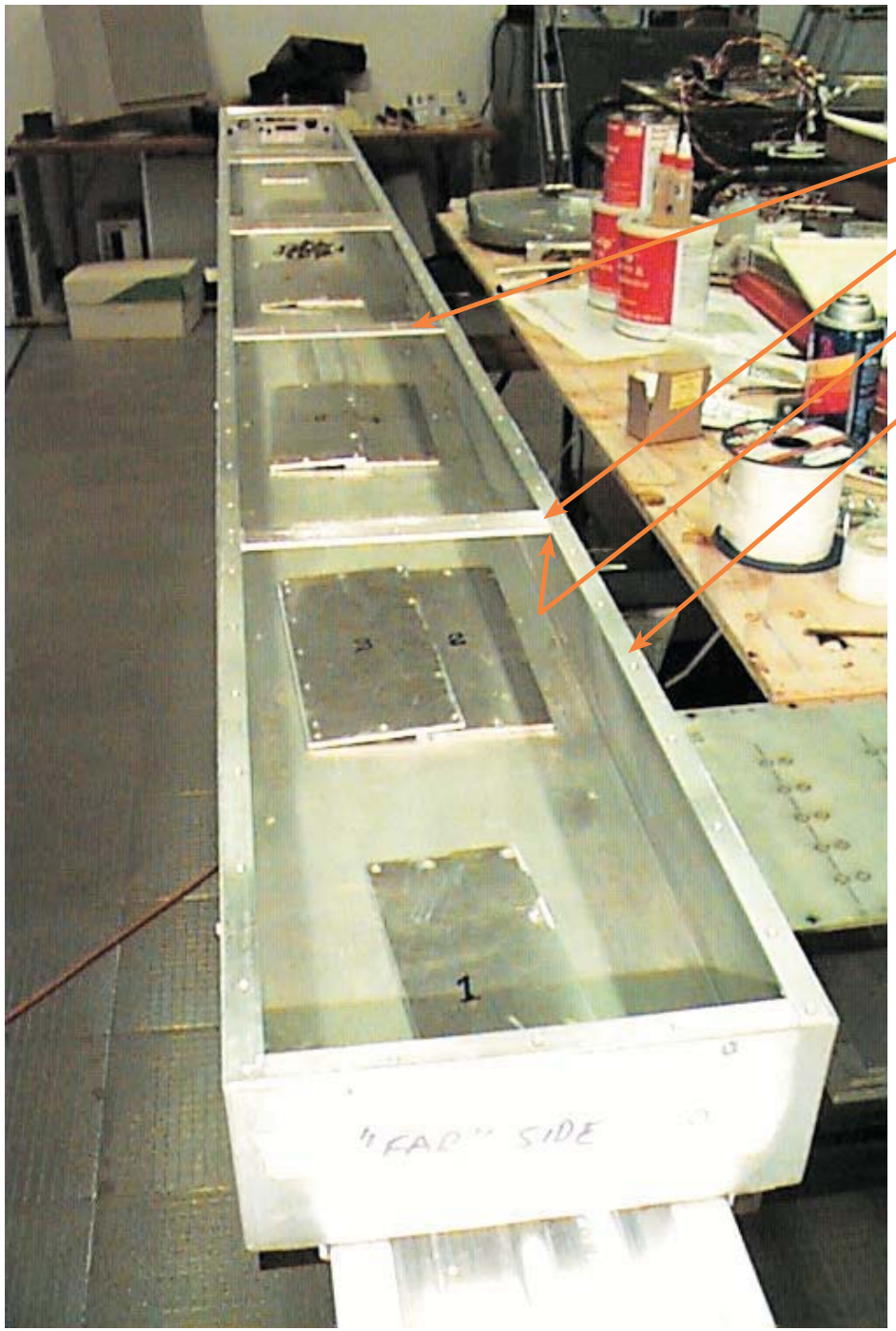
jigs
tapping
welding

Rail Assembly Construction

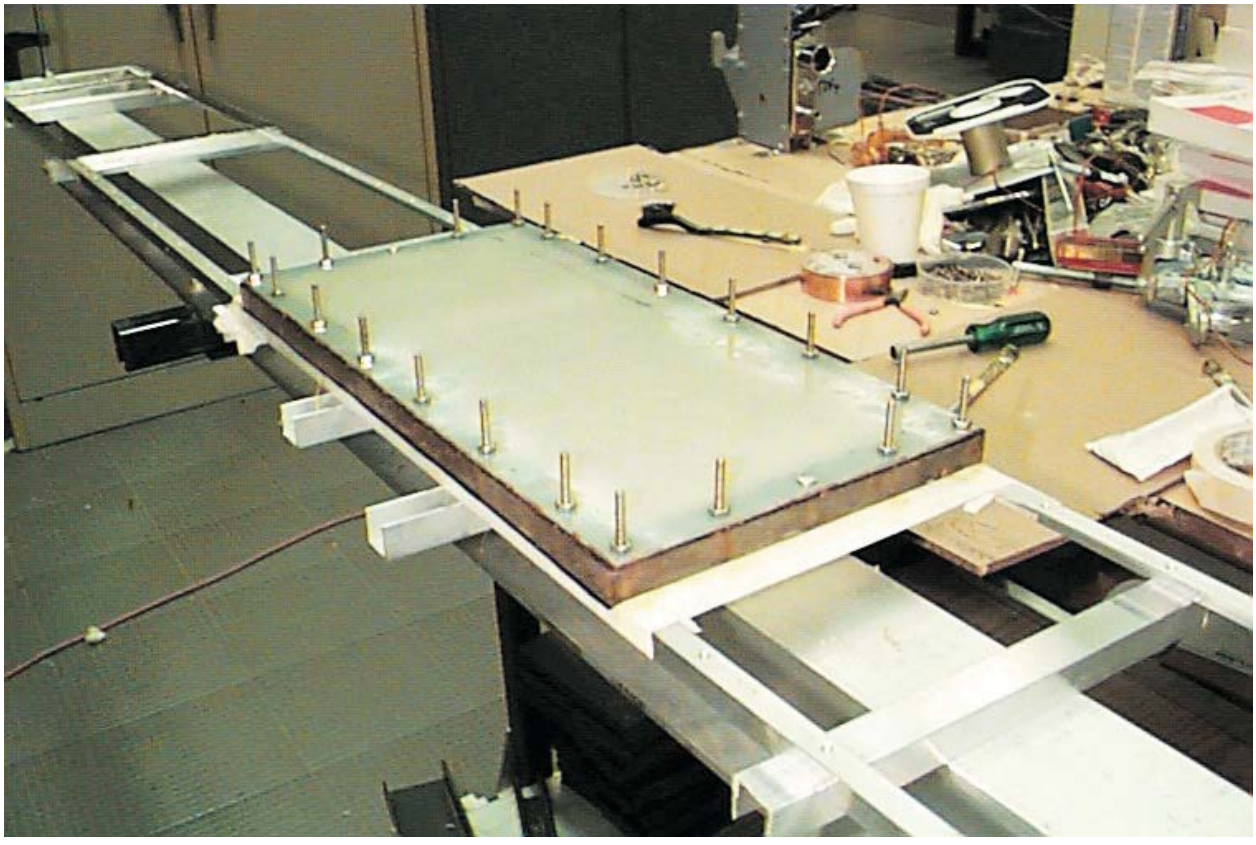
Build new side and end rails to match FT plate posns
Install in tray
Build Plates and install in posn using Al "Fake FT Plates"

Remove Rails, Plates, and fake FT plates as one piece
Clamp, prep for welding, and weld plates to rails.

Rail Assembly Construction (cont.)



Gasket Installation onto Welded Rail Assembly



TOFr in Run-III (summary)

- Tapping ~200 holes in the rails
- Cross-plate fabrication and tapping
- Welding the rails and cross-pieces into the rail assembly
- Glued neoprene gaskets

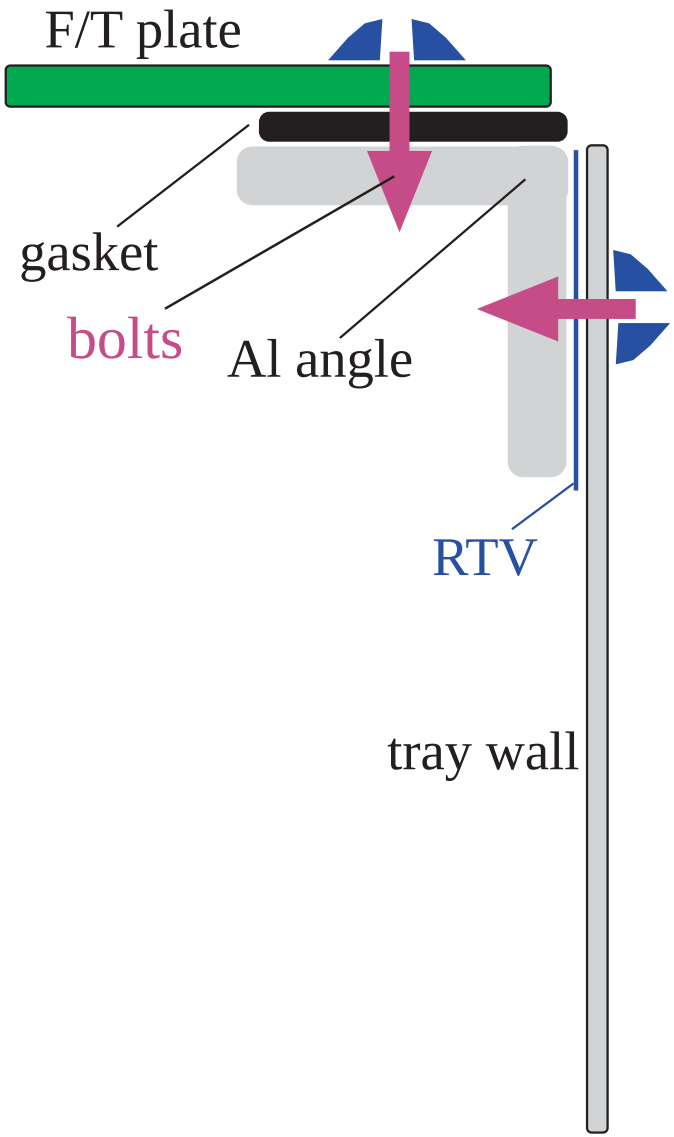
→ all aspects of TOFr that are **impractical or too expensive or inappropriate** for the full system in terms of tray fabrication...

