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Facility	:	SARAO (South African Radio Astronomy Observatory)
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PATCH PANEL REQUIREMENTS - HERA CONTAINER/NODE

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Prepared by ..... K A Rosie
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DOCUMENT APPROVAL

	Name	Designation	Affiliation	Signature/Date
Prepared by	K Rosie	HERA Project Engineer	SARAO	Kathryn Rosie (Oct 4, 2018)
Reviewed by	M Padayachee	Fibre Technician	SARAO	Manny Padayachee
Reviewed by	R Julie	Fibre Engineer	SARAO	Roufurd Julie Roufurd Julie (Oct 4, 2018)
Approved by	Z Halday	HERA Project Manager	SARAO	Ziyaad Halday (Oct 4, 2018)

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ORGANISATION DETAILS

Name	SARAO, Cape Town Office (Pinelands, Western Cape)	SARAO, Johannesburg Office (Rosebank, Gauteng)
Registered Address	3rd Floor, The Park, Park Road, Pinelands, 7405, South Africa	1st Floor, 17 Baker Street Rosebank, Gauteng 2196, South Africa
Telephone	+27 (0) 21 506 7300	+27 (0) 11 268 3400
Fax.	+27 (0) 21 506 7375	+27 (0) 11 442 2454
Website	www.sarao.ac.za	www.sarao.ac.za

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ABBREVIATIONS

HERA..... Hydrogen Epoch of Reionization Array

OEM..... Original Equipment Manufacturer

QMS..... Quality Management System

SARAO ..... South African Radio Astronomy Observatory

1 INTRODUCTION

1.1 BACKGROUND

The HERA telescope requires patch panels in its field container to terminate fibre cables providing reticulated network access between the container and the HERA Nodes which are distributed throughout the array.

1.2 PURPOSE

This document specifies the product performance, mechanical and environmental requirements for the patch panels required for the container-side fibre terminations.

1.3 IDENTIFICATION

The patch panels are identified by the part number as **H0050-1704** in the HERA Product Breakdown Structure [RD1], and serially per item.

1.4 HERA CONTAINER/NODE PATCH PANEL DESCRIPTION

1.4.1 Overview

The HERA Container/Node patch panels are located in the HERA container and provide termination for 30 fibre cables which are individually distributed between the HERA container and each of the 30 HERA Nodes.

1.4.2 Context Diagram

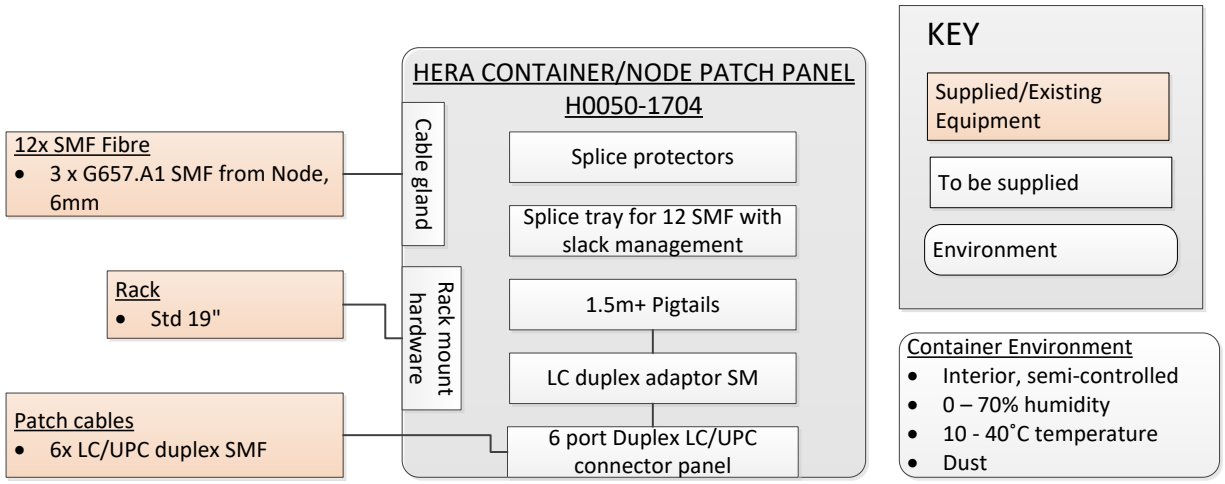

Figure 1: Context Diagram for a Single HERA Container/Node Patch Panel

2 REFERENCES

2.1 APPLICABLE DOCUMENTS

The following documents are applicable to the extent stated herein. In the event of conflict between the contents of the applicable documents and this document, **the applicable documents** shall take precedence.

