0485

Title: **Herschel CRYO-Harness Advanced Materials List for CPPA**

CI-No:

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1 Introduction

The schedule critical Items of the Herschel CCH and SIH have been summarized according the latest design descriptions as defined in the AD1-AD3.

The CCH items have been estimated and defined according latest design.

The Listings shall support the investigation of CPPA workload evaluations.

2 Documents

2.1 Applicable Documents

AD-1	First/Planck Instrument Interface Document – Part B, SCI-PT-IIDB/SPIRE-02124, Issue 2/0, 31/07/01	
AD-2	First/Planck Instrument Interface Document – Part B, SCI-PT-IIDB/PACS-02126, Issue 2/0 MPE, 10/05/01	
AD-3	First/Planck Instrument Interface Document – Part B, SCI-PT-IIDB/HIFI-02125, Issue 2/0, 31/07/01	
AD-4	Connector Electrical Rectangular Removable Crimp Contacts, based on type D*MA	ESA SCC 3401/002
AD-5	Connector Electrical Rectangular Microminiatur, based on Type MDM	ESA SCC 3401/029
AD-6	Accessories for Connectors Microminiatur 3401/029 and 3401/031 connectors	ESA SCC 3401/032
AD7	Connector Savers Electrical Rectangular Microminiatur, based on Type MDM	ESA SCC 3401/041
AD-8	Connectors Electrical Circular Bayonet Coupling Removable crimp Contacts	ESA SCC 3401/044
AD-9	Connectors Electrical Circular hermetic Pin-contacts according MIL-C-38999 series 2 of Type Glenair 197-008P**-35P	(under investigations)
AD10	Space Grade Micro-D Connectors of MWDM (metal shell)	MIL-C/PRF-83513/3
AD-11	Glenair Nanonix connectors of Type NDDM*-L*N	(under investigations)

2.2 Reference Documents

RD-1 ESA / SCC Detailed Specification for ISO-K-101 issue: 2 cables

3 General Remarks

3.1 CRYO-Harness Materials Lists

The Cryo-harness materials lists defined, reflets the current amount of connectors and cables of the scientific instrument harness SIH and of the cryo controll harness CCH.

The total amount is defined for one Herschel Harness Model.

3.2 Harness Material Standards

The Herschel EQM will consist of NON-HIREL and HIREL Harness sections,.

The design of harness sections and definition of the single material standards to be required , are under investigations at Astrium.

The PFM shall be procured with space approved and HIREL standard materials.

3.3 Connector and contacts

There will be non-magnetic of class-B normal density and high-density rectangular D-sub connectors, with crimp-type contacts, Micro-D- connectors with metal shells and round-connectors to be used for the cryo harness. The connector finish shall be gold- or electroless nickel plated.

To get the normal density D-sub and high-density D-sub connectors with solid-wire ends , Astrium has contact company TRISTAR-CH. Advanced investigations have been started with company Framatom-F in addition, to get the modified D-sub connector contacts, part type approved, for Herschel use in time.

The micro-D connectors with solid-wire contacts size of AWG26 ,diameter of 0,5 mm and contact length of 15 mm are present under investigations at company Glenair-D and Astrium. The contact front-end and release mechanism shall be left unchanged.

The CVV connector shell finish will be electroless nickel. The connector series MIL-C-38999 series 2 , same as on program ISO will be used, but with modified crimp contacts. The former crimp cup contact , will be changed to a solid wire-end of certain contact back-end length. Investigations are in progress at company Glenair – D and Astrium.

The part type approvals of those modified connector contacts have to be evaluated with ESA .

3.4 Wire and Cables

From the former program ISO , the wire and cable specification ref. ISO-K-101 have been taken to evaluate the Herschel Harness.

The ISO specification will be changed to a new ESA ECSS specifications for Herschel needs.

A few additional cable types to ISO and modified cable configurations will be incorporated for Herschel needs.

The part type approvals have to be evaluated with ESA next.

The material tables as provided herein, define the cables configurations in a generic code, to cover the existing and new cable configurations. e.g. 1S11TC38 = 1 cable shield, 11 twisted cores AWG 38.

Wire core materials same as used for ISO, are of the 4 types only:

SST = stainless steel	AWG 38	for cores
SST	AWG 44	for served wire shields
Brass	AWG 30+ 38	for Cores
Brass + SST	AWG 30+ 38	for cores +SST 44 for shields

The single source for ISO-K-101 wire and cables is the company GORE-D.