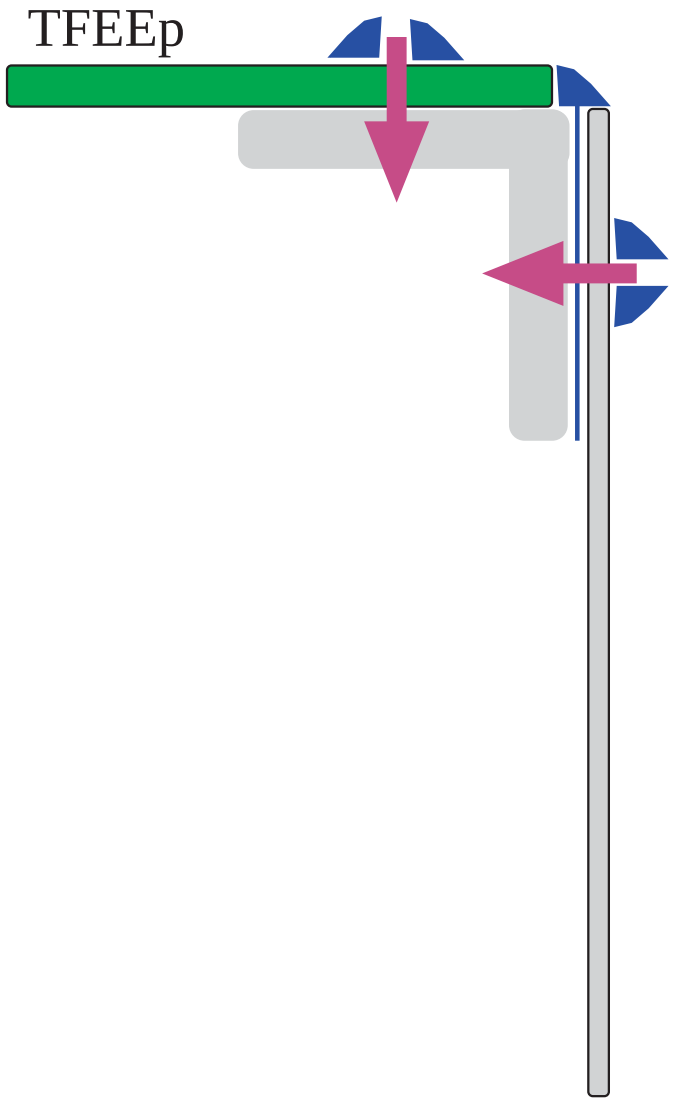
....other weak points in TOFr's design

- too many **holes** in the box that need to be sealed...
  (feet are riveted to tray bottom, rail assy is bolted to tray walls, FT plates bolted to rail assy)
- gasketing resulted in a **gap** between the top of the box walls and the F/T plates...
  → wierd ground paths "through the bolts", plus RFI can sneak into the box, ...
- gasketing didn't work perfectly. so generic RTV sealant used in addition... this sealant **aged**...
  (applied ~Feb 2002, ags running, visibly discolored by ~Sep 2002.)

→ we need a more realistic, more appropriate, tray design in general....

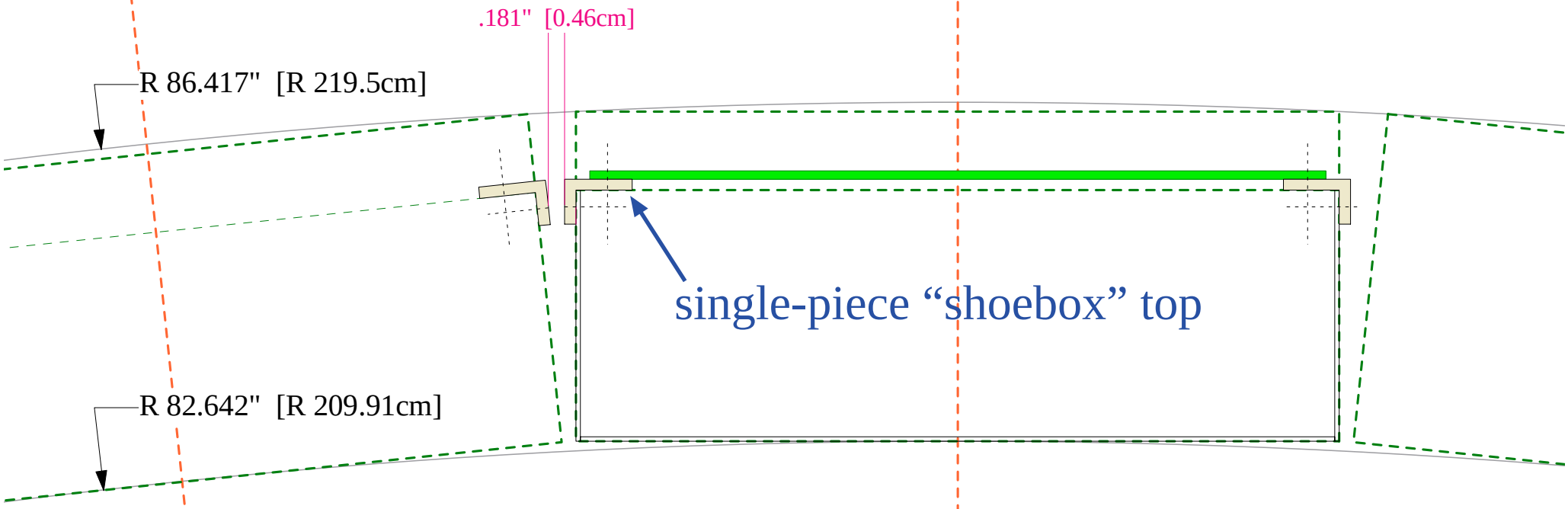
→ get this started with the design of TOFr' (TOFr in Run-IV)....





better TFEE-rail contact but not perfect
(still ~10mil vertical gaps between bolts)
rails assy still there
very small surface for “fillet” sealing