[AD1] ITU-T G.657 (11/2016): Characteristics of a bending-loss insensitive single-mode optical fibre and cable.

2.2 REFERENCE DOCUMENTS

The following documents are referenced in this document. In the event of conflict between the contents of the referenced documents and this document, **this document** shall take precedence.

[RD1] H0000-0000-001 HERA Product Breakdown Structure Rev C

3 PATCH PANEL REQUIREMENTS

[R1] The performance specifications as specified in this section shall be met or exceeded on delivery of the item to the client. The supplier shall ensure adequate margin for possible changes in performance during the stages of procurement, assembly, and transport.

3.1 PANEL CONNECTORS

3.1.1 Panel Connector Type

[R2] The panel connector type shall be LC/UPC duplex.

3.1.2 Number of Connector Banks

[R3] Each patch panel shall be populated with three banks of 6 port duplex connector panels (i.e. 18 port LC/UPC duplex total).

3.1.3 Connector Bank Separation

[R4] Each bank of 6 duplex LC ports shall be visually distinct from the next, i.e. spatial separation between each set of 6 ports. An example is given in Figure 2.

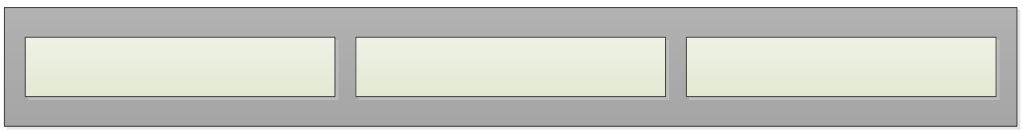

Figure 2: Example of connector bank separation

3.2 PIGTAILS

3.2.1 Number of Pigtails

[R5] Each connector bank shall be populated with 12 pigtails of the type described herein.

3.2.2 Fibre Type

[R6] The pigtails shall be made from single mode 9/125, G657.A1 compliant fibre.

3.2.3 Pigtail Connector Type

[R7] Each pair of pigtail fibres shall terminate on the patch panel end with a duplex LC/UPC connector.

3.2.4 Pigtail Length

[R8] The length of each pigtail shall be no shorter than 1.5m and no longer than 2m.

3.2.5 Pigtail Jacket

[R9] The fibre jacket shall be of the Low Smoke Zero Halogen (LSZH) type.

3.2.6 Pigtail Buffer

[R10] Each pigtail shall have a 900µm semi-tight buffer.

3.3 SPLICE TRAY

[R11] The patch panel shall have a splice tray with slack management for 36 single mode fibres as described.

3.4 FIBRE CABLE INTERFACE

3.4.1 Fibre Cable Size

[R12] The patch panel shall allow for entry of 6mm fibre cables.

3.4.2 Number of Fibre Cables

[R13] The patch panel shall accommodate entry of three 6mm cables.

3.4.3 Fibre Cable Entry Direction

[R14] The fibre cables shall enter the panel housing from the left side or the rear side.

3.4.4 Cable Gland

[R15] The patch panel housing shall be supplied with cable glands suitable for the specified fibre cable.

3.5 RACK INTERFACE

3.5.1 Rack-Mount Configuration

[R16] The patch panel shall mount to a standard 19-inch rack.

3.5.2 Rack Hardware

[R17] The patch panel shall be supplied with the requisite 19-inch mounting fasteners.

3.6 PATCH PANEL CONSTRUCTION

3.6.1 Patch Panel Height

[R18] The patch panel shall have a height of 1U.

3.6.2 Accessibility

[R19] The patch panel configuration shall allow access to connector ports without the need to unscrew panels or cover plates.

3.6.3 Connector Port Direction

[R20] Connector ports shall face towards the front of the rack mount unit.

3.6.4 Patch Panel Material

[R21] The patch panel enclosure material shall be metallic (e.g. aluminium).

3.6.5 Patch Panel Colour

No colour preference for the patch panel enclosure is specified.

