Materials Spreadsheet –

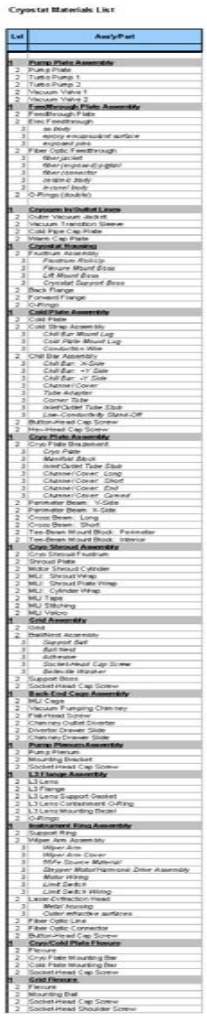
Large Synoptic Survey Telescope

Cryostat Materials List

											Rated Temperatures for Use of Part						Per Part			Total for All Parts				
Lvl	Ass'y/Part	I.D. #	Description	Status Date	Material	Density	Surface	Part Surface		Surface Preparation		Min Surv	Min AT	Min Op	Max Op	Max AT	Max Surv	Exposed Surface	Vol.	Part Qty	Exposed Surface	Vol.	Wt	Vacuum Region	Total Outgassing
				mm/dd/yyyy	(select)	(g/cm**3)	Description	(select - A)	(select-B)	(select - A)	(select-B)	(deg C)	(deg C)	(deg C)	(deg C)	(deg C)	(deg C)	(mm2)	(mm3)	(#)	(mm2)	(mm3)	(kg)	(select)	(torr L/sec)
1	Pump Plate Assembly																								
2	Pump Plate			5/6/2008	SS 300 Series	8	plate holding two pumps. Attached to back annular flange. Assume 4" holes for CF flanges - recessed in	Rolled - raw	Electropolish	Vacuum Group - etch/solvent cleaned	Vacuum Oven Dried (Cycle 5)	-250		-40	100		250	233786	5938160	1	233786	5938160	47.505	Main Vacuum	
2	Turbo Pump 1				SS 300 Series	8	2" cyl. Pipe 1/16" to top of turbine	Extruded - raw	Extruded - raw	Vacuum Group - solvent cleaned	Vacuum Oven Dried (Cycle 3)	-250		-40	100		250	16214	26358	1	16214	26357.7	0.2109	Main Vacuum	
2	Turbo Pump 2				SS 300 Series	8	2"long cyl pipe 1/16" to top of turbine	Extruded - raw	Extruded - raw	Vacuum Group - solvent cleaned	Vacuum Oven Dried (Cycle 3)	-250		-40	100		250	16214	26358	1	16214	26357.7	0.2109	Main Vacuum	
2	Vacuum Valve 1			5/6/2008	SS 300 Series	8	4" gate valve -- all metal seals	Ground	Electropolish	Vacuum Group - solvent cleaned	Vacuum Oven Dried (Cycle 3)	-250		-40	100		450	8107	2000000	1	8107.3	2000000	16	Main Vacuum	
2	Vacuum Valve 2			5/6/2008	SS 300 Series	8	4" gate valve -- all metal seals	Ground	Electropolish	Vacuum Group - solvent cleaned	Vacuum Oven Dried (Cycle 3)	-250		-40	100		450	8107	2000000	1	8107.3	2000000	16	Main Vacuum	
1	Feedthrough Plate Assembly																								
2	Feedthrough Plate			5/6/2008	SS 300 Series	8																			
2	Elec Feedthrough																								
3	*ss body*			*5/6/2008*	*SS 300 Series*	*8*																			
3	*epoxy encapsulant surface*																								
3	*exposed pins*																								
2	Fiber Optic Feedthrough																								
3	*fiber jacket*																								
3	*fiber (exposed) pigtail*																								
3	*fiber connector*																								
3	*ceramic body*																								
3	*inconel body*																								
2	O-Rings (double)																								
1	Cryogen In/Outlet Lines																								
2	Outer Vacuum Jacket			5/6/2008	SS 300 Series	8																			
2	Vacuum Transition Sleeve			5/6/2008	SS 300 Series	8																			
2	Cold Pipe Cap Plate			5/6/2008	SS 300 Series	8																			