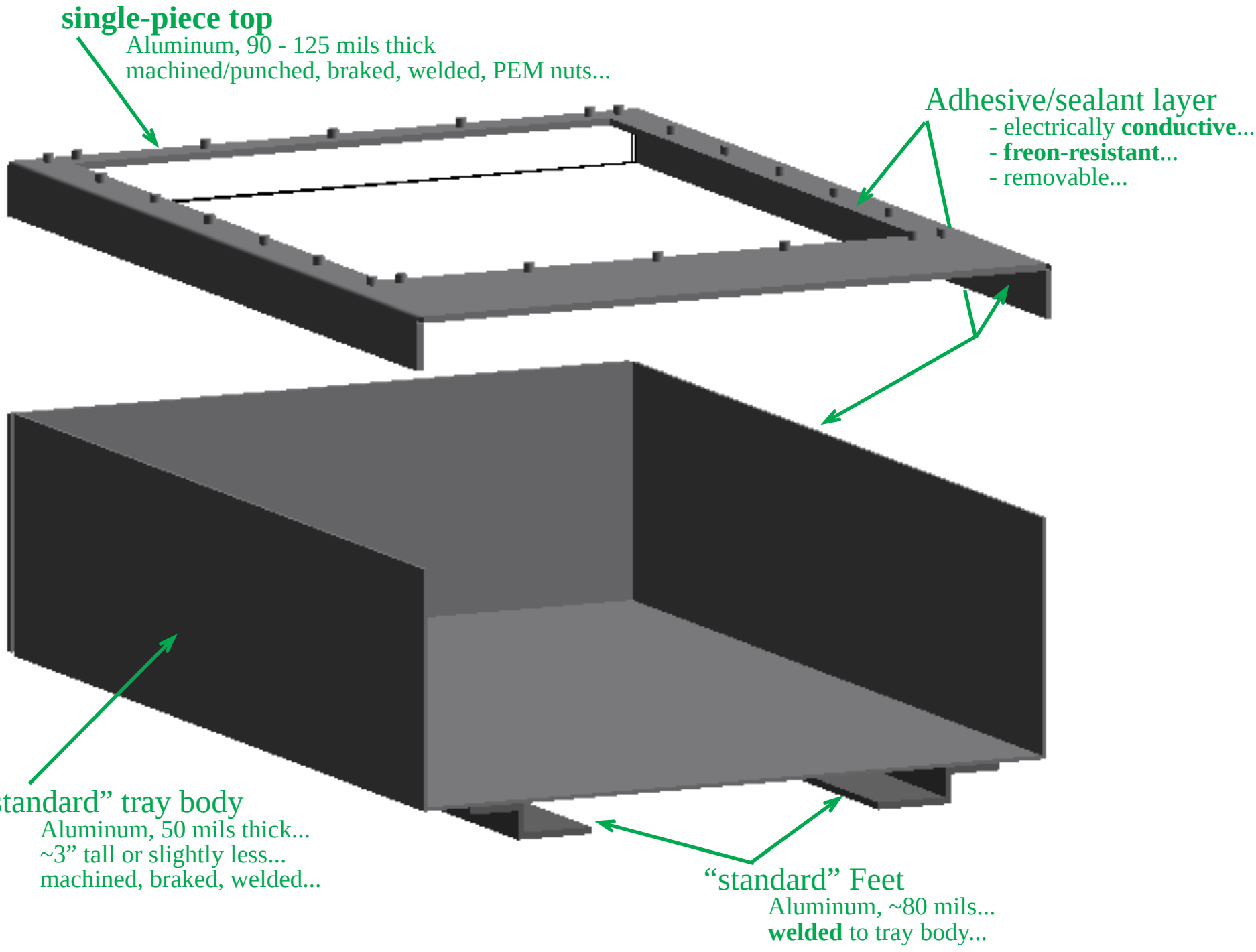
Proposed New Approach



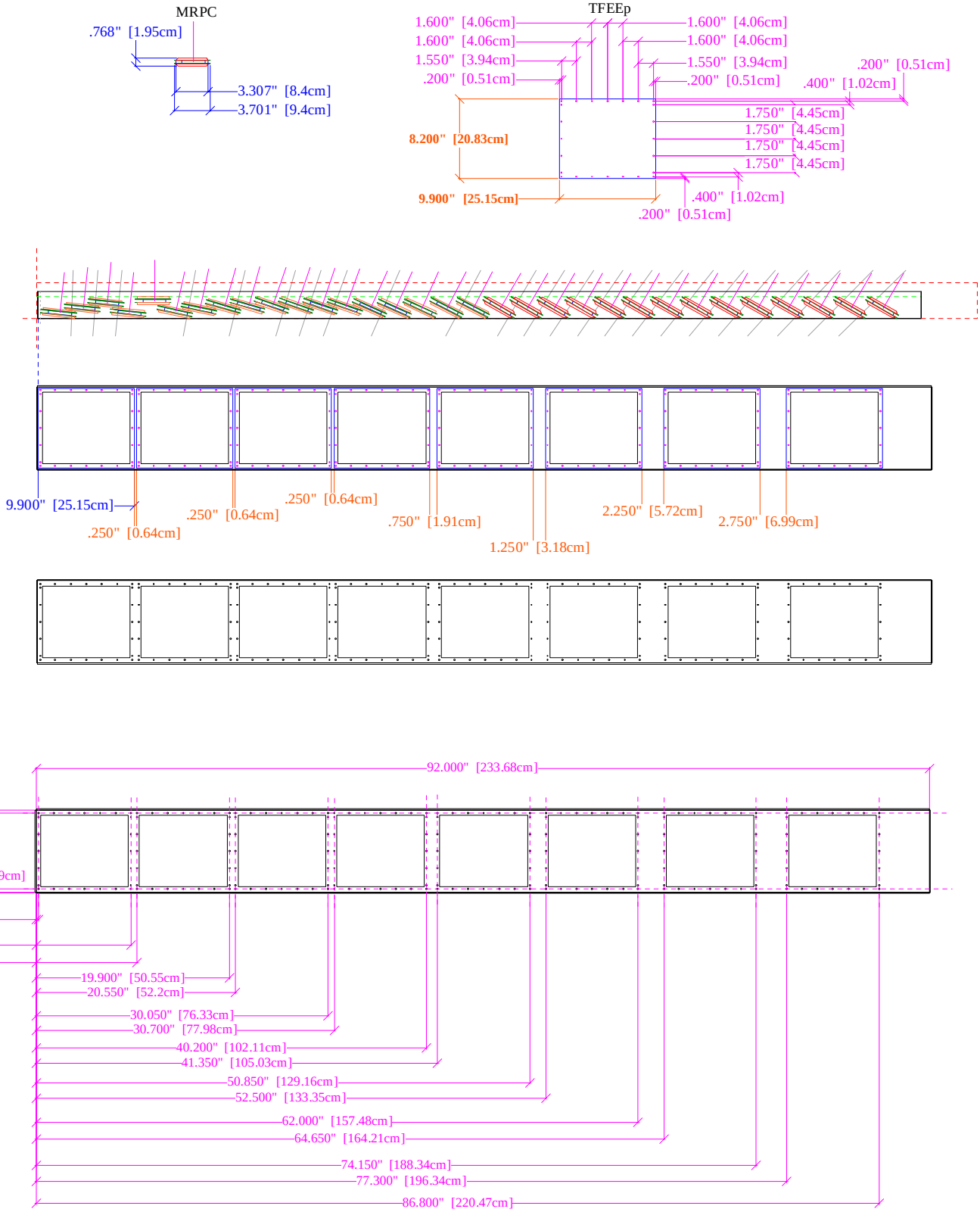
Rail Assy Gone... Effectively recovers ~0.55in - 0.25” of new space
- eases too-tight constraints on module placement - better tolerances

Embedded PEM nuts in tray top
- no bolt welding
- vastly simpler and better gas containment

Electrically-conductive sealant between TFEE and top
- “perfect” electrical contact between (wavy) TFEE and the box body
- much wider sealant layer - better gas containment


single-piece top
Aluminum, 90 - 125 mils thick
machined/punched, braked, welded, PEM nuts...
Adhesive/sealant layer
- electrically **conductive**...
- **freon-resistant**...
- removable...
“standard” tray body
Aluminum, 50 mils thick...
~3” tall or slightly less...
machined, braked, welded...
“standard” Feet
Aluminum, ~80 mils...
welded to tray body...

Design as of 8/28/2003 (@ TOFr' in Run-IV planning mtg).....



STAR TOFrp Tray

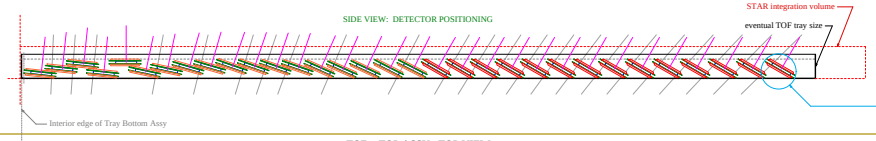
Drawing Number: TOFrp001-E-1
Drawn By: W. J. Llope, llope@physics.rice.edu, 713-348-4741
Version: Sept 02, 2003

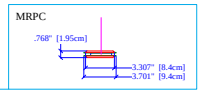
Parts

1. One (1) Tray Top Assy (Views 2, 3, 4, & 5)
   0.090" 5052 H32 Aluminum Sheet Stock
2. One (1) Tray Bottom Assy (Views 6 & 7)
   0.050" 5052 H32 Aluminum Sheet Stock
3. Two (2) Tray Feet (Views 6 & B)
   0.090" 5052 H32 Aluminum Sheet Stock

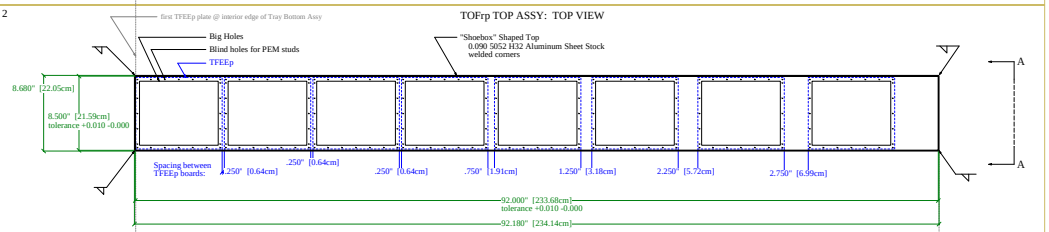
Notes:
1. Parts are to be degreased and wrapped in plastic.
2. PEM nuts and studs to be cleaned before mounting in Top Assy.

