

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev
		Date: 12/11/2023
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client
	Document Title: Specification for Instrument Junction Boxes	02
		00
		Page 2 of 11

Tabulation of Revised Page

Sheet	Revisions							Sheet	Revisions						
	00	01	02	03	04	05			00	01	02	03	04	05	
1	X	X						41							
2	X							42							
3	X							43							
4	X							44							
5	X							45							
6	X							46							
7	X							47							
8	X							48							
9	X							49							
10	X							50							
11	X							51							
12								52							
13								53							
14								54							
15								55							
16								56							
17								57							
18								58							
19								59							
20								60							
21								61							
22								62							
23								63							
24								64							
25								65							
26								66							
27								67							
28								68							
29								69							
30								70							
31								71							
32								72							
33								73							
34								74							
35								75							
36								76							
37								77							
38								78							
39								79							
40								80							

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 3 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

Table of Contents

1.0	INTRODUCTION	4
2.0	DEFINITIONS	4
3.0	STANDARDS AND CODES.....	4
3.1	Codes and Standards.....	4
3.1.1	IEC Codes.....	4
3.1.2	Order of Precedence	5
3.1.3	USE OF LANGUAGE.....	5
4.0	DOCUMENT REQUIREMENTS	5
5.0	SITE CONDITION AND METEOROLOGICAL DATA	6
6.0	ENGINEERING, DESIGN & SUPPLY.....	6
6.1	Junction Boxes	6
6.1.1	General Requirement for Junction Boxes Cable.....	6
6.1.2	Marking	8
6.2	Cable Glands and Accessories.....	8
6.2.1	CABLE GLANDS FOR JUNCTION BOXES	8
6.2.2	LOCKNUTS	9
6.2.3	BLANK PLUGS C/W LOCKNUT AND WASHER	9
6.2.4	PLUG MATERIAL.....	10
6.2.5	MARKINGS	10
7.0	MATERIALS	10
8.0	QUALITY CONTROL PLAN	10
9.0	PACKING, MARKING AND SHIPMENT	10

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 4 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

1.0 INTRODUCTION

This document covers the minimum technical requirements for the design, supply, manufacturing, testing and performance of Junction Boxes and Cable Glands for the Copper-Concentrator Project. It shall be read in conjunction with other documents listed in the Material Requisition.

2.0 DEFINITIONS

Owner
Project
MC
Consultant
Contractor

3.0 STANDARDS AND CODES

3.1 Codes and Standards

Junction boxes and cable glands shall comply with the requirements of laws, regulations, codes and standards. Where other codes and standards are used, they shall be used in addition to the above. In the event of conflicting requirements between codes and standards used, the requirements shall apply.

All information shall be based on International System (SI) unit of measure.

Unless specifically stated otherwise, the design of all Junction boxes and cable glands will be based on the current standards and/or codes, as issued by the organizations listed below.

IEC	International Electro technical Commission
CENELEC	

The codes, standards and recommended practices applicable to the project are the following:

3.1.1 IEC Codes

IEC	DOCUMENT TITLE	CONFORMANCE
IEC 60204	Safety of Machines	
IEC 60050	International Electrotechnical Vocabulary	

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 5 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

IEC	60529	Degrees of Protection of Enclosures of Switchgear and Control gear for Voltages including 1000VAC and 1200VDC
IEC	61241	Electrical Apparatus used in the Presence of Combustible Dust Part 1: Protection by enclosure "tD"
IEC	60085	Method for Determining the Thermal Classification of Electrical Insulation
IEC	61000	Electromagnetic compatibility (EMC)
IEC	60079	Electrical apparatus for explosive gas atmosphere

3.1.2 Order of Precedence

The order of precedence shall be:

- This Specification.
- Project Standard Specifications.
- IEC Codes.
- CENELEC Codes
- Supplier Standards.

3.1.3 USE OF LANGUAGE

Throughout this specification, the words "will", "may", "shall" and "should" when used, have meaning as follows:

- "Will" is used for Client/MC scope of provision;
- "may" is used where solution is not highly superior to other alternatives and other alternatives can be utilized without notice;
- "shall" is used where requirement is mandatory, contractor asserts the provision/realization;
- "should" is used where a solution is preferred but other solutions can be utilized with notice.

4.0 DOCUMENT REQUIREMENTS

The following table consists of the minimum document required for each Junction box that shall be issued by the Supplier:

Row	Document Name	Issue time
1	General arrangement of junction box (GA)	Before construction
2	Bill of Material (BOM)	Before construction

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 6 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

3	Material certificates	Final Book
4	Certificate for Ingress Protection type test.	Final Book
5	Ex. Certificate (for Ex. Junction boxes)	Final Book

- Any change in subsequent revisions shall be clearly marked with revision markers (e.g., triangles and/or clouds). Any changes shall be marked in the index/revision sheet.
- Each multiple sheet document shall be preceded by a cover sheet and an index revision sheet.
- Each document shall have a document number according to the procedure attached to the Material Requisition (MR).