3.7 CONNECTOR PERFORMANCE

3.7.1 Insertion Loss

[R22] The insertion loss of each connector shall not exceed 0.25dB at 1310nm and 1550nm.

3.7.2 Return Loss

[R23] The return loss of each connector shall be greater than 55dB at 1310nm and 1550nm.

3.8 CONNECTOR END-FACE QUALITY

[R24] Each connector end-face shall PASS the IEC 61300-3-35 standard for scratches and cleanliness.

4 ENVIRONMENTAL REQUIREMENTS

[R25] The patch panel components shall retain their optical and mechanical properties as described in this document in the case of exposure to the following environmental conditions.

4.1.1 Temperature Cycling

[R25.1] Transport and storage: -10 to +70 degrees Celsius

[R25.2] Installation: 0 to +50 degrees Celsius

[R25.3] Operation: +10 to +40 degrees Celsius

4.1.2 Humidity

[R25.4] All stages: 0 to 100%

5 DELIVERY REQUIREMENTS

5.1 PACKAGING

[R26] The patch panels shall be packed in such a way to prevent damage to the assembly during shipment and handling.

5.2 MARKING

No specific marking requirements are specified.

5.3 PIGTAIL ENDS

[R27] The pigtails shall be routed in the splice trays such that they are readily removable for splicing.

5.4 CLEANLINESS

[R28] All optical interfaces shall be clean, as specified in [R24], with dust caps inserted.

5.5 CERTIFICATE OF CONFORMANCE

[R29] Each patch panel shall be supplied with a certificate of conformance, stating the following at minimum:

[R29.1] The SARAO order number

[R29.2] The patch panel and all components have been checked and delivered according to the requirements of H0050-1704-000 (Rev #).

[R29.3] The connectors have been cleaned and inspected in accordance with [R28] of H0050-1704-000 (Rev #).

[R29.4] Name and signature of the responsible party.

5.6 TEST RESULTS

[R30] Each patch panel shall be supplied with insertion loss test results for each pigtail that forms part of the patch panel.

[R31] The results for the entire patch panel shall be compiled on a single A4 sheet and dated.

6 QUALITY ASSURANCE

6.1 QUALITY MANAGEMENT SYSTEM

[R32] The patch panel OEM shall be ISO 9001 certified.

6.2 INSPECTION EQUIPMENT

[R33] The supplier shall have access to sufficient inspection equipment such that the parameters specified herein can be checked and recorded. The facilities may be audited by SARAO representatives to confirm suitability.

[R34] All test equipment used shall be within a valid calibration period.

7 COMPLIANCE MATRIX

Bidders are required to complete the following table and return it with their bid. *Comply / Intend to Comply / Non-compliance* shall be indicated in the relevant column and documentation which supports this needs to be provided. Please note that if no supporting documentation is provided for 'comply', the paragraph will be marked *Non-compliance*.

Table 1: Compliance Matrix

Req No.	Description	Comply / Intend to Comply / Non-compliance	Supporting Documentation
[R1]	Requirements for all stages		
[R2]	Panel connector type		
[R3]	Number of connector banks		
[R4]	Connector bank separation		
[R5]	Number of pigtails		
[R6]	Fibre type		
[R7]	Pigtail connector type		
[R8]	Pigtail length		
[R9]	Pigtail jacket		
[R10]	Pigtail buffer		
[R11]	Splice tray		

Req No.	Description	Comply / Intend to Comply / Non-compliance	Supporting Documentation
[R12]	Fibre cable size		
[R13]	Number of fibre cables		
[R14]	Fibre cable entry direction		
[R15]	Cable gland		
[R16]	Rack-mount configuration		
[R17]	Rack hardware		
[R18]	Patch panel height		
[R19]	Accessibility		
[R20]	Connector port direction		
[R21]	Patch panel material		
[R22]	Insertion loss		
[R23]	Return loss		
[R24]	Connector end-face quality		
[R25]	Environmental requirements		
[R26]	Packaging		

Req No.	Description	Comply / Intend to Comply / Non-compliance	Supporting Documentation
[R27]	Pigtail ends		
[R28]	Cleanliness		
[R29]	Certificate of Conformance at delivery		
[R30]	Insertion loss test results		
[R31]	Compiled results		
[R32]	OEM QMS		
[R33]	Supplier access to equipment		
[R34]	Supplier test equipment calibration		