

NCSX June 2007 ETC
TABLE I - DESIGN LABOR

WBS Number: 162
WBS Title: Coil Electrical Leads
Job Number: 1601-162
Job Title: Coil Electrical Leads
Job Manager: Paul Goranson

Description:

This effort covers all Title I, II, and III engineering for the LN2 distribution system inside the cryostat, which includes all the necessary manufacturing and connections to interface with the cryostat LN2 supply system. This system will be fabricated in-house by PPPL. All Title III engr associated with installation is included in WBS 7.

Task ID	Multiplier	Unit	Number of		HOURS													Basis of Estimate		
			Units	Hours	ORNL EM	ORNL DSN	ORNL RM	EMEM	EMSM	EMSB	EMTB	EAEM	EASM	EEEM	EESM	EESB	EETB		ECEM	ECSB
Title I and II Design																				
Pro-E models (avg)	8	hrs/model	50	400	400															See Worksheet below - based on recent experience at MDL
assy dwgs	16	hrs/dwg	15	240	240															See Worksheet below - based on recent experience at MDL
Detail drawings	8	hrs/dwg	40	320	320															See Worksheet below - based on recent experience at MDL
installation dwg	16	hrs/dwg	29	464	464															See Worksheet below - based on recent experience at MDL
cooling schematic	0	hrs/dwg	1	0	0															See Worksheet below - based on recent experience at MDL
electrical schematic	8	hrs/dwg	14	112	112															See Worksheet below - based on recent experience at MDL
I&C schematic	8	hrs/dwg	0	0	0															See Worksheet below - based on recent experience at MDL
stress analysis	0	hrs/calc	0	0	0															See Worksheet below - based on recent experience at MDL
thermal analysis	24	hrs/calc	1	24	24															See Worksheet below - based on recent experience at MDL
special analysis (electromagnetics)	40	hrs/calc	1	40	40															See Worksheet below - based on recent experience at MDL
Procurement Specifications	40	hrs/spec	1	40	40				0											See Worksheet below - based on recent experience at MDL
preliminary and final design reviews	40	hrs/rev	1	40	40															See Worksheet below - based on recent experience at MDL
meetings/reporting/presentations	10%	% of tot hrs		168	168															See Worksheet below - based on recent experience at MDL
Subtotal Title I & II Design			1848	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Title III																				
vendor inspection & oversight	8	hrs per	1	8	8															
Disposition of deviation requests and non-conformances	0.5	hrs/wk	20	10	10															Based on recent experience on NCSX
In-House fab/assy oversight & inspection	2	hrs/wk	4	8	8							8								
As-built drawings	1	hrs/dwg	84	84	84							8								Based on recent experience on NCSX
Subtotal Title III Design			110	102	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	

Notes and worksheets

PF Coil leads

	coils at 10, 70, 130, 190, 250, 310 degrees	coils at 30, 90, 150, 210, 270, 330 degrees	coils at 60, 110, 170, 230, 290, 350 degrees	PF1+2	PF3	PF4	PF5	PF6	coils at 0, 120, 240, degrees, top and bottom	coils at 60, 180, 300 degrees Top and bottom	Outer perimeter coils	coil 1 at 10, 70, 130, 190, 250, 310 degrees	coil 2 at 30, 90, 150, 210, 270, 330 degrees	coil 3 at 50, 110, 170, 230, 290, 350 degrees	thermal transition box	total	
Pro-E models	6	6	6	1	1	1	1	1	1	1	1	1	1	1	1	50	leads modeled to create drawings, reserve space in assembly
assy dwgs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	one assembly for each circuit
Detail drawings	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	40	drawings for lead length, mounting details
installation dwg	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	29	one installation dwg for each cable
cooling schematic																1	one cooling schematic for all leads
electrical schematic	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	one schematic for each circuit	
I&C schematic																	part of WBS 163
stress analysis																	
thermal analysis																1	one analysis to check temp rise, cooling
special analysis																1	one analysis for field error determination
procurement specifications																1	one specification for leads, all carry the same current, will have it
preliminary and final design reviews																1	one review for all coil leads
meetings/reporting/presentations																10%	