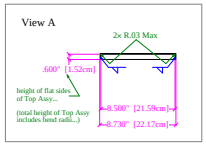
View 1



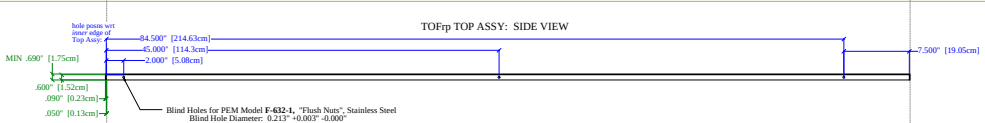


View 2

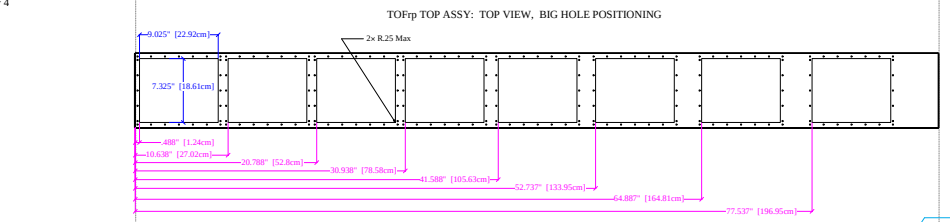


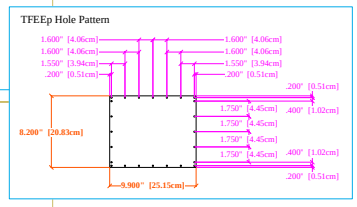


View 3

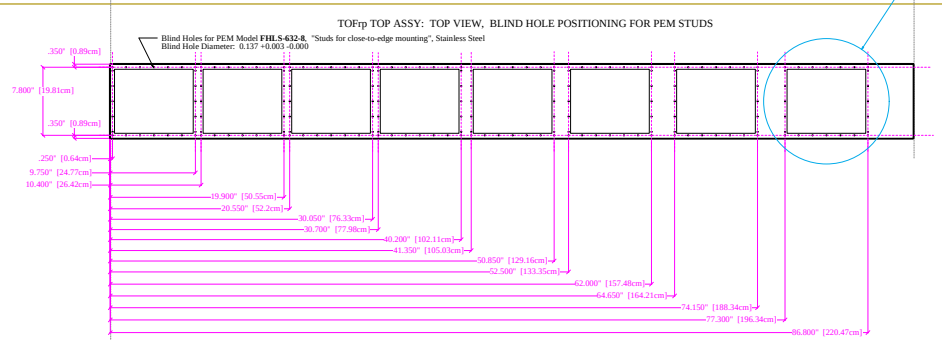


View 4

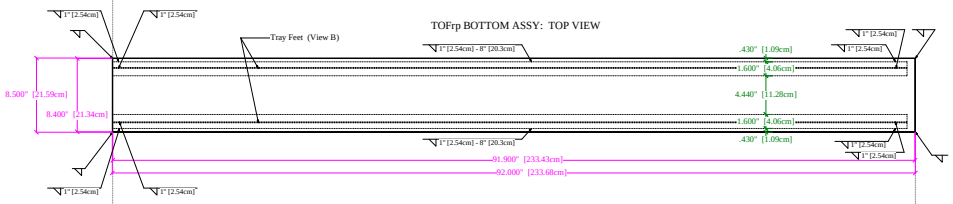




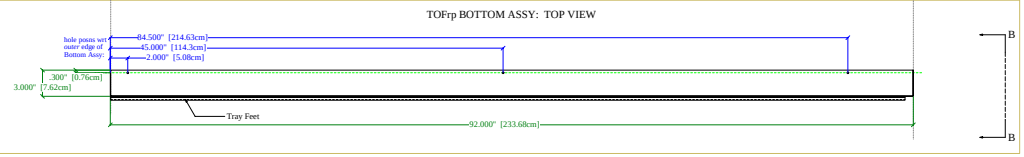
View 5

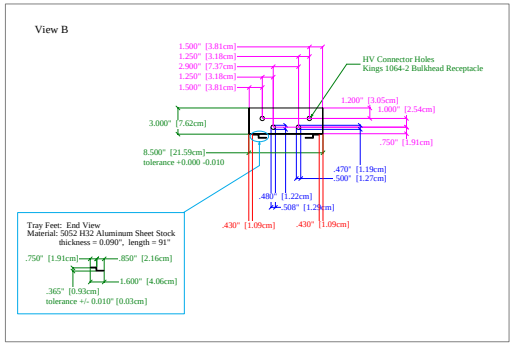


View 6

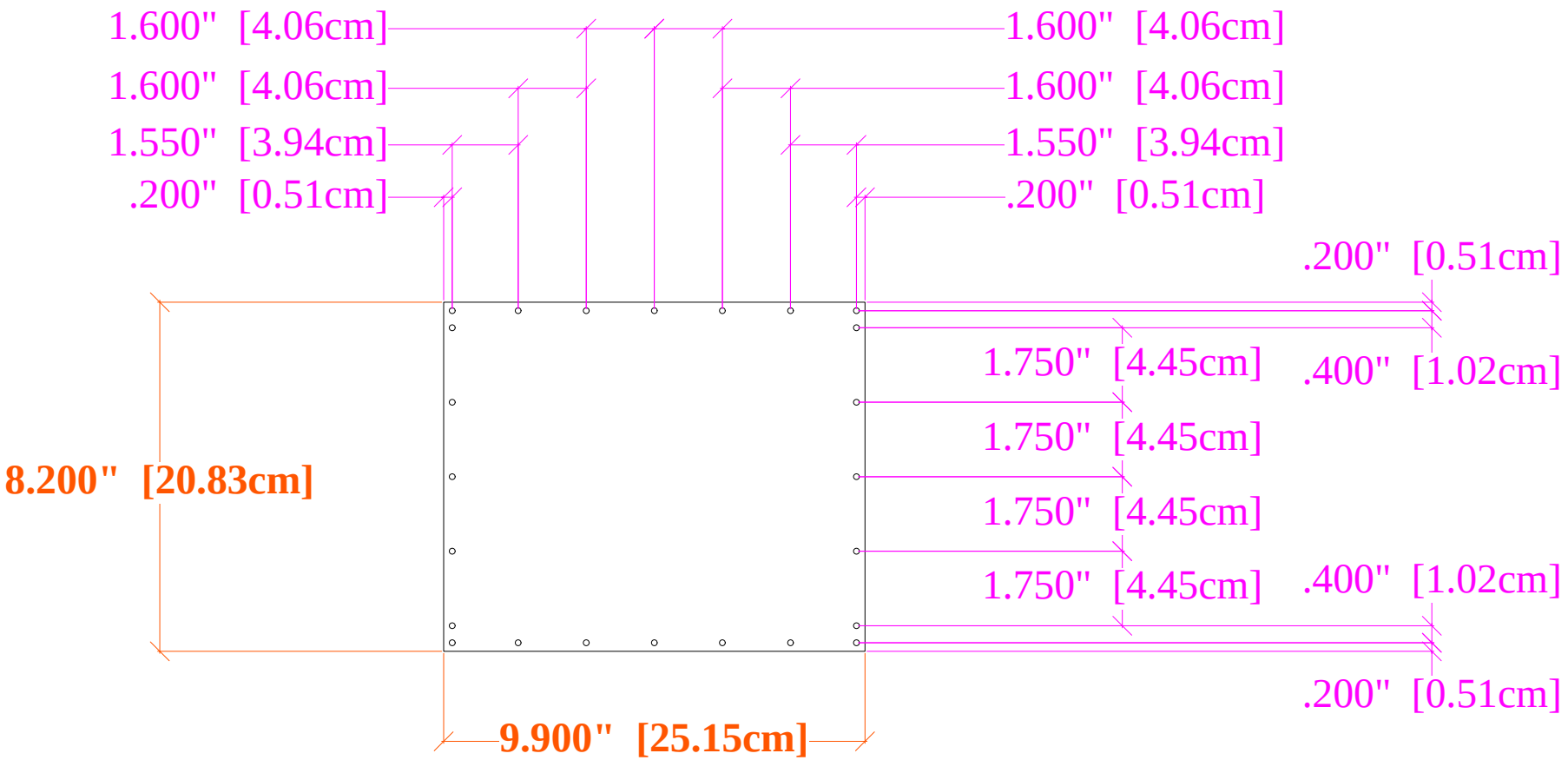


View 7

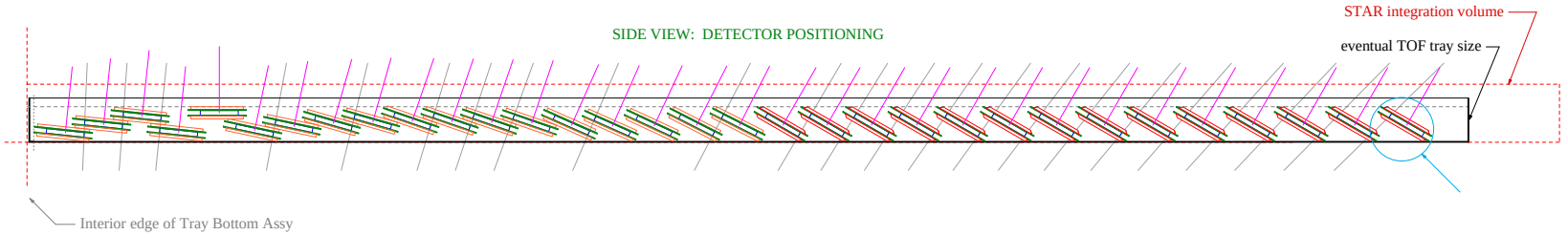




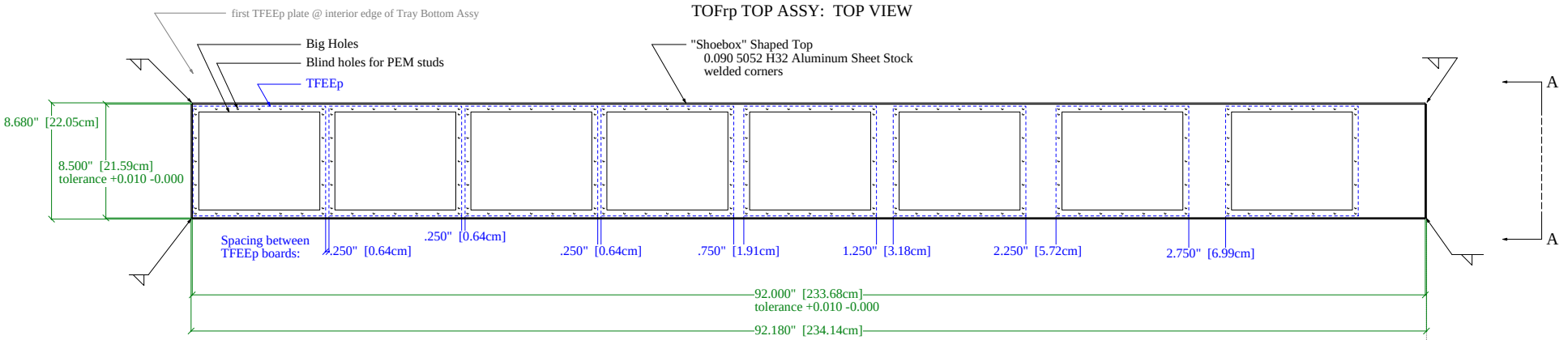
TFEEp Hole Pattern



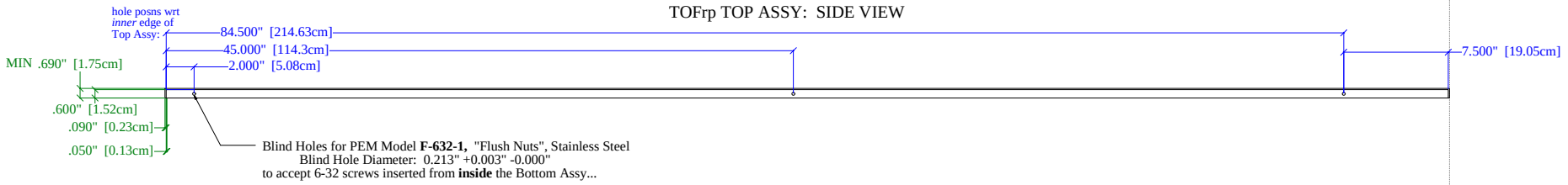
View 1



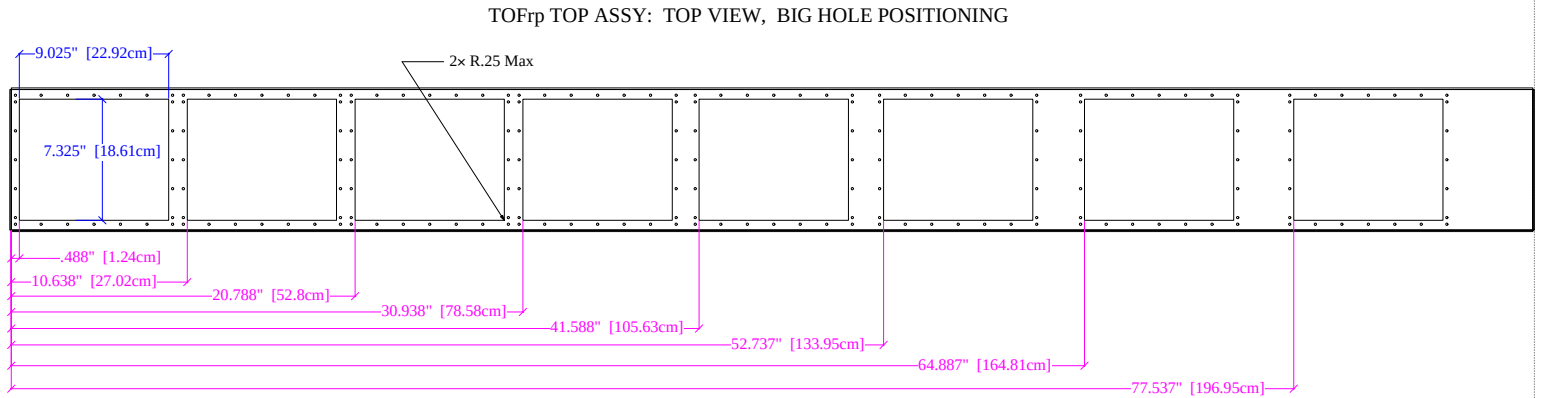
View 2



View 3

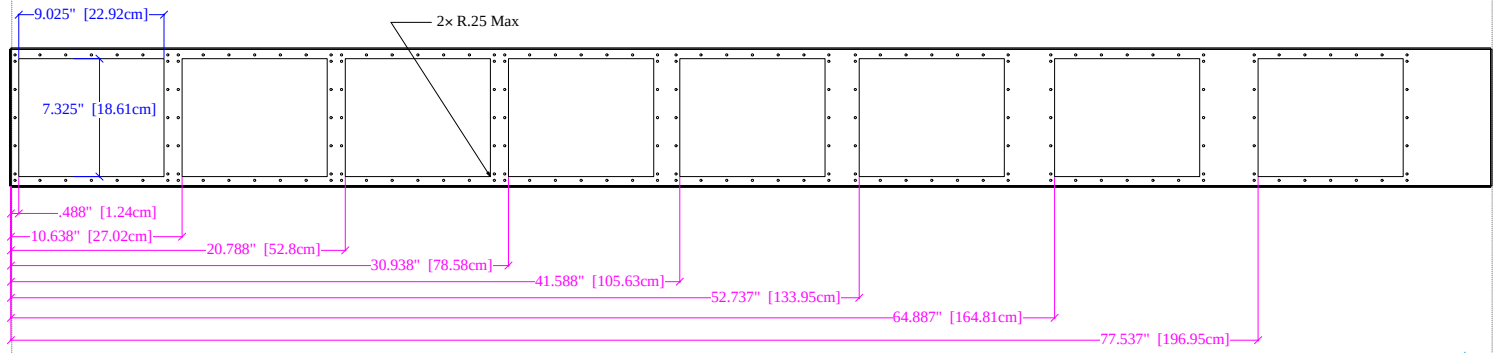


View 4



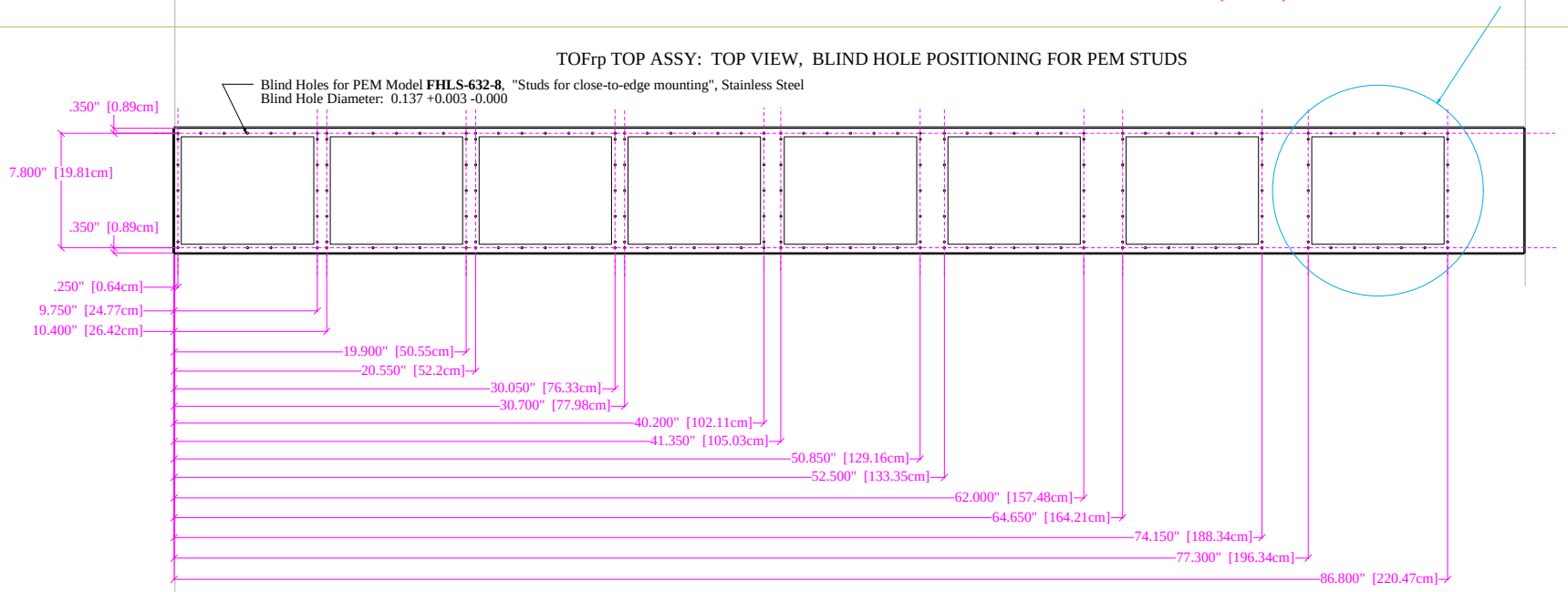
View 4

TOFrp TOP ASSY: TOP VIEW, BIG HOLE POSITIONING



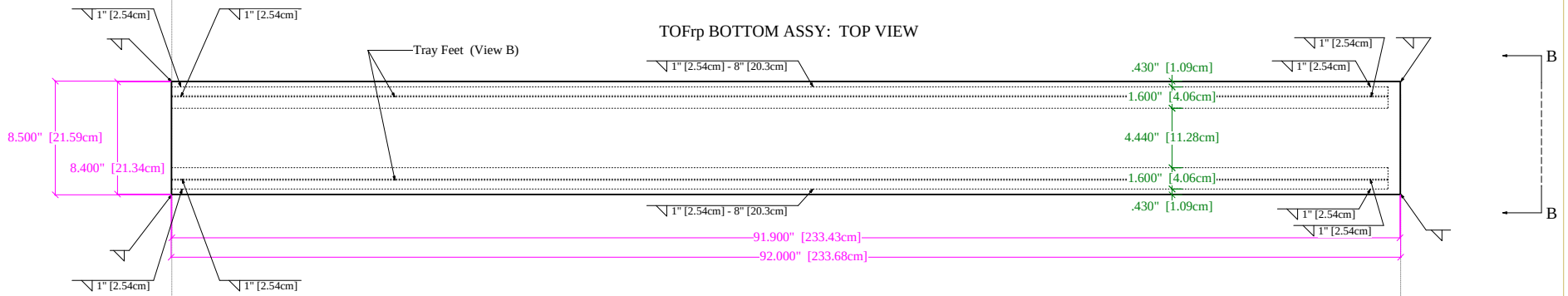
View 5

TOFrp TOP ASSY: TOP VIEW, BLIND HOLE POSITIONING FOR PEM STUDS



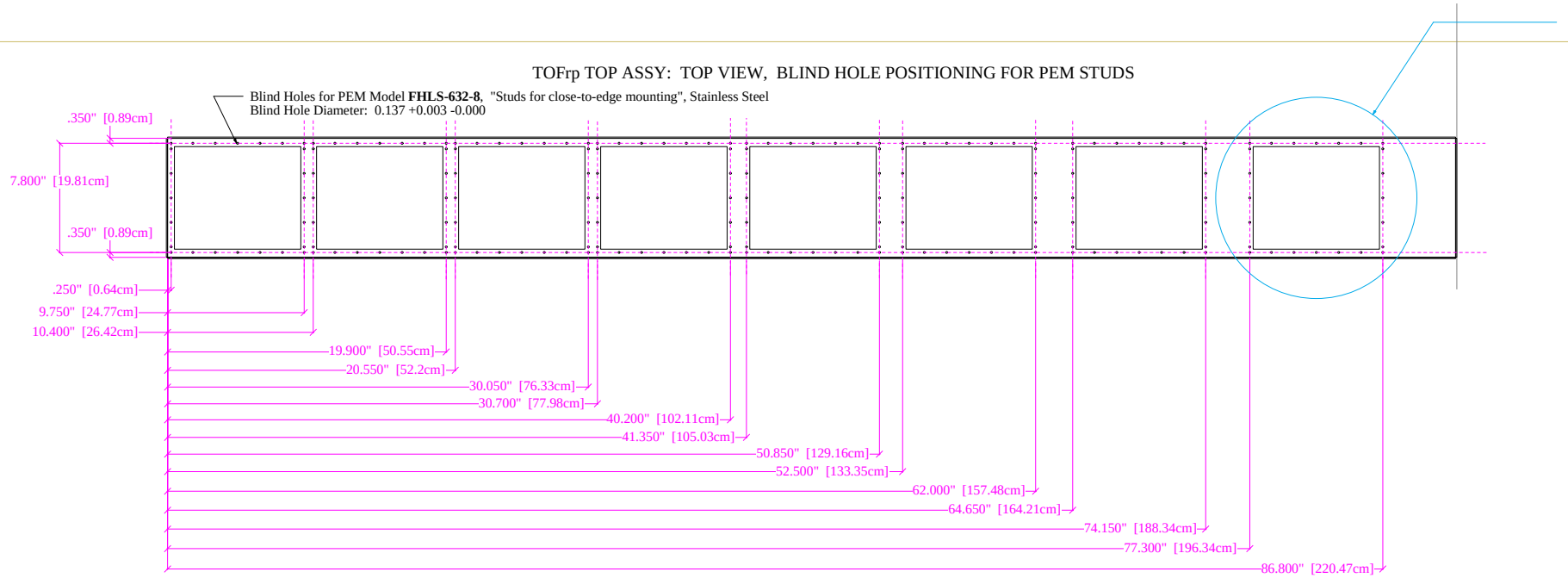
View 6