Simplified the data we are asking for

Materials Spreadsheet – Not That Hard


Cryostat Materials List

Lvl	Assy/Part
1	**Pump Plate Assembly**
2	Pump Plate
2	Turbo Pump 1
2	Turbo Pump 2
2	Vacuum Valve 1
2	Vacuum Valve 2
1	**FeedThrough Plate Assembly**
2	FeedThrough Plate
2	Elec Feedthrough
3	as Body
3	epoxy encapsulant surface
3	exposed pins
2	Fiber Optic Feedthrough
3	fiber jacket
3	fiber (inside/ cryogen)
3	fiber connector
3	ceramic body
3	shroud body
2	O-Rings (double)
1	**Cryogen In/Outlet Lines**
2	Outer Vacuum Jacket
2	Vacuum Transition Sleeve
2	Cold Pipe Cap Plate
2	Warm Cap Plate
1	**Cryostat Housing**
2	Faceplate Assembly
3	Faceplate Rod-Up
3	Flexure Mount Boss
3	Lift Mount Boss
3	Cryostat Support Boss
2	Back Flange
2	Forward Flange
2	O-Rings
1	**Cold Plate Assembly**
2	Cold Plate
2	Cold Strap Assembly
3	Cold Bar Mount Lug
3	Cold Plate Mount Lug
3	Conductive Wire
2	Cold Bar Assembly
3	Cold Bar: -X Side
3	Cold Bar: +Y Side
3	Cold Bar: -Y Side
3	Channel Cover
3	Tube Adapter
3	Corner Tube
3	Inlet/Outlet Tube Stub
3	Low-Conductivity Stand-Off
2	Button-Head Cap Screw
2	Hex-Head Cap Screw
1	**Cryo Plate Assembly**
2	Cryo Plate Shadowed
3	Cryo Plate
3	Manifold Block
3	Inlet/Outlet Tube Stub
3	Channel Cover: Long
3	Channel Cover: Short
3	Channel Cover: End
3	Channel Cover: Corner
2	Perimeter Beam: +X Side
2	Perimeter Beam: +/- Side
2	Cross Beam: Long
2	Cross Beam: Short
2	Tee-Beam Mount Block: Perimeter
2	Tee-Beam Mount Block: Interior
1	**Cryo Shroud Assembly**
2	Cryo Shroud Fruitcake
2	Shroud Plate
2	Middle Shroud Cylinder
2	MLI: Shroud Wrap
2	MLI: Shroud Plate Wrap
2	MLI: Cylinder Wrap
2	MLI Tape
2	MLI Stitching
2	MLI Velcro
1	**Grid Assembly**
2	Grid
2	Restraint Assembly
3	Support Bolt
3	Bolt Nest
3	Adhesive
3	Socket-Head Cap Screw
3	Belleville Washer
2	Support Block
2	Socket-Head Cap Screw
1	**Back-End Cryo Assembly**
2	MLI Caps
2	Vacuum Pumping Chimney
2	Flat-Head Screw
2	Chimney Outlet Diverter
2	Diverter Drawer Slide
2	Chimney Drawer Slide
1	**Pump Plenum Assembly**
2	Pump Plenum
2	Mounting Bracket
2	Socket-Head Cap Screw
1	**L3 Lense Assembly**
2	L3 Lens
2	L3 Flange
2	L3 Lens Support Gasket
2	L3 Lens Containment O-Ring
2	L3 Lens Mounting Pedal
2	O-Rings
1	**Instrument Ring Assembly**
2	Support Ring
2	Wiper Arm Assembly
3	Wiper Arm
3	Wiper Arm Cover
3	RFe Source Material
3	Bryant Motor/Harmonic Drive Assembly
3	Motor Wiring
3	Limit Switch
3	Limit Switch Wiring
2	Laser Orientation Head
3	Metal Housing
3	Outer reflective surfaces
2	Fiber Optic Line
2	Fiber Optic Connector
2	Button-Head Cap Screw
1	**Cryo/Cold Plate Flexure**
2	Flexure
2	Cryo Plate Mounting Bar
2	Cold Plate Mounting Bar
2	Socket-Head Cap Screw
1	**Grid Flexure**
2	Flexure
2	Mounting Bar
2	Socket-Head Cap Screw
2	Socket-Head Shoulder Screw

LSST MATERIALS IN CRYOSTAT V3 CRYOSTAT ELEMENTS Page 1 of 1

NOT THAT HARD:

Eg: Cryostat has ~140 items

Three layers of Indentation

Most Quantities are in Pull Down Lists

Dimensions Needed to ~20% or so for starters

Plan For Testing Program

- **Once we have basic data from everyone, we should have a good idea of:**
  - what exposed surface areas will total up to for each particular material.
  - We will order the testing such that “suspicious/risky” items (and large surface area items) get tested first
    - after cleaning them and baking them to allowable temperatures, measure the:
      - **Species being desorbed**
      - **Rate of rise of each species**
      - **Temperature dependence**
  - At the minimum this should give us an idea of the total gas load and its composition in the cryostat at each point of the assembly.

During Construction

- **Discussion of Contamination control**
  - **Initial Materials Database**
    - Find suitable materials
    - Find Suitable Coatings
    - Develop cleaning and handling procedures
    - Establish expected outgassing species and rates
  - **Database for tracking actual camera components**
    - Individual materials tests and certification
    - Sub-assembly tests and certification
    - Tests and certification after shipping but before I&T at SLAC