



INSPECTION OF ELECTRICAL CONDUITS

CODE

PCC-04

REVISION

03

EMISSION

12.APR.23

SIGNATURE CONTROL

DEVELOPED	REVISED	AUTHORIZED
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CHANGE CONTROL

DESCRIPTION OF THE CHANGE	REVISION	DATE
The translation of this PCC-04 procedure is included in the IMS; the English version is integrated with the same control data as the Spanish document. Modification of associated formats for handling the English-Spanish version.	03	12.APR.23
Section Integration: Related Documents, Definitions, and Responsibilities	02	13.AUG.22
The procedure is updated and Modified in the PCC-04/F-01 Inspection of Electrical Conduits format.	01	07.FEB.22
Creation and Issuance of the Procedure.	00	28.JUN.21

PURPOSE OF THE PROCEDURE

Establish the guidelines for carrying out inspections of the works related to electrical conduits used according to the designs and plans of each project to evaluate their safety, efficiency, and compliance with regulations, codes, and standards in the field of electrical engineering.

SCOPE OF THE PROCEDURE

It applies to all jobs that require electrical conduits or electrical systems and to the Quality Control area, which carries out the inspections, as well as project supervisors and operational personnel responsible for the work.

REFERENCE DOCUMENTS

- International Quality Management Systems ISO 9001:2015 Standard
- International Standard Environmental Management Systems ISO 14001:2015
- NOM-001-SEDE-2012. Electrical installations (use).
- NFPA-70 NEC. NFPA-70 National Electrical Code.
- NMX-J-118/2 Low Voltage Force Distribution Boards.
- NMX-J-118/1 Low voltage lighting and distribution panels.
- NMX-J-511-ANCE-2011. Supports for electrical conductors-Systems of metal tray-type supports.
- NMX-J.534-ANCE-2008 Heavy-type rigid steel metal pipes and their accessories for the protection of conductors.

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- NMX-J-536-ANCE-2008 Light-type rigid steel metal pipes and their accessories for the protection of electrical conductors.

DEFINITIONS

Channeling. Closed channels of metallic or non-metallic materials are expressly designed to contain wires, cables, or conductor bars. Raceways include but are not limited to, rigid metallic conduit, rigid non-metallic conduit, semi-heavy metallic conduit, liquid-tight flexible conduit, flexible metallic conduit, flexible metallic conduit, non-metallic electrical piping, metallic electrical conduits, underground conduits, cellular concrete floor raceways, cellular metal floor raceways, ducts and electroducts.

Trays. They are platforms or grids in the form of a bracket aligned forming a continuous path and made up of fittings, accessories, plates, tubes, or rollers that are strongly fixed to any structure or wall and that are required to accommodate, support and conduct mainly insulated conductors.

Conduit tube. Ducting system designed and built to accommodate conductors in electrical installations, tubular shaped, circular section.

Conduit box. A box designed to provide access to the inside of the tube through one or more removable covers.

Support System. A support system consists of a piece or set of parts, sections, and associated accessories, which form a rigid and electrically continuous structural system used to support conductors.

Dead loads. They are those permanent loads that do not change in magnitude mass and are in fixed places and include vertical supports, lateral supports, brackets, braces, trays, conduit pipes, and accessories.


Live Cargo. They are those that do not change in magnitude mass, and their location varies; the weight of the cables and the assumed weight of a man on the tray are considered.

Dynamic loading. These are impact loads, including earthquake stresses, which must be considered for the design of tray supports.

Load Capacity. Load capacity is defined as the total allowable mass of cables and tubes carried on the trays.

Concentrated Load. It is the total mass of any load gathered or supported at a single specific point or place located on the line of trajectory.

Classification of hazardous areas. It is the arrangement of the areas of a facility according to risk due to the presence of hazardous atmospheres.

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RESPONSIBILITIES

Construction Supervisor:

- Carry out the installation of ducting and support work.
- Inform the Quality Control Inspector of the beginning and completion of the process.

Quality Control Inspector:

- Implement in conjunction with the construction supervisor and monitor strict compliance with the parameters established herein.
- Notify of any deviations found.

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DESCRIPTION OF THE PROCEDURE

Responsible	Activity	Records
Quality Control	<p>1. INTRODUCTION</p> <p>To ensure the quality of the electrical conduit work carried out through trays, ducts, metal, and flexible conduit pipes, inspections are carried out, both preventive and regulatory.</p> <p>Inspections aim to maintain safety and contribute to the reliability and technical efficiency of electrical installations, as they are essential for equipment to fulfill its functions.</p> <p>2. GENERAL</p> <p>A. TOOL & EQUIPMENT</p> <p>The following list of instruments is required to perform the inspection. Tools may vary, subject to the special requirements of each circuit.</p> <ul style="list-style-type: none"> • Joist level • Torpedo level • Vernier • Tape Measure • Set of squares • Lamp (100 lumens minimum) <p>B. ENTRY INFORMATION</p> <p>The following input information must be provided by the construction supervisor to perform the inspection of the electrical conduits.</p> <p>System Architecture</p> <ul style="list-style-type: none"> • Electrical Conduit Plan (Conduit Route, Tray, Formwork, etc.) • Typical Instrument Installation • Equipment and valve installation drawings • Cable and piping schedule plan. <p>3. INSPECTION OF ELECTRICAL CONDUITS</p> <p>The inspection must be carried out with the construction plans in the last review. It should be checked that the tools and equipment for the inspection are in good condition.</p> <p>The routing of the electrical conduit should follow what is indicated in the approved engineering drawings. The routes may vary in their trajectory depending on the conditions of available space or changes requested by the client, but they cannot be deleted. To assess the acceptability of an electrical conduit, the following must be verified:</p> <ol style="list-style-type: none"> 1. In overhead pipes, conduits must be accessible for opening by maintenance personnel. The lids must have opening clearances that allow them to be removed. 2. The route must not cross the space designated for personnel transit. 	
Quality Control Inspector		