Gore have already ordered the complete raw core and shield strand material lots, to cover the ESA requirement, that Herschel harness shall be produced of one SST and Brass material lot per wire size.

The extracted ISO-K-101 data are provided in para 7.

4 Cyogenic Material Tests

All harness materials shall be qualified or part type approved for their use within in the cryogenic environment prior to harness production.

Especially each of the cryostat vacuum vessel CVV feed-through receptacle connectors have to be checked against its specified leakages.

5 Cryo Harness Advanced Quantities of Connectors and Contacts per Model (see Annex 1)

Unit	DEMA-9S	DEMA-9P	DAMA-15S	DAMA-15P	DBMA-25S	DBMA-25P	DCMA-37S	DCMA-37P	DDMA-50S	DDMA-50P	HDBMA-44S	HDBMA-44P	HDCMA-62S	HDCMA-62P	MDM-9S	MDM-9P	MDM-15S	MDM-15P	MDM-21S	MDM-21P	MDM-25S	MDM-25P	MDM-31S	MDM-31P	MDM-37S	MDM-37P	197-010-M-22-35P**	197-008-M-22-35S**
PACS					2	10	6						2	2	2	2	2	4	4	10	8	15	15	26	26	19	19	
SPIRE	2		8			10	8	2	18												34			6	8	25	25	
HI-FI			16	12		28	28			28	28	28	28													7	7	
CCH																										12	12	
CVV-CB																												
OB-CCC														5	5	5	5	5	5									
SVM-CB		2	12	16	2		36	38	18	2	28	28	28	28														

Note: CCC = Cryo Control Components

Note** = Roundconnector Sizes TBC

Unit	DEMA-9S	DEMA-9P	DAMA-15S	DAMA-15P	DBMA-25S	DBMA-25P	DCMA-37S	DCMA-37P	DDMA-50S	DDMA-50P
	9	9	15	15	25	25	37	37	50	50
PACS						2	10	6		
SPIRE	2		8				10	8	2	18
HI-FI			16	12			28	28		
CCH										
CVV-CB										
OB-CB										
SVM-CB		2	12	16	2		36	38	18	2
connector	2	2	36	28	2	2	84	80	20	20
sum contact	18	18	540	420	50	50	3108	2960	1000	1000

Unit	HDBMA-44S	HDBMA-44P	HDCMA-62S	HDCMA-62P
	44	44	62	62
PACS				2
SPIRE				
HI-FI	28	28	28	28
CCH				
CVV-CB				
OB-CB				
SVM-CB	28	28	28	28
connector	56	56	56	58
sum contact	2464	2464	3472	3596

Unit	MDM-9S	MDM-9P	MDM-15S	MDM-15P	MDM-21S	MDM-21P	MDM-25S	MDM-25P	MDM-31S	MDM-31P	MDM-37S	MDM-37P
	9	9	15	15	21	21	25	25	31	31	37	37
PACS	2	2	2	2	4	4	10	8	15	15	26	26
SPIRE								34			6	8
HI-FI												
CCH												
CVV-CB												
OB-CB	5	5	5	5	5	5						
SVM-CB												
connector	7	7	7	7	9	9	10	42	15	15	32	34
sum contact	63	63	105	105	189	189	250	1050	465	465	1184	1258

Unit	197-010-M-22-35P	197-008-M-22-35S
	100	100
PACS	19	19
SPIRE	25	25
HI-FI	7	7
CCH	12	12
CVV-CB		
OB-CB		
SVM-CB		
connector	63	63
sum contact	6300	6300

Unit	D-Sub-Skt	4716								
	D-Sub-Pin		4448							
PACS	HD-Skt			5936						
SPIRE	HD-Pin				6060					
HI-FI										
CCH	MDM-Skt					2256				
CVV-CB	MDM-Pin						3130			
OB-CB										
SVM-CB	MS-22D-Skt							6300		
connector	MS-22D-Pin								6300	
sum contact										
	Total									39146

6 Cryo-Harness Advanced Quantities of Cables per Model (see Annex 2)

HERSCHEL Cryo-Harness Cable-Quantities per Model										
Cable - Type	Instrument									
SST - wire (AWG 38)	SPIRE		PACS		HI-FI		CCH		Qty_Total	
	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m
S1C										
T2C							18	141,3	18	**141,3**
T4C							110	863,5	110	**863,5**
1S1C										
1ST2C	24	171,12	25	182,5	15	89,25	16	125,6	80	**568,47**
1ST3C	19	135,47	25	182,5	15	89,25			59	**407,22**
1ST4C	60	427,8	75	547,5	38	226,1			173	**1201,4**
1ST7C			20	146					20	**146**
1ST11C			11	80,3					11	**80,3**
1ST19C										
1ST26C			10	73					10	**73**
2S1C			50	365					50	**365**
LENGTH / m	7,13		7,3		5,95		7,85		**3846**	

