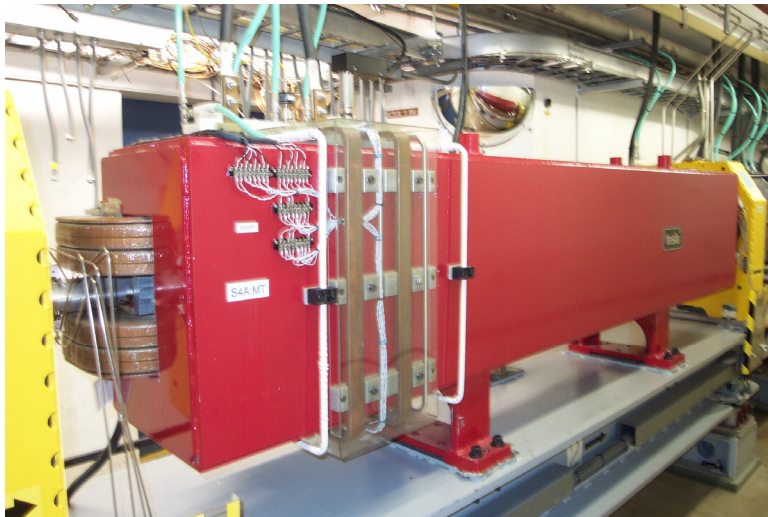


Storage Ring Dipole Magnet

310101-00055 with modification 310101-100100

There are eighty storage ring dipole magnets at the APS. In each sector the storage ring dipoles are on girders 2 and 4 and are identified with the names AM and BM respectively. The original storage ring dipoles were built as shown on drawing 310101-00055. The modification shown on drawing 310101-100100 was implemented in 2001/2002. This was done to eliminate the copper deposit in the manifolds that began after the trim coils started to be used due to implementing the Decker Distortion. The copper deposit would electrically short the trim coil to the main coil.

If a storage ring magnet ever goes bad the whole girder will be replaced.



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Storage Ring Dipole Magnet

Parameters for the Storage Ring Dipole Magnet

Number	80 + 1
Magnetic length	3.06 m
Bending radius	38.9611 m
Field	0.599 T
Beam stay clear	
Horizontal	±35.0 mm
Vertical	±20.0 mm
Dipole trim coils	
Number	80 + 1
No. of independent power supplies	80
Magnetic length	3.06 m
Field	0.04 T
Gap Height	60 mm
Total Mass of Magnet	5130 kg
Coils per Pole	2

Conductor	
Height	22.0 mm
Width	12.2 mm
Hole Diameter	9.0 mm
Number of Turns per Pole	32
Total Inductance	51 mH
Total Resistance	38 m Ω
Time Constant	1342 ms
Peak Current	452 A
Current Density in Coil	1.4 A/mm ²
Voltage	17.3 V
Power	7.8 kW
Cooling Water Circuits per magnet	2
Total Water Flow	2.4* gpm
Water Pressure Drop	100* psi
Water Temperature Rise	12* °C

*Will be redesigned at 80 psi

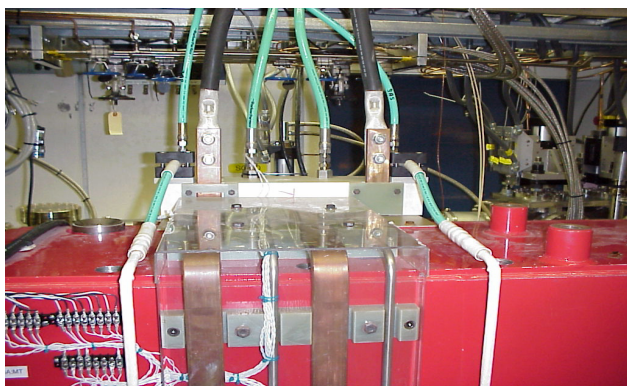
Storage Ring Dipole Magnet



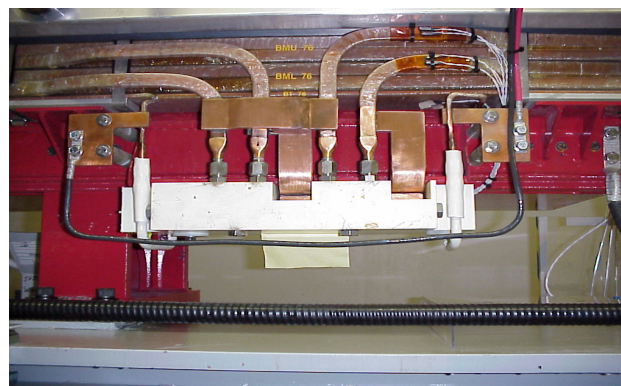
Storage ring dipole magnets in assembly bay.