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3. It must not hinder the operation and maintenance activities of the equipment and valves.
4. It must not obstruct access to platforms and stairs.

Any changes must be reflected in the engineering drawings in the immediate superior review.

For the installation of electrical conduit circuits, the following points must be verified:

1. The materials must comply with what is indicated in the approved engineering plans, as well as with the corresponding classification of areas.
2. The diameter of the conduit, as well as the dimensions of the tray, must be indicated by the approved engineering and must match the corresponding circuit.
3. It must be supported every 2.5 m maximum, ensuring that the circuit is firm in all its sections and changes of direction.
4. All paths must be level horizontally and vertically concerning the level of the structural base.
5. All low spots must have a vent drain.
6. Conduit pipe seals must be installed for change of classified area and no more than 30 cm from the installation equipment and junction boxes. The installation of the seals must include the appropriate fiber and compound for the sealing function (after approval of the On-Site Acceptance Tests).
7. The spacing between conduit lines in electrical conduits must be as indicated in the following tables:

Table 1 Minimum Spacing Between Overhead Lines of Conduit Tubes (Center to Center)

(Diámetro) de tubo conduit en mm									
φ	13	19	25	32	38	51	64	76	102
13	40	62	65	72	77	82	95	104	116
19	62	65	68	75	80	84	98	106	118
25	65	68	70	78	82	90	100	108	122
32	72	75	78	82	86	94	104	112	126
38	77	80	82	86	90	98	110	116	130
51	82	84	90	94	98	102	115	122	135
64	95	98	100	104	110	115	128	134	148
76	104	106	108	112	116	122	134	142	156
102	116	118	122	126	130	135	148	156	180



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Table 2 Minimum distance between conduit lines for underground pipes

	Distancia entre centro de los 2 tubos conduits de (diámetros) mayores adyacentes en hileras o columnas (CENTRO A CENTRO EN mm)						Distancia entre el centro del tubo conduit de (diámetro) mayor y el borde del banco de ductos.
CONDUIT (DIAM.) mm	25	38	51	76	102	152	mm
25	100	100	100	120	120	160	100
38	100	100	100	120	150	160	100
51	100	100	120	120	150	160	100
76	120	120	120	150	160	200	120
102	120	150	150	160	160	200	150
152	160	160	160	200	200	250	150

8. Burrs from conduit pipes must be removed at the ends and on arrival at junction boxes and boards (in this case, by installing against nut and monitor).
9. For diameter changes in electrical conduits, bell-type reductions must be used. Bushing reductions should only be installed in instrument connections.
10. The pipe and fittings must not have physical damage from the factory or damage caused by installation (pipe "sucked" on bayonets, pipe with mechanical damage due to the use of stilson wrenches, etc.).
11. If the pipe and fittings are made of hot-dip galvanized steel material and there is physical damage due to installation, these must be repaired, and the damage covered with a layer of cold galvanized. In the same way, all screw joints must be coated with a layer of cold galvanizing.
12. If the pipe and fittings are of a material other than hot-dip galvanized steel, the use of band wrenches is recommended instead of stilson wrenches. If the pipe or fitting is physically damaged by installation, it must be replaced.
13. For the manufacture of rope in pipes, grease of vegetable or animal origin should not be used.
14. Spare holes in boards should be covered with NPT (non-metric) screw caps.
15. Check that all clamp nuts are tight.

4. DOCUMENTARY RECORD

Quality Control Inspector

The Quality Control Inspector, at the end of the work, must document the visual inspection in the format of a *Record of Inspections of electrical conduits (PCC-04/F-01)*, which specifies the following points:

- Project
- Location
- Customer
- Date
- Report Number
- Function
- Point of Inspection
- Accepted/ Rejected
- Remarks

Electrical Conduit Inspection Log (PCC-04/F-01)

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	<p>If any of the inspection points established in the report is established as rejected, Quality Control must draw up a <i>Non-Conforming Exit Report (PCC-14/F-01)</i> to follow up on the repair or correction process of the deviations found, establishing the person responsible for carrying it out and the date of commitment to carry it out.</p>	<p>Report of Non-Compliant Departure (PCC-14/F-01)</p>
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FORMATS ASSOCIATED WITH THE PROCEDURE

CODE	REGISTRATION	REVIEW LEVEL	RETENTION TIME
PCC-04/F-01	<i>Register of Inspections of electrical conduits</i>	02	1 year physical/digital without expiration