TOFrp BOTTOM ASSY: TOP VIEW



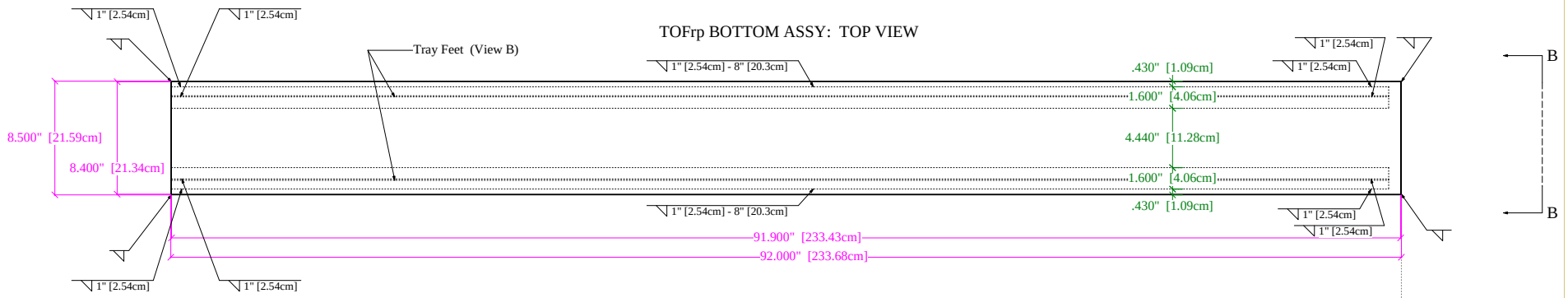
View 5

TOFrp TOP ASSY: TOP VIEW, BLIND HOLE POSITIONING FOR PEM STUDS



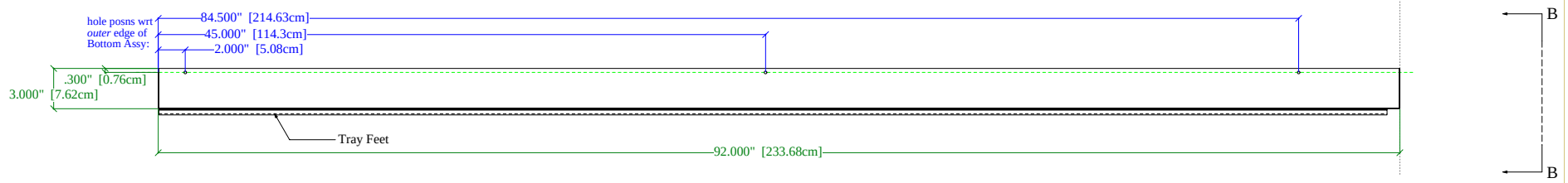
View 6

TOFrp BOTTOM ASSY: TOP VIEW

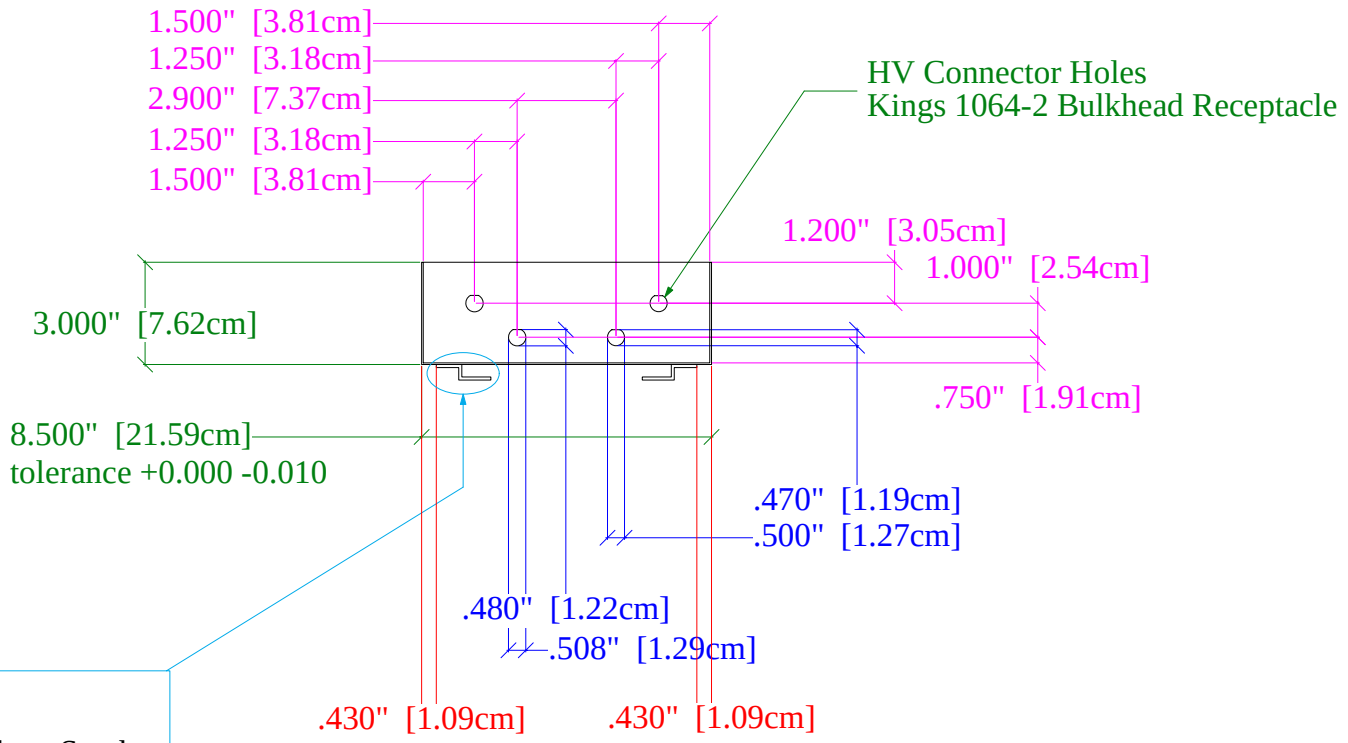


View 7

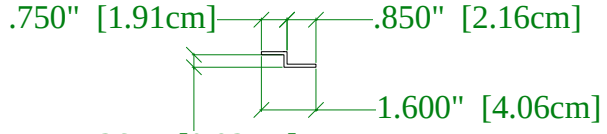
TOFrp BOTTOM ASSY: TOP VIEW



View B



Tray Feet: End View
Material: 5052 H32 Aluminum Sheet Stock
thickness = 0.090", length = 91"



tolerance +/- 0.010" [0.03cm]

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Welcome to the PEMNET® Resource Center

PEM® Fastening Systems is the inventor and sole manufacturer of PEM® brand self-clinching and broaching fasteners. These include a wide variety of nuts, studs, standoffs, panel fasteners, captive fasteners, threaded access hardware, and wire/cable mounting hardware. Our other products include, SI® inserts for plastics, STICKSCREW® small screw insertion systems, custom hardware and PEMSERTER® fastener-insertion presses and automation equipment.