The last storage ring dipole magnet going into facility



Upper water manifold block installed



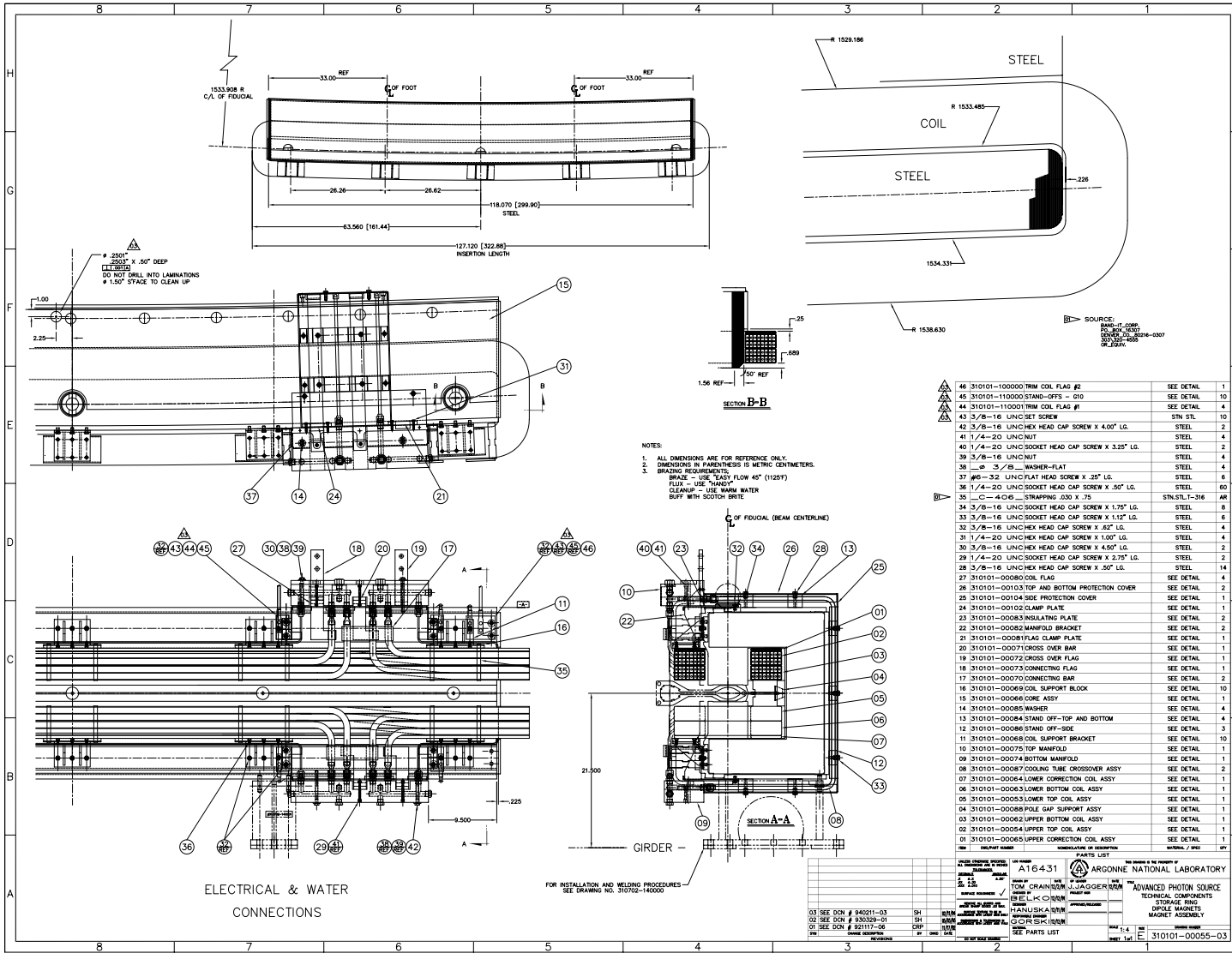
Lower water manifold block installed

Storage Ring Dipole Magnet

8	7	6	5	4	3	2	1																																																						
<p>#1 GIRDER PREPARATION</p> <p>-CLEAN GIRDER (MUST BE FREE OF RUST OR DIRT)</p> <p>-CHECK THREADED HOLES</p> <p>-MODIFY FOR DIAGNOSTICS & CHAMBER SEE DWG. # 310701-00040-03 # 310701-00041-04</p>	<p>#2 INSTALL CHAMBER SUPPORTS TO GIRDER</p> <p>-SEE DWG. # 310301-00075-00 SHEET #1 & #2, STEPS 1 THRU 4</p>	<p>#3 INSTALL CHAMBER SUPPORTS (BASE) TO GIRDER</p> <p>-SEE DWG. # 310301-00075-00 SHEET #1 & #2, STEPS 3 & 6</p>	<p>#4 INSTALL BK-4 JACKS TO GIRDER</p> <p>-SEE DWG. # 310701-00063-03 # 310701-00040-03</p> <p>-NOTICE ANCHOR THREADED ROD POSITION</p> <p>-NOTICE DIRECTION OF ANCHOR</p>	<p>#5 ATTACH AM MAGNET (DIPOLE) TO GIRDER</p> <p>-SEE DWG. # 310702-140000-00 # 310701-00149-02</p> <p>-FIELD RE-WORK IF REQ'D.</p> <p>-NOTICE SHIMS & HEIGHT OF MAGNET SUPPORT</p>	<p>#6 LEVEL (TWIST) MAGNET (DIPOLE) TO GIRDER</p> <p>-SEE DWG. # 310702-140000-00 (TO BE REVISED)</p>	<p>#7 ATTACH AS2 MAGNET (SEXTAPOLE) TO GIRDER</p> <p>-SEE DWG. # 310702-950000-00 # 310702-00149-02</p> <p>-FIELD RE-WORK IF REQ'D.</p> <p>-NOTICE SHIMS & HEIGHT OF MAGNET SUPPORT</p>	<p>#8 ATTACH AS3 MAGNET (SEXTAPOLE) TO GIRDER</p> <p>-SEE DWG. # 310702-950000-00 # 310702-00149-02</p> <p>-FIELD RE-WORK IF REQ'D.</p> <p>-NOTICE SHIMS & HEIGHT OF MAGNET SUPPORT</p>	<p>#9 ALIGN MAGNETS TO GIRDER</p> <p>-SEE DWG. # 310701-00040-03 # 310701-00149-02</p> <p>-ALSO SEE ALIGNMENT INSTRUCTION DOCUMENT #</p>																																																					
<p>#10 PREPARE MAGNETS FOR CHAMBER INSTALLATION</p> <p>-PREPARE PER INSTRUCTIONS TO BE PROVIDED BY SEXTAPOLE COMPONENTS ENGINEER.</p>	<p>#11 INSTALL AND ALIGN CHAMBER</p> <p>-SEE DWG. # 310301-00075-00 SHEET #1 & #2, STEPS 7 THRU 15</p> <p>-ALSO SEE DWG. # 310701-00149-02 # 310701-00056-02 # 310701-00019-01 # P310-500000-00</p>	<p>#12 PIN CHAMBER SUPPORTS TO GIRDER</p> <p>-SEE DWG. # 310301-00075-00 SH1, #1 & #2, STEPS 1 THRU 4</p>	<p style="text-align:center;">SECTION #2</p>			<p>#13 RE-ATTACH MAGNETS TO GIRDER WITH CHAMBER</p> <p>-PREPARE PER INSTRUCTIONS TO BE PROVIDED BY SEXTAPOLE COMPONENTS ENGINEER.</p>	<p>#14 ALIGNMENT CHECK</p> <p>-SEE DWG. # 310301-00075-00 SHEET #1 & #2, STEPS 7 THRU 15</p> <p>-ALSO SEE DWG. # 310701-00149-02 # 310701-00056-02 # 310701-00019-01 # P310-500000-00</p> <p>-ALSO SEE ALIGNMENT INSTRUCTION DOCUMENT #</p>	<p>#15 HYDROSTATIC TESTS</p> <p>-LEAK TEST AT 250 P.S.I.</p> <p>-CHECK FLOW RATE</p> <p>-OUTLET FLOW RATE AT 70 P.S.I.</p> <p>-INLET FLOW RATE AT 150 P.S.I.</p> <p>-SEE DOCUMENT #</p>																																																					