HERSCHEL Cryo-Harness Cable-Quantities per Model

Cable - Type	Instrument									
CU - wire	SPIRE		PACS		HI-FI		CCH		Qty_Total	
(AWG 28)	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m	no_cable	qty_m
S1C	28	42							28	**42**
T2C							39	42,9	39	**42,9**
T4C	10	15					110	121	120	**136**
1S1C										
1ST2C	472	708	29	62,35	47	56,87	16	17,6	564	**844,82**
1ST3C	6	9	25	53,75	30	36,3			61	**99,05**
1ST4C	44	66	92	197,8	52	62,92			188	**326,72**
1ST7C			20	43	2	2,42			22	**45,42**
1ST11C			11	23,65					11	**23,65**
1ST19C										
1ST26C			10	21,5					10	**21,5**
2S1C			50	107,5					50	**107,5**
LENGTH / m	1,5		2,15		1,21		1,1		**1690**	

HERSCHEL Cryo-Harness Cable-Quantities per Model										
Cable - Type	**Instrument**									
BRASS - wire	**SPIRE**		**PACS**		**HI-FI**		**CCH**		**Qty_Total**	
(AWG 38)	**no_cable**	**qty_m**	**no_cable**	**qty_m**	**no_cable**	**qty_m**	**no_cable**	**qty_m**	**no_cable**	**qty_m**
S1C										
T2C							21	164,85	21	**164,85**
T4C	8	57,04							8	**57,04**
1S1C										
1ST2C	12	85,56			32	190,4			44	**275,96**
1ST2C(AWG 30)			4	29,2					4	**29,2**
1ST3C	42	299,46			14	83,3			56	**382,76**
1ST4C	26	185,38			14	83,3			40	**268,68**
1ST4C(AWG 30)			17	124,1					17	**124,1**
1ST7C	30	213,9			2	11,9			32	**225,8**
1ST11C										
1ST19C	60	427,8							60	**427,8**
1ST26C										
2S1C										
LENGTH / m	7,13		7,3		5,95		7,85		**1791**	

7 ISO-K-101 Issue: 2 Extracted Data

ISO-K-101_variant_no	01	02	05	07	08	10	11	12	13	15	16	03	06	09	14	17	04	18
GSC_No_Rev	**6775_2**	**6777**	**6782**	**6786_3**	**6788_3**	**6790_3**	**6792_4**	**6793_4**	**6795_3**	**6802**	**7525**	**6778_3**	**6783_3**	**6789**	**6796**	**6778_3**	**6779_3**	**6779_3**
shd_and_jacked_1	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes		no	
shd_and_unjacked_2	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
shd_qty	1	0	0	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0
no-shd_jacked_1	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
no-shd_unjacked_2	no	yes	yes	yes	no	no	no	no	no	no	no	yes	yes	no	no	yes	yes	yes
core_qty	1	2	4	2	3	7	11	19	4	26	5x7	2	4	3	4	2	2	2
C_AWG	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**38**	**30**	**30**
C_dia-max_mm	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,26	0,26
C_Section-nom_qmm	0,008		0,008					0,008									0,051	0,051
C_material	SST	SST	SST	SST	SST	SST	SST	SST	SST	SST	SST	**Brass**	**Brass**	**Brass**	**Brass**	**Brass**	**Brass**	**Brass**
C_R_Ωp-m	130	130	130	130	130	130	130	130	130	130	130	10	10	10	10	10	2	2
Dia_fine_wire	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,52	0,55	0,71
Insul-Section-nom_qmm	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,043	0,106	0,079	0,173
Insul-Section-color	blue	blue	blue	blue	blue	blue	blue	blue	blue	blue	blue	red	red	red	red	red+Pl	yel	yel+Pl
shd-Section-nom_qmm	0,020			0,060	0,070	0,085	0,110	0,134	0,070	0,156	5x0,085 &0,392			0,070	0,070			
shd-AWG	**44**			**44**	**44**	**44**	**44**	**44**	**44**	**44**	**44**			44	44			
Cab-Dia-nom_mm	0,7	0,5	0,7	1,2	1,2	1,4	1,6	1,9	1,9	2,2	4,5	0,5	0,7	1,2	1,3	0,7	1	1,2
Twisted-wire_Length-of-lay-nom_mm		7	9	7	8	10	14	18	9	21	10	7	9	8	9	7	14	17
Jacket_poliimid_Section-nom_qmm				0,207	0,214	0,255	0,315	0,352	0,226	0,401	0,885			0,214	0,226			
Jacket_poliimid_color	natural			natural	natural	natural	natural	natural	natural	natural	natural			natural	natural			
R-max_tol-10%_Ω-p-m	**140**	**140**	**140**	**140**	**140**	**140**	**140**	**140**	**140**	**140**	**140**	12	12	12	12	12	2,2	2,2
Cab-capacity_max_pF-p-m conductor-conductor	120	65	55	60	65	60	65	60	60	60	60	50	55	65	60	50	65	65
Cab-capacity_max_pF-p-m conductor-shd				100	105	100	100	100	100	100	100			105	100			
Cab-weight_gram-p-m	0,730	0,360	0,720	1,750	2,000	3,900	4,200	6,100	2,220	8,250	25,000	0,370	0,740	2,000	2,260	0,630	1,380	1,720
Voltage_max_V-rms	100																	
Current_max_mA	70	70	70	70	70	70	70	70	70	70	70	230	230	230	230	230	800	800
Frequency_range_KHz	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100
Operation_Temperatur-min_Kelvin	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Operation_Temperatur-max_Kelvin	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473
Storage_Temperatur-range_min	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Storage_Temperatur-range_max	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473	473
conductor_Elongation_factor	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,00086	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,00110