5.0 SITE CONDITION AND METEOROLOGICAL DATA¹

Site Location:

For detail, please refer to “12002-D-PR-DOC-303-GNL-001 (Site Condition)”.

6.0 ENGINEERING, DESIGN & SUPPLY

Supplier shall perform design, engineering, assembly, inspection, testing, & supply of complete junction box, accessories and cable glands.

Junction boxes, cable glands shall be supplied in accordance with this specification and the documents attached with the requisition.

Junction boxes shall be supplied complete with cable glands, terminals and all accessories such as mounting rails, end plates, cross-connections screwable links (Using wires for bridges (Jumper) is not allowed, nameplates, terminal markers, combined drain & breather, earth stud and all items essential for the safe and satisfactory operation of the equipment.

The supplier shall prepare dimensional drawings with material and description details.

All materials used must be new and of the highest quality.

Any deviation from the requirements of the specification must be clearly identified by the supplier. Note:

Nameplate which will be engraved on junction boxes should be S.S.

6.1 Junction Boxes

6.1.1 General Requirement for Junction Boxes Cable

¹ Contract, Annex No.1

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 7 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

Entries and Glands

All cable entries for main run cables shall be located at the bottom and individual secondary cables (M20 or M16 to be confirmed according to the selected cable gland supplier) located at bottom of the junction boxes also.

Cable entry diameter for multi-conductors or multi-pairs will be specified according to the cable supplier specification.

Gland plate shall be pre-drilled by the supplier with clearance holes, suitably size for cable glands. All holes shall be installed with temporary plugs to prevent unwanted material or insects entering the box before installation.

Wire Termination

All junction boxes shall be provided with sufficient space inside to ensure ease of termination.

Terminals shall be compression clamp type terminal blocks c/w terminal markers 1 to n on both ends, DIN rail mounted, suitable for maximum 2.5mm² stranded wire, with wire markers (both sides), end section and end stop.

All terminals shall be grey in color except for IS circuits, which shall be blue.

All terminals shall be mounted vertically on one or two rails as specified on the junction box schedule with the specified quantities of terminals. The terminal blocks shall be provided with complete lengths of cross-connections links (equivalent to the numbers of terminals) and screws for cable screens link where indicated.

Combined Drain & Breather

Combined drain & breather size shall be 20mm ISO, fitted with entry thread seal (nylon O-ring) to comply with IP65 and supplied with compatible locknut located at the bottom of the junction box.

Junction Box Construction

Junction box material shall be aluminum, S.S.316 or GRP, lockable door, and have a minimum Ingress Protection:

- Indoor installation IP54
- Outdoor installation IP65

Junction box shall be supplied complete with terminal blocks, cross-connection links, mounting rails, end/stop plate, mounting plate, mounting bracket, earth stud, 316SS drain & breather and drawing pocket mounted inside the enclosure.

Nonmetallic junction boxes can be accepted in some particular areas on the Client's approval.

Junction box shall be suitable for wall mounting. All mounting hardware such as brackets nuts, screws

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 8 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

shall be 316SS and rails shall be zinc bichromate plated steel or stainless steel.

Junction box design shall incorporate a rain channel to prevent rainwater collecting against the door seals. Door and gland plates shall be fitted with oil resistant neoprene gasket.

Junction box shall be provided with identification nameplate on the front of junction box. Material shall be S.S. Nameplates shall be generally black on white, white on red for fire & gas, and white on blue for IS circuits. The identification plate shall be attached permanently to the junction box in such a manner that the junction box certification will not be invalidated. Character height shall be 25mm. Minimum plate dimension shall be 150mm W X 40mm H.

All I.S. junction boxes shall have an additional label with white characters of 6mm height on blue background mounting on the door bearing the following statement:

IMPORTANT
ONLY INTRINSICALLY SAFE CIRCUITS TO BE CONNECTED WITHIN THIS BOX

Where certification is required, the certification provided by the supplier shall cover the complete junction box, terminal blocks, combined breather and drain, earth stud and gland plates Junction Box Dimensions

Note: All junction boxes shall have minimum 20 percent spare terminal.

6.1.2 Marking

Each Junction Boxes shall be provided with a permanently attached stainless steel plate with the following data:

Manufacturer name. Type or model number Serial number.

Electrical classification – certification number Degree of mechanical protection index CE

Marking.

6.2 Cable Glands and Accessories

6.2.1 CABLE GLANDS FOR JUNCTION BOXES

Cable glands shall be nickel-plated brass material, suitable for unarmoured cable with metric ISO thread form and fitted with, preferably compatible integral entry thread seal O-ring or seal washer to comply with minimum IP 65 rating. Certification shall be EEx 'e' where required.