<p>#16 ELECTRICAL TESTS</p> <p>-HI-POT AT 5,000 VOLTS</p> <p>-CHECK D.C. RESISTANCE OF COIL</p> <p>-CHECK POLARITY</p> <p>-SEE DOCUMENT #</p>	<p>#17 CHECK AND INSTALL PARTS TO SUPPORT PEDESTALS</p> <p>-CLEAN PEDESTAL MUST BE FREE OF ANY RUST OR DIRT.</p> <p>-SEE DWG. # 310702-930000-01 # 310701-00040-03 # 310702-910000-01</p> <p>-ROD END MUST MOVE FREELY ON SHAFT</p>	<p>#18 STATE SECTOR NUMBER</p> <p>-COPY SECTOR NUMBER LOCATED ADJACENT TO GIRDER ON INSIDE WALL (RECORD ON TRAVELER)</p> <p>IDENTIFY SECTOR LOCATION PER RING MANAGER</p> <p>-ATTACH I.D. NUMBER TO GIRDER</p> <p>SEE NOTE ON DRAWING</p> <p>-PREPARE GIRDER FOR INSTALLATION</p> <p>SEE DWG. # 310702-930000-01</p> <p>-NOTICE ADJUSTMENT ROD CAP MUST NOT BE ATTACHED YET</p>	<p>#19 CHECK AND INSTALL LOCATING CART</p> <p>-SEE TRANSPORTER INSTALLATION DOCUMENT</p> <p>-CHECK MAINTENANCE REPORT POINTS OUTLINED IN SERVICE MANUAL</p> <p>-CENTER & SQUARE CART BETWEEN PEDESTALS</p> <p>-ENERGIZE CART</p> <p>-RAISE UNTIL CASTERS ARE OFF OF FLOOR.</p> <p>-SEE DOCUMENT # 310701-00078-00</p>	<p>#20 CHECK TRANSPORTER</p> <p>-CHECK MAINTENANCE REPORT POINTS OUTLINED IN SERVICE MANUAL</p> <p>-ATTACH DOLLIES TO TUG TOW BAR AND DRAG IN A STRAIGHT LINE.</p> <p>-SEE DOCUMENT # 310701-00078-00</p>	<p>#21 ALIGNMENT CHECK</p> <p>-SEE ALIGNMENT INSTRUCTION DOCUMENT #</p>	<p>#22 ATTACH GIRDER TO TRANSPORTER</p> <p>-LIFT GIRDER VIA SPREADER BEAM AND CRADLES TO THE DOLLIES</p> <p>-REMOVE SPREADER BEAM & CRADLES</p> <p>-ATTACH TIE-DOWNS TO GIRDER AND DOLLIES</p> <p>-SEE DOCUMENT # 310701-00078-00</p>	<p>#23 INSTALL GIRDER TO PEDESTALS</p> <p>-TRANSPORT GIRDER WITH TUG & BOLLY SYSTEM TO THE DESIGNATED POSITION IN THE STORAGE RING.</p> <p>-DETACH TIE-DOWNS</p> <p>-REMOVE THE JACK BRACES</p> <p>-REMOVE THE DRAG LINK & TIES</p> <p>-MOVE THE LOCATING CART TRANSVERSELY TO BENEATH THE ORDERS</p> <p>-RAISE LOCATING CART TO FULL HT. THUS LIFTING THE GIRDER.</p> <p>-IN THE RAISED POSITION PLACE THE SAFETY PINS IN THE DESIGNATED HOLES</p> <p>-MOVE SYSTEM TRANSVERSELY TO BETWEEN THE PEDESTALS</p> <p>-REMOVE SAFETY PINS</p> <p>-LOWER GIRDER TO PEDESTALS</p> <p>-REMOVE LOCATING CART.</p> <p>-SEE ALIGNMENT PROCEDURES</p> <p>-SEE DOCUMENT # 310701-00078-00</p>	<p>#24 ALIGN GIRDER TO PEDESTALS</p> <p>-SEE DWG. # 310701-00149-02 # 310701-00056-03 # 310701-930000-01</p> <p>-NOTICE BASE PLATE THREADED HOLES ARE CENTERED ON THE 2-3/4" PEDESTALS MOUNTING HOLES</p> <p>-NOTICE SET-UP ASSEMBLY DIMENSIONS</p>																																																					
<p>#25 DIAGNOSTICS AND CONTROL</p> <p>-TO BE DETERMINED</p>	<p>NOTE: PRIOR TO STARTING TASKS THE FOLLOWING MUST BE ACCOMPLISHED</p> <p>1) ALL RELVANT DRAWINGS AND INSTRUCTION MANUALS MUST BE PRESENT</p> <p>2) ALL RELVANT PARTS MUST BE INSPECTED.</p>		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">SYM</td> <td style="width:40%;">CHANGE DESCRIPTION</td> <td style="width:10%;">BY</td> <td style="width:10%;">CHD</td> <td style="width:10%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>			SYM	CHANGE DESCRIPTION	BY	CHD	DATE																					<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:20%;">ITEM</td> <td style="width:20%;">DWG./PART NUMBER</td> <td style="width:40%;">NOMENCLATURE OR DESCRIPTION</td> <td style="width:20%;">MATERIAL / SPEC</td> <td style="width:10%;">QTY</td> </tr> <tr> <td colspan="5" style="text-align:center;">PARTS LIST</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	ITEM	DWG./PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL / SPEC	QTY	PARTS LIST																								
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Storage Ring Dipole Magnet