8 User Comments to this Document

Para:_____

Connectors:
Typen Vacuum feed through
" Internal
with Mil Spec. No
and specific changes
Cables
Others

Quantity	Name	Dep./Comp.	Quantity	Name	Dep./Comp.
	Alberti von Mathias Dr.	ED 544		Thörmer Klaus-Horst Dr.	OTN/ED 37
	Barlage Bernhard	ED 62		Wagner Adalbert	OTN/IP 35
	Bayer Thomas	ED 532		Wilz Eberhard	OTN/ED 37
1	Faas Horst	ED 12		Ziegler Fred	OTN/ED 522
1	Grasl Andreas	OTN/TN 42		Zipf Ludwig	OTN/EC 32
	Hartmann Hans Dr.	ED 522			
	Hauser Armin	ED 541			
1	Hohn Rüdiger	ED 531			
1	Hölzle Edgar	ED 12			
	Huber Johann	ED 532			
1	Hund Walter	ED 556			
1	Idler Siegmund	ED 521			
1	Ivády von András	EC 32	1	Mr.A.Naber	SRON-U
	Jahn Gerd Dr.	ED 541	1	Mr.TH.De Graauw	SRON-N
1	Kameter Rudolf	OTN/ED 37	1	Mr.A.Poglitsch	MPE
	Knoblauch August	ED 51	1	Mr.U.Grötzinger	MPE
	Koelle Markus		1	Mr.M.Griffin	QMWC-U
	Kroeker Jürgen	ED 515	1	Mr.J.Delderfield	QMWC-U
	Lamprecht Ernst	OTN/TP82			
1	Lang Jürgen	ED 556			
1	Langfermann M.		1	Mr. J. J. Juillet	Alcatel
1	Maier Hans-Ulrich	ED 61	1	Mr.G. Lund	Alcatel
	Moritz Konrad Dr.	ED 37	1	Mr.O.Chanal	Alcatel
	Peitzker Helmut	ED 37	1	Mr.B.Collaudin	Alcatel
	Peltz Heinz-Willi	ED 515			
1	Peters, Gerhard	ED 533	1	Mr. T. Passvogel	ESTEC
	Pietroboni Karin	ED 37	1	Mrs.A.Heske	ESTEC
	Puttlitz Joachim	OTN/ED 37	1	Mr.J.Bruston	ESTEC
	Rebholz Reinhold	ED 531			
	Reuß Friedhelm	ED 7			
	Rühe Wolfgang	ED 52			
	Sachsse Bernt	EC 34			
	Sagner Udo	OTN/TN 42			
1	Schink Dietmar	ED 522			
	Schlosser Christian	OTN/TN 42			
	Schweickert Gunn	ED 544			
	Steininger Eric	ED 522			
1	Stritter Rene	ED 61			
	Tenhaeff Dieter	ED 544			