If there is information which you require that is not provided on this site please E-mail the webadmin for a fast reply.

Whats New

Q2 2003 Solutioneering Newsletter

Fasteners For Use In Stainless Steel Sheets

Type PFC4™ Panel Fasteners For Installation Into Stainless Steel Sheets

Type PF13/14™ Panel Fastener Assemblies

PEM® Fastening Systems Licenses MAThread® Technology

Type PF50/60™ Low-Profile Panel Fastener Assemblies with Phillips recess.

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ISO 9001 PEM QS-9000
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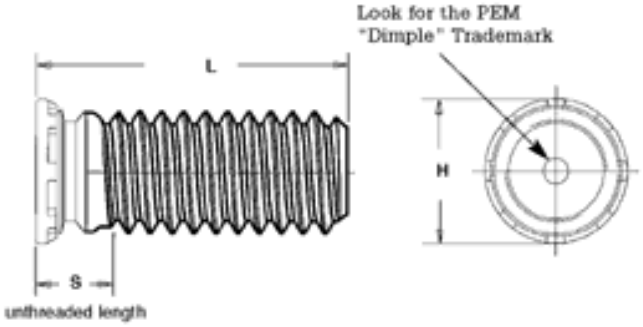
Fastener Products

Product Type:	Studs
Category:	Studs for close-to-edge mounting
Material:	Stainless Steel
Size:	.138-32 (#6-32)
Length "L":	8

Manual or automated installation equipment available for most fasteners

Flush Head Studs

Specifications for: FHLS-632-8	
Min. Sheet Thickness	.040