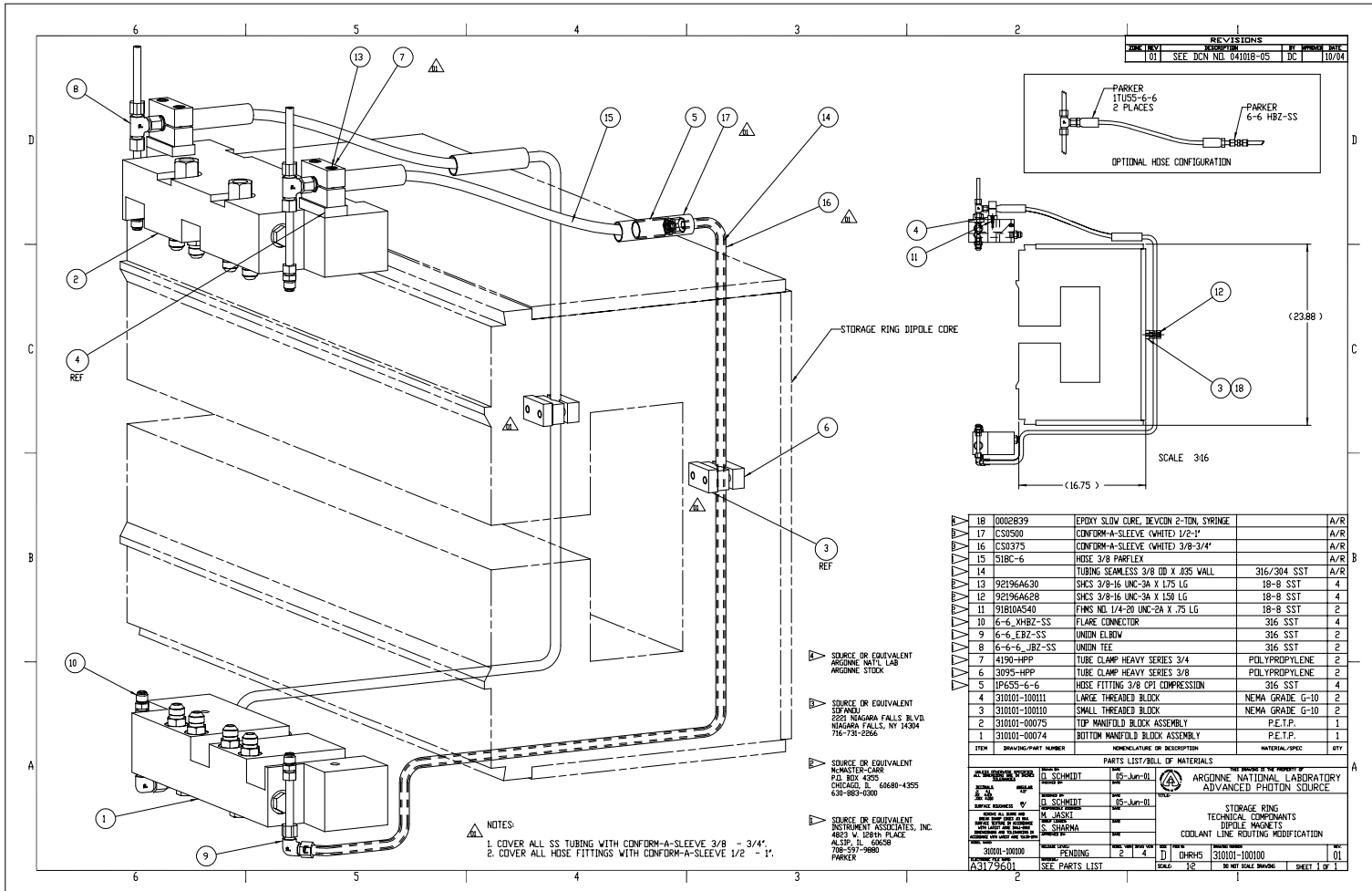
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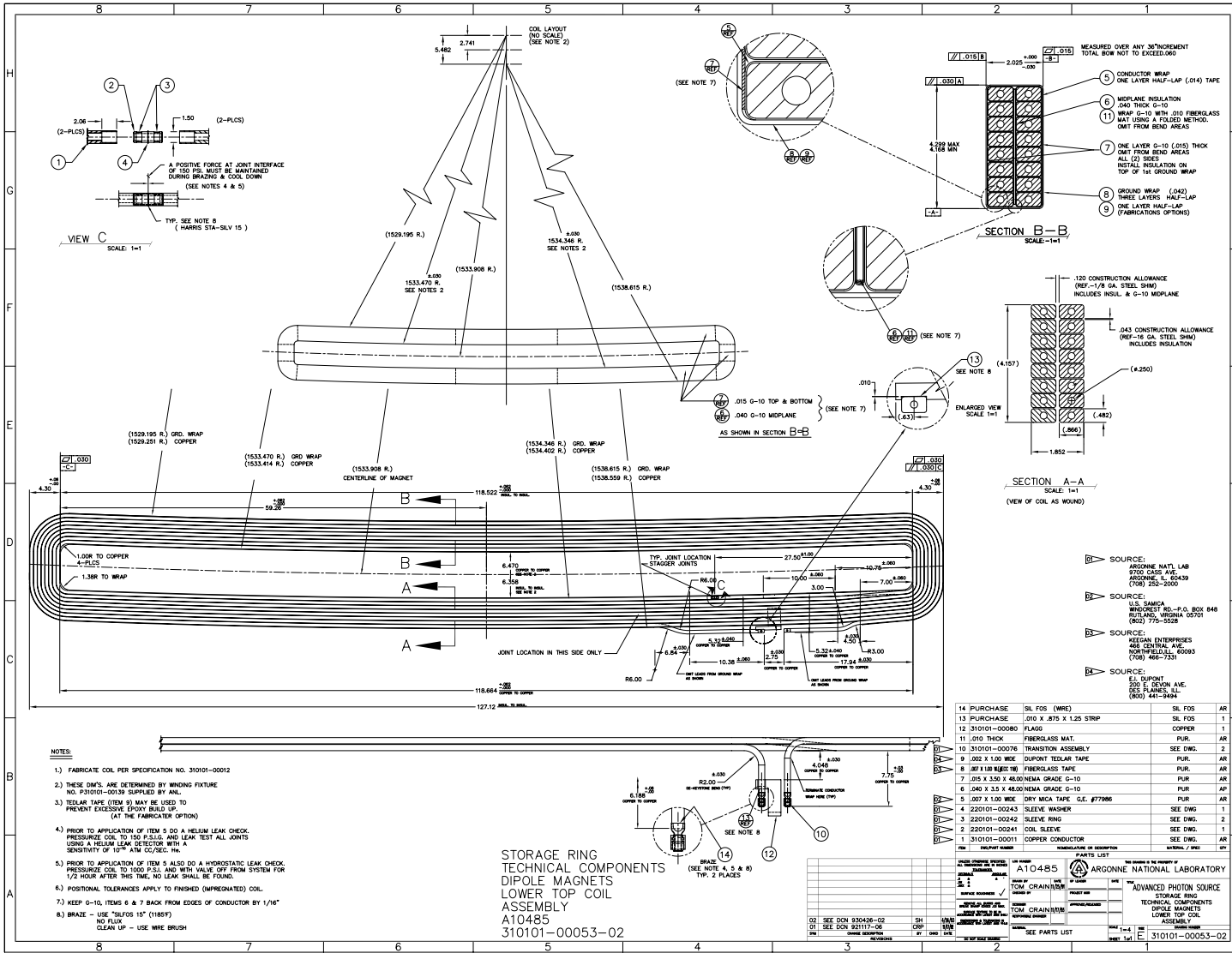