Cable glands shall have thermoplastic elastomer seals for sheathing which will not damage cables that have "cold flow" characteristics. Minimum operating temperature shall be in the range of – 20°C to 70°C.

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor
	Document Title: Specification for Instrument Junction Boxes	02	00
			Page 9 of 11

The following table shows the type of cable gland sizes with the acceptable dimensions to be confirmed according to the chosen supplier:

ACCEPTABLE CABLE DIMENSIONS FOR CABLE GLAND			
TYPE	ENTRY THREAD SIZE	OUTER SHEATH DIAMETER (MM)	HAZARDOUS CERTIFICATION
M 16	16mm ISO	5.5 – 9.5	General Purpose
M 20	20mm ISO	8.5 – 13.0	General Purpose
M 25	25mm ISO	12.0 – 17.0	General Purpose
M 32	32mm ISO	15.0 – 22.0	General Purpose
M 40	40mm ISO	19.5 – 28.0	General Purpose
M 50	50mm ISO	25.5 – 36.0	General Purpose
M 63	63mm ISO	33.0 – 46.0	General Purpose
M 16	16mm ISO	6.0 – 11.0	EEx 'e'
M 20	20mm ISO	8.5 – 13.0	EEx 'e'
M 25	25mm ISO	13.5 – 18.0	EEx 'e'
M 32	32mm ISO	17.5 – 25.0	EEx 'e'
M 40	40mm ISO	24.5 – 33.5	EEx 'e'
M 50	50mm ISO	33.0 – 43.0	EEx 'e'
M 63	63mm ISO	45.5 – 55.0	EEx 'e'

Cable Glands for EEx 'd' Junction Boxes or Instruments

Cable glands shall be nickel plated brass material, suitable for unarmoured cable with metric ISO thread form and fitted with, preferable compatibly integral entry thread seal O-rings or seal washer to comply with enclosure IP rating and suitable for EEx'd' enclosures.

6.2.2 LOCKNUTS

Locknuts are used for fastening cable glands to the gland plates. Locknuts shall be nickel plated brass material, and compatible with cable glands supplied.

TYPE	THREAD SIZE
M 16	16mm ISO
M 20	20mm ISO
M 25	25mm ISO
M 32	32mm ISO
M 40	40mm ISO
M 50	50mm ISO
M 63	63mm ISO

6.2.3 BLANK PLUGS C/W LOCKNUT AND WASHER

Blank plugs are for spare cable entries in junction boxes. Blank plugs shall be nickel plated brass, fitted with integral entry thread seal O-ring to comply with IP65 and supplied with compatible nickel-plated brass

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 10 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

or polyamide material Locknut. Certification shall be EEx 'e' or EEx 'd' where required.

TYPE	THREAD SIZE	HAZARDOUS CERTIFICATION
M 16	16 mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 20	20mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 25	25mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 32	32mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 40	40mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 50	50mm ISO	General Purpose, EEx 'e' or EEx 'd'
M 63	63mm ISO	General Purpose, EEx 'e' or EEx 'd'

6.2.4 PLUG MATERIAL

Note: Plug material should be nickel-plated brass.

6.2.5 MARKINGS

All cable glands shall be stamped with type and size of glands, type and size of entry thread and the relevant approval details.

Note: gland plates and lock nuts are usually used for panels.

7.0 MATERIALS

All junction boxes and cable glands herein shall be new and unused, of current manufacture, of the highest grade and free from all defects and imperfections affecting performance.

8.0 QUALITY CONTROL PLAN

The General QA/QC requirement is attached to the Requisition and defines the minimum requirements to be adhered to by the Supplier.

The Supplier shall carry out standard manufacturing testing in addition to those mentioned in Inspection and Test Plan (ITP) attached in the Requisition

The Supplier shall allow the Client's representative all reasonable access to his manufacturing facility for the purpose of assessing and reporting on the quality and progress of the work. The Supplier shall also impose a similar condition on all sub-vendors.

In addition to the required "Test and Inspection Documents" the Supplier shall supply a certificate stating that the junction boxes and cable glands comply in all respects with this Specification, Requisition and Purchase Order, including the test requirements as per order.

9.0 PACKING, MARKING AND SHIPMENT

The supplier shall follow the "Packing, Marking and Shipping Instruction" (PMS) attached to the Purchase Order.

	Document Number: 12002-D-IN-SPC-303-GNL-004	Rev	Date: 12/11/2023	
Class: FA	Library Code: 303-E03-0000-00-IN-SPC-004-2	Client	Vendor	Page 11 of 11
	Document Title: Specification for Instrument Junction Boxes	02	00	

All necessary precautions shall be taken for adequate protection of the junction boxes and cable glands during shipment and storage at their destination