Hole Size In Sheet +.003 -.000	.137
Max. Hole In Attach. Parts	.150
H ±.015	.164
S Max.	.090
Min. Dist. Hole C/L To Edge	.150



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ISO 9001 PEM QS-9000
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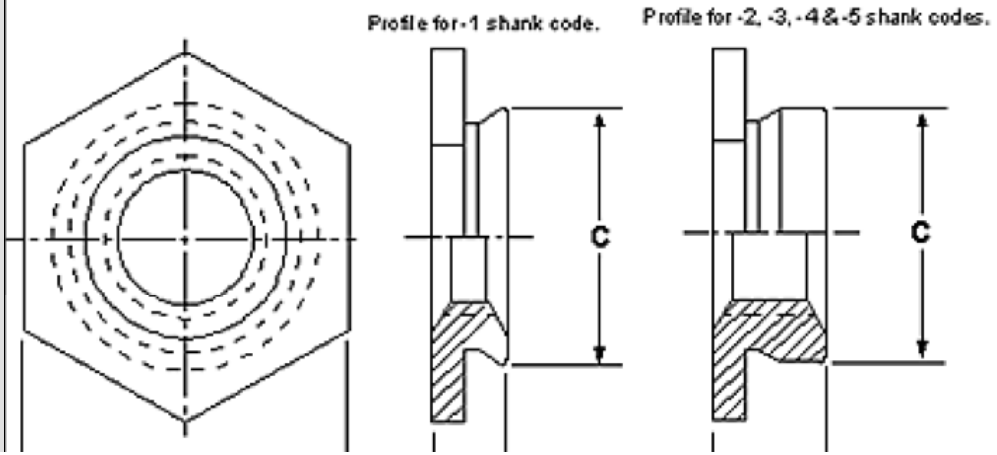
Fastener Products

Product Type: Nuts
Category: Flush Nuts
Material: Stainless Steel
Size: .138-32 (#6-32)
Length "L": N/A

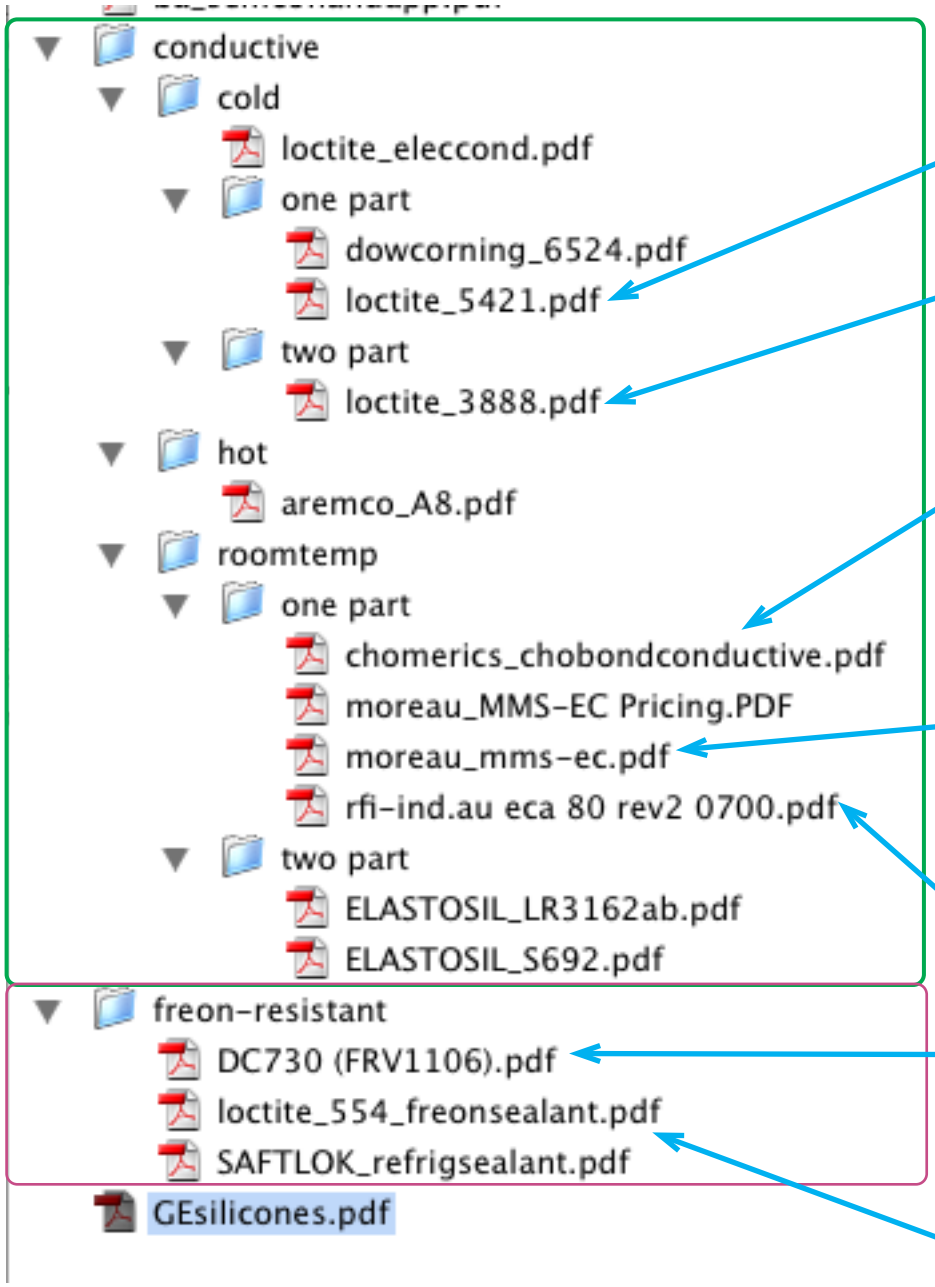
Manual or automated installation equipment available for most fasteners

PEMSERT® Self-Clinching Flush Fastener

Specifications for: F-632-1	
A Max.:	.060
Sheet Thickness:	.060-.090
Hole Size in Sheet +.003 -.000:	.213
C Max.:	.212
H Nom.:	1/4
Min. Dist. C/L To Edge:	.27



Adhesive/Sealant choice....



one-part conductive RTV

two-part conductive

one-part conductive, “no removal”

one-part conductive RTV

one-part conductive RTV (available?)

fuel/solvent resistant
extremely expensive

freon-resistant

Freon resistant?