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ITEM	DESCRIPTION	QUANTITY	UNIT
14	PURCHASE SIL FOS (MSE)		AR
13	PURCHASE .010 X .875 X 1.25 STRIP		AR
12	310101-00080 FLAG		AR
11	510 THICK FIBERGLASS MAT.		AR
10	310101-00076 TRANSITION ASSEMBLY		AR
9	1.002 X 1.00 WIDE DUPONT REDIAR TAPE		AR
8	807 1 1/8 (REG: 18) FIBERGLASS TAPE		AR
7	3.55 X 3.55 X 480/90N6 GRADE G-10		AR
6	4.00 X 3.5 X 480/90N6 GRADE G-10		AR
5	1.007 X 1.00 WIDE DRY MICA TAPE G.L.E. #77986		AR
4	220101-00243 SLEEVE WASHER		AR
3	220101-00242 SLEEVE RING		AR
2	220101-00241 COIL SLEEVE		AR
1	310101-00011 COPPER CONDUCTOR		AR

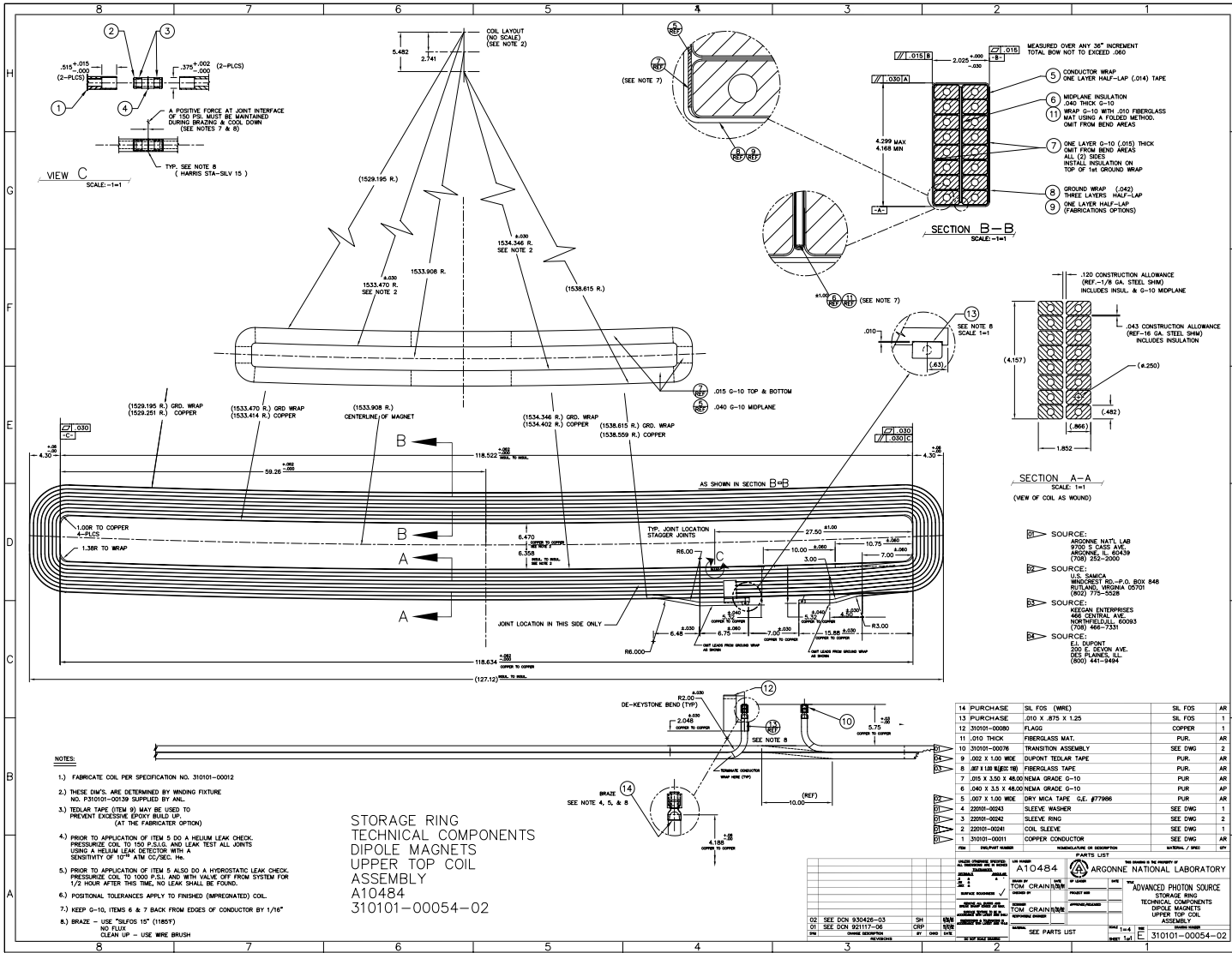
REV	DESCRIPTION	DATE	BY	CHKD
02	SEE DCN 930426-02			
01	SEE DCN 920117-06			

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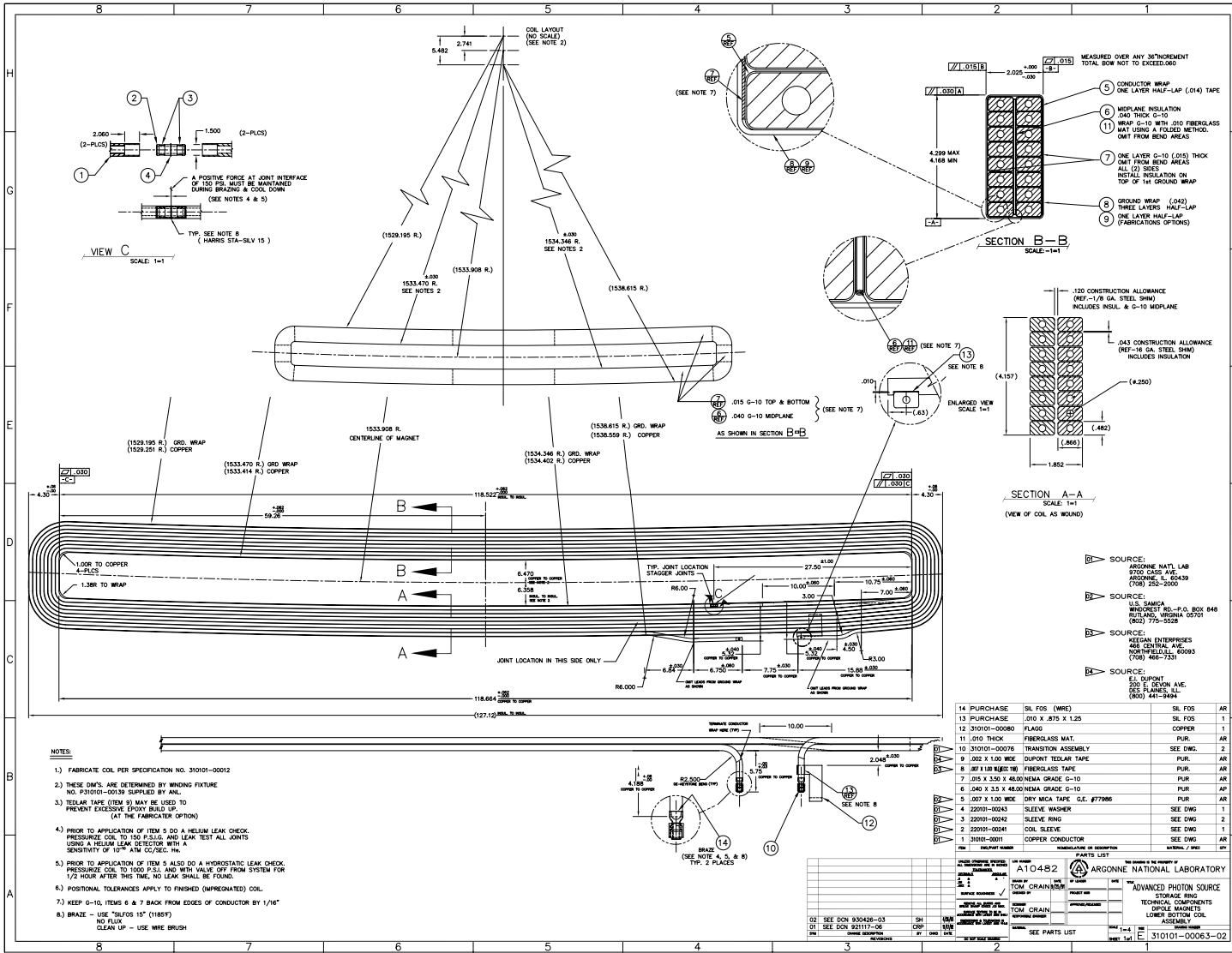


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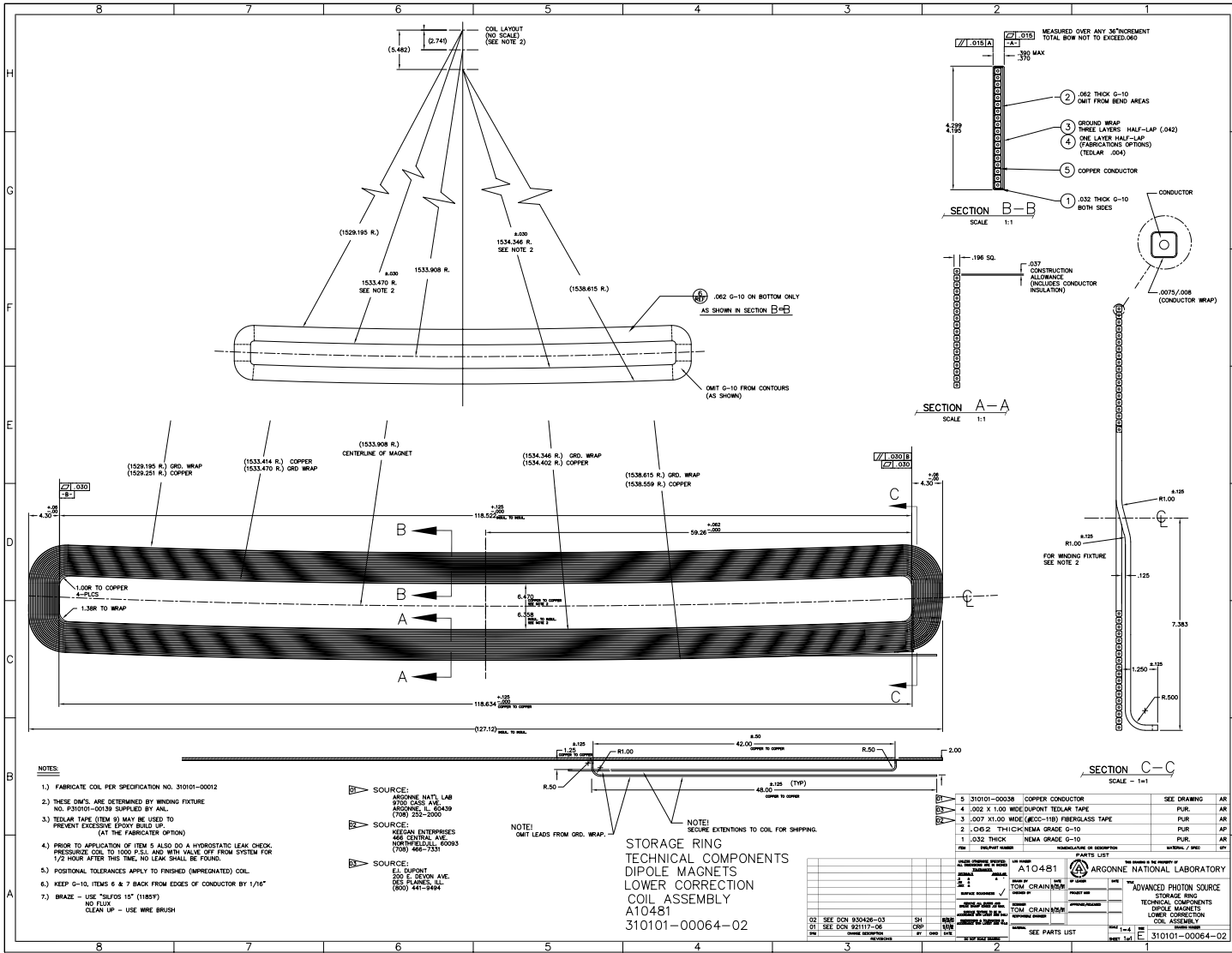