Non-conductive

LOCTITE

1001 Trout Brook Crossing
Rocky Hill, CT 06067-3910
Telephone: (860) 571-5100
FAX: (860) 571-5465

Technical Data Sheet

Product 5421

Industrial Version, December 1999

PRODUCT DESCRIPTION

LOCTITE® Product 5421 is a single component, RTV silicone that makes a flexible, formed-in-place, electrically conductive bond. The product cures on exposure to moisture in the air. The product dries tack free within 1 hour and fully cures in 24 hours. Full cure times will vary with temperature, humidity and gap.

TYPICAL APPLICATIONS

LOCTITE® Product 5421 is used for automotive sensor bonding and Gasketing of EMI/RF shielded enclosures.

PROPERTIES OF UNCURED MATERIAL

	Typical Value
Chemical Type	Silicone
Appearance	Tan paste
Specific Gravity @ 25°C, ASTM D-1475-60	2.96
Flash Point (TCC), ASTM D-93-85, °C (°F)	>87 (>180)

TYPICAL CURING PERFORMANCE

LOCTITE® Product 5421 was cured for 72 hours @ 22°C @ 50% RH. Actual cure schedule depends on mass and geometry of parts.

TYPICAL PROPERTIES OF CURED MATERIAL

Electrical Properties

Volume Resistivity, MIL-A87172G	
15 gauge needle, Ω•cm	4.1×10^{-3}
18 gauge needle, Ω•cm	4.5×10^{-3}

Physical Properties

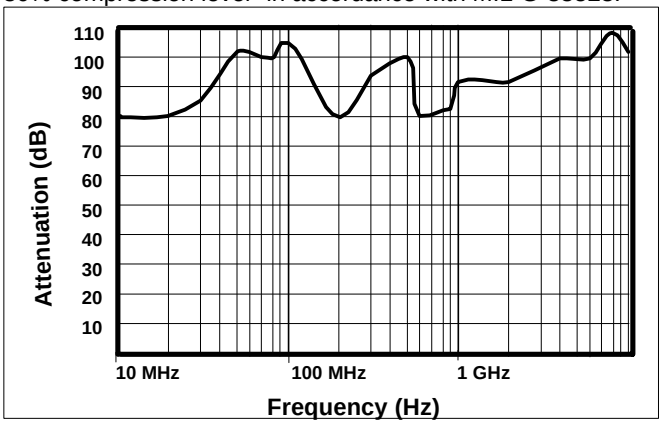
Hardness, ASTM D2240, Shore A	58
Tensile strength, ASTM D-412, N/mm^2 (psi)	0.9 (130)
Elongation at break, ASTM D-412, %	68

PERFORMANCE OF CURED MATERIAL

Shear Strength, ASTM D1002	Typical Value
aluminum, N/mm^2	0.5
psi	(65)

EMI/RF Shielding Effectiveness

30% compression level* in accordance with MIL-G-83528.



*The 30% compression testing is required for the MIL spec, however the product is not recommended for cured-in-place gasketing (cured prior to assembly).

GENERAL INFORMATION

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Directions for use

Product should be brought to room temperature before use. Thoroughly clean all substrates to be bonded. Apply product to one substrate. Mate the other substrate to be bonded by applying enough pressure to compress the material to the desired thickness. Actual cure schedule depends on mass and geometry of parts. Actual bond-line electrical Resistivity obtained is a function of assembly process, substrates, and ageing conditions.

Storage

Product shall be stored in a cool, dry location in unopened containers at a temperature between 2°C to 8°C (36°F to 46° F) unless otherwise labeled. Optimal storage is at the lower half of this temperature range. To prevent contamination of unused product, do not return any material to its original container. For further specific shelf life information, contact your local Technical Service Center.

Data Ranges

The data contained herein may be reported as a typical value and/or range. Values are based on actual test data and are verified on a periodic basis.

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Loctite Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

LOCTITE

1001 Trout Brook Crossing
Rocky Hill, CT 06067-3910
Telephone: (860) 571-5100
FAX: (860) 571-5465

Product Description Sheet

Product 554

Industrial Products, October 1998

PRODUCT DESCRIPTION

Loctite® Refrigerant Sealant 554 provides maximum solvent resistance on threaded fittings and pipe up to 2" in diameter. It is recommended for refrigeration systems and service with strong chemicals. The sealant is used in place of specialty non-hardening compounds, litharge, glycerine, and sealing tape. **Refrigerant Sealant is not for slip fitted tube joints.** 554 has excellent solvent resistance and withstands temperatures to 300ºF (149ºC).

TYPICAL APPLICATIONS

- Metal and fiber plants
- Chemical processing
- Paper processing plants
- Waste treatment facilities
- Textile industry

PROPERTIES OF UNCURED MATERIAL

	Typical Value
Chemical Type	Methacrylate Ester
Appearance	Red liquid
Specific Gravity @ 25°C	1.02
Viscosity, @ 25°C, MPa.s (cP)	
Brookfield RVF, Method B	
Spindle 3 @ 20 rpm	2,500
Flash Point (TCC), °C	>200ºF (93ºC)
Toxicity	Low

USE AND APPLICATION

Directions for Application

1. Optimum results will be obtained on fittings that are clean and free of grease and oil.
2. Apply 554 to the leading threads of the male fitting, leaving the first thread free of sealant. Force material into the threads to thoroughly fill the voids.
3. Using accepted trade practices, assemble and wrench tighten fittings until proper alignment is obtained.
4. Properly tightened fittings will seal instantly to moderate pressures. For maximum pressure resistance and solvent resistance allow 554 to fully cure (at least 24 hours).

Disassembly

Fittings assembled with 554 may be disassembled with normal hand tools. For large pipe diameters (over 1") heat may be required to disassemble fittings. Fittings may be reused by removing loose sealant residue with a wire brush and reapplying 554 Refrigerant Sealant.

TYPICAL PROPERTIES OF CURED MATERIAL

Time to achieve full strength on steel @ 72ºF		24 hrs min
Coefficient of thermal expansion, ASTM D696		0.1
Coefficient of thermal conductivity, ASTMC177		
	W / m.ºK	0.1
Specific heat,	k J / kg.ºK	0.3

PERFORMANCE OF CURED MATERIAL

(After 72 hrs @ 22 °C on steel)

	Typical Value
Breakaway torque, on steel 3/8 x 24 degreased grade 5 bolts and grade 2 nuts	240 in. lb
Prevail Torque, on steel 3/8 x 24 degreased grade 5 bolts and grade 2 nuts	210 in. lb

MATERIAL COMPATABILITY

Loctite anaerobic adhesive/sealants can be used in conjunction with all metals, glass, ceramics and many thermoset plastics such as phenolic, polyster, etc. Liquid adhesives will, however, soften and sometimes craze thermoplastics including ABS, polycarbonate, vinyl, methacrylates, etc. They will also soften varnish and lacquer finishes. Most baked enamel finishes are not harmful by initial contact but should be wiped clean within an hour of application. The cured 554 Refrigerant Sealant will not affect any of these materials.

GENERAL INFORMATION

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). It is recommended to confirm compatibility of the product with such substrates.

Directions for use

1. Optimum results will be obtained on fittings that are clean and free of grease and oil.

2. Apply 554 to the leading threads of the male fitting, leaving the first thread free of sealant. Force material into the threads to thoroughly fill the voids.

3. Using accepted trade practices, assemble and wrench tighten fittings until proper alignment is obtained.

4. Properly tightened fittings will seal instantly to moderate pressures. For maximum pressure resistance and solvent resistance allow 554 to fully cure (at least 24 hours).

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3M™ Electrically Conductive Tape 9703, 1/4 in x 36 yd, 36 per case

Printer-friendly format

This 3M™ Electrically Conductive Tape 9703 is a sensitive acrylic adhesive Z-axis tape with 58 lb polycoated kraft paper liner, 1/4 in x 36 yd, medium temperature and high solvent resistance, high HSE and low LSE.

3M Id : 70-0062-4286-4
GTIN(UPC/EAN) : 0 00 21200 39616 8

Additional Information

3M™ Electrically Conductive Tape 9703 is used for grounded EMI/RFI shielding attachment or interconnection of silver ink/ polyester based flexible circuits. Tape 9703 provides stable electrical performance at moderately high temperatures and good adhes

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Packaging Data

9703 Electrically Conductive Tape - Data Sheet (PDF 19.3 K)

Please Note:
Adobe® Acrobat® Reader is required to view PDF documents.

UHMW-polethylene strips must go on after welding at Oaks....

replace 6 independent strips by two “U” extrusions, ~7’ long...

glue these U’s into place inside the already welded feet...