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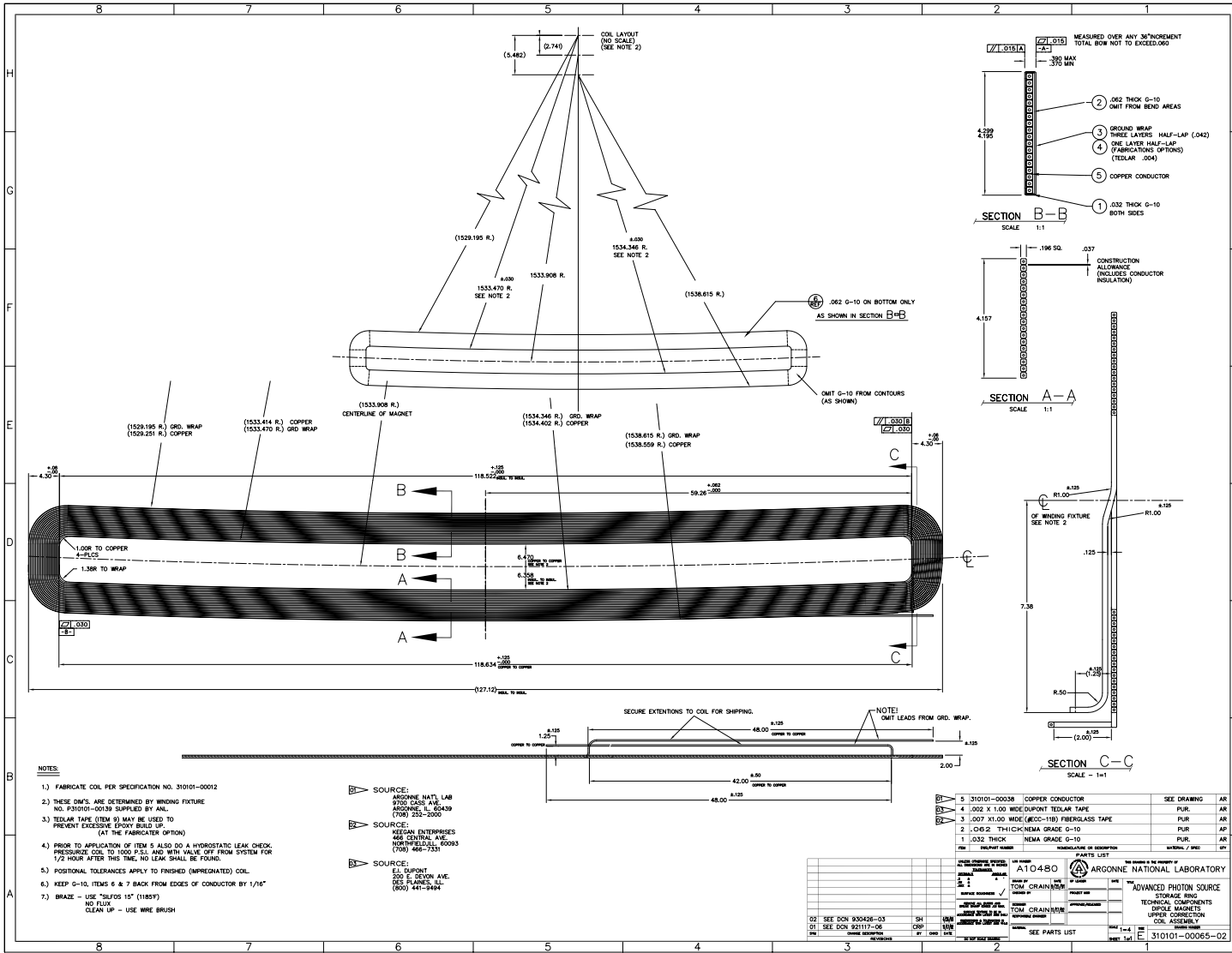


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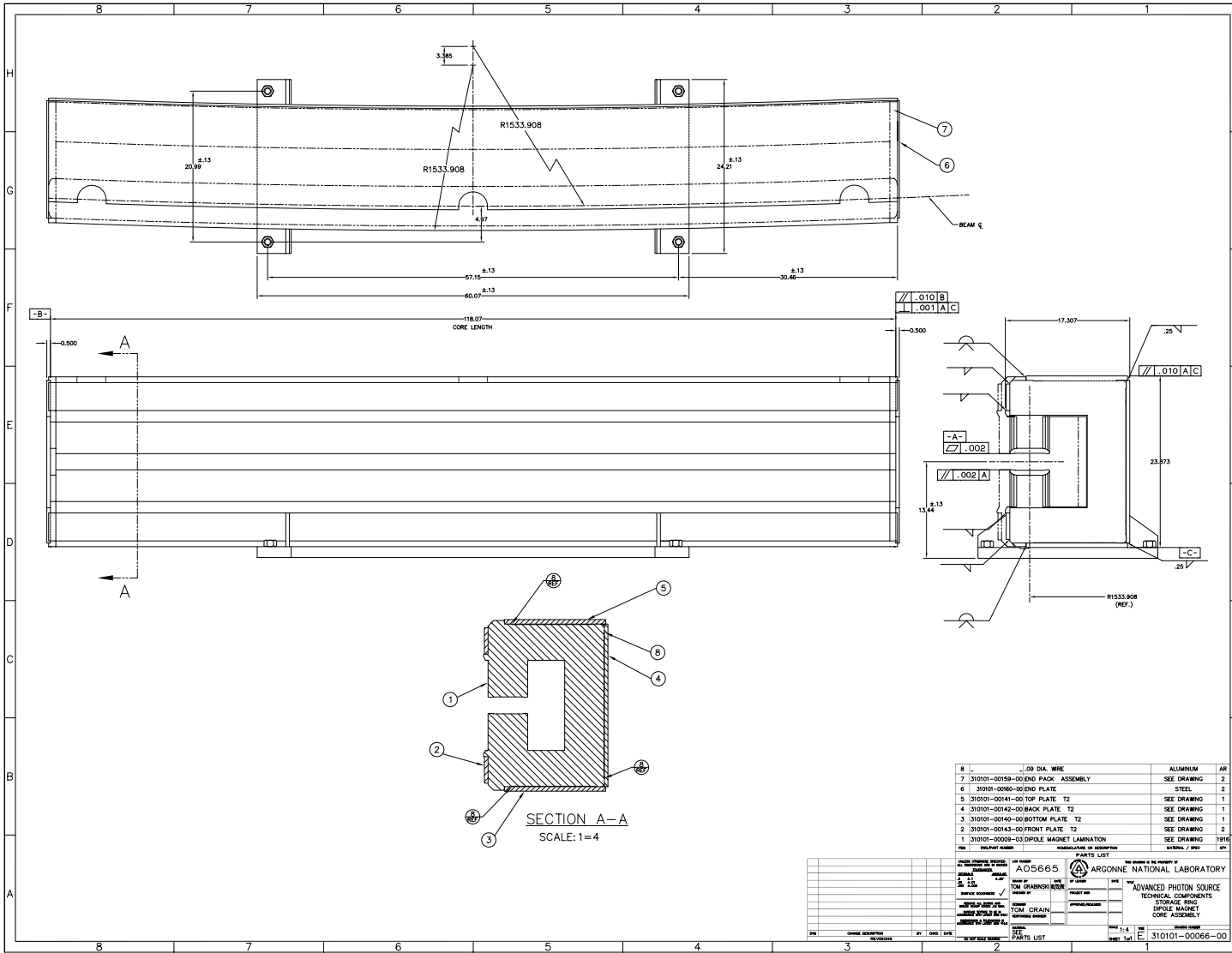
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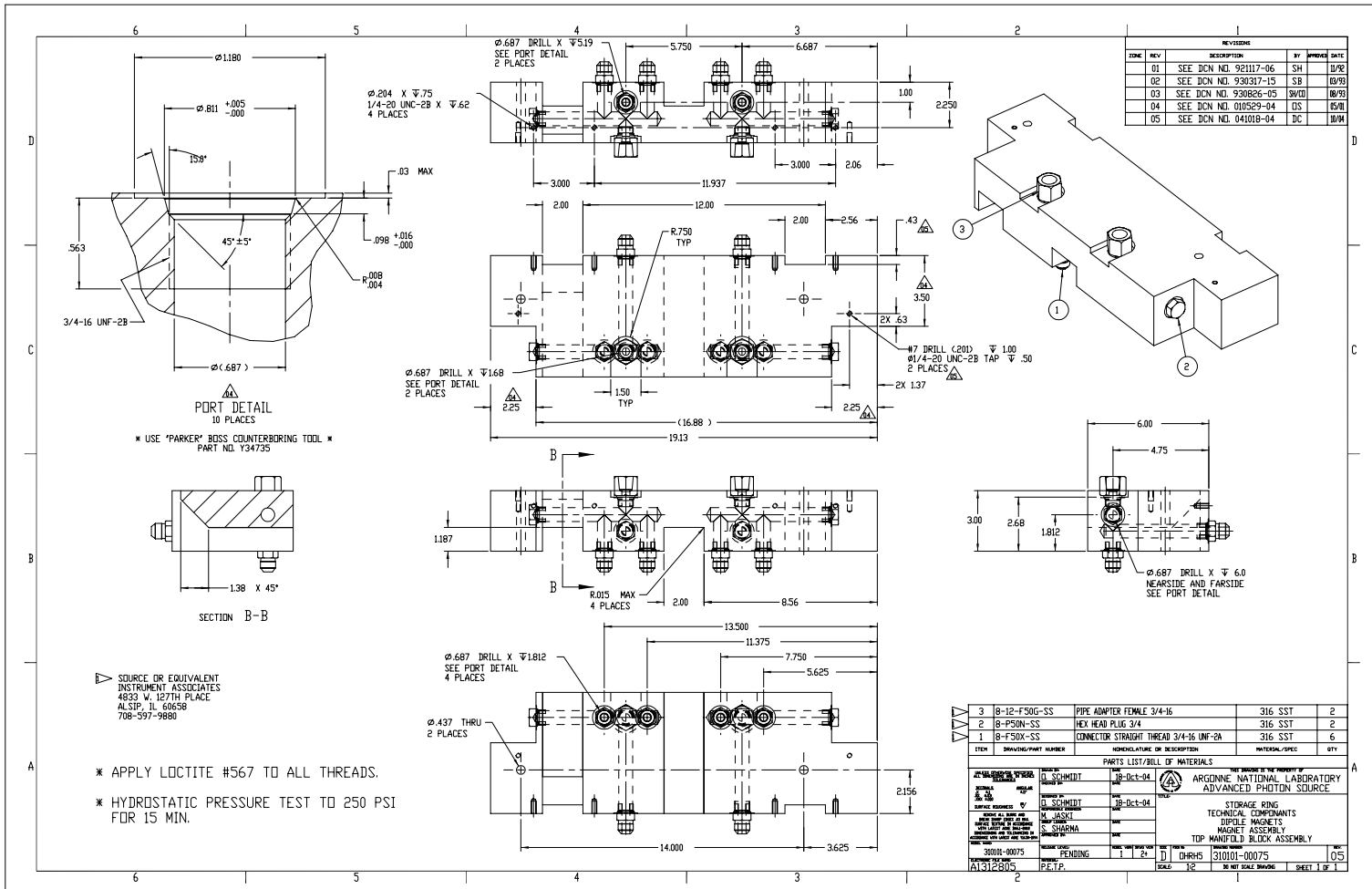


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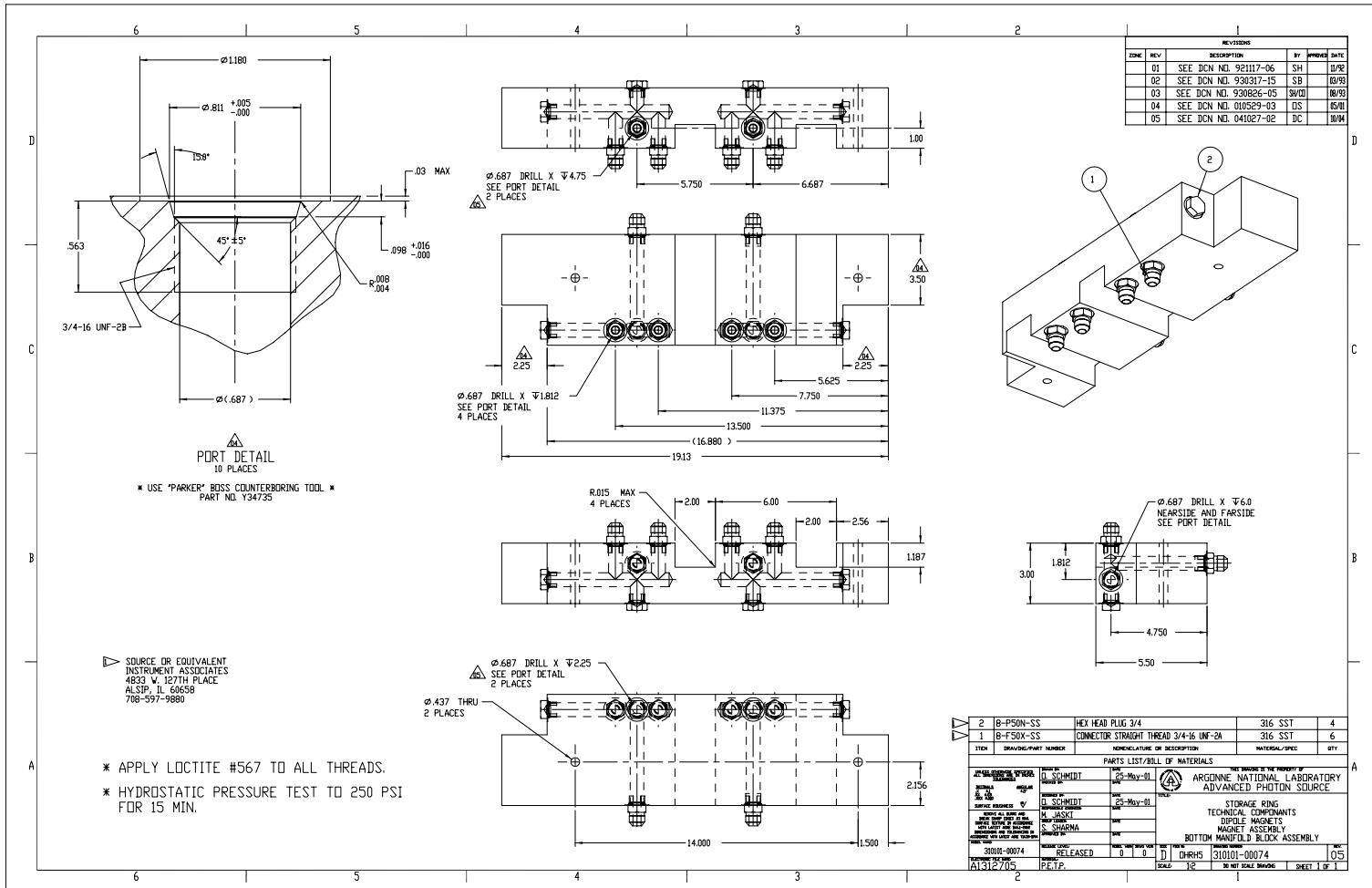


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