

Fiscalization manual of works of structured cabling for a telecommunications infrastructure in buildings according to standards ANSI//TIA 568 C, 569 C, 606 B, 607 B for the company Sinfotecnia

Hidrobo Pérez Marco Rigoberto
marcohidrobo@hotmail.com
 Tecnica del Norte University

Summary - The present work of qualification aims to develop a manual for the control of works of structured cabling for buildings through the analysis of standards ANSI/TIA 568 C.0, 568 C.1, 568 C.2, 568 C.3 569 C ,606 b, 607 B.

It was conducted a study of the legislative framework of Ecuador as is the Organic Law of the National System of Public Procurement and the regulation of determination of stages in the process of execution of works and provision of public services to the manual has a legal basis and an analysis of the structured cabling standards with the purpose that the manual has a technical regulations in the that can be based for the control in the control of this type of works. Subsequent to this was carried out the audit process and the development of forms of control based on the rules of structured cabling to improving the audit in a telecommunications infrastructure in buildings. Consecutively proceeded with the preparation of the manual that was a compilation of information previously analyzed the same that will serve not only for the process of control but also for a control of the facilities carried out by the technical staff of the company.

Indexed terms -. Fiscalization Manual, telecommunications infrastructure, ANSI/TIA 568 C, 569 C, 606 B, 607B.

I. INTRODUCTION

Sinfotecnia is a proactive company that is dedicated to provide integral solutions in networking systems, assurances, communications and computing in general agreement with the experience of the company has realized that in Ecuador the majority of companies that offer the service for monitoring of works are responsible for the civil party, electrical more not in which corresponds to a telecommunications infrastructure.

Sinfotecnia due to that in the country there are not many companies that dedicate themselves to offer the service previously that you want to deploy the service for monitoring of works of structured cabling, currently cannot do so due to a lack of awareness of the existing legislation on the control of works and the technical criteria needed, so you need a manual that will serve as the basis to be able to develop this type of activity.

This project will enable Sinfotecnia have a manual which will be based on the current Ecuadorian legislation on public procurement as well as the technical regulations relating to structured cabling as is the ANSI, EIA, TIA with their corresponding versions.

The audit manual will serve as a basis for the company to be able to deploy this service, you will need a legal sustenance, making reference to the control of works as such and a technical support of parameters well justified allowing having all the tools which will help technical staff can play in a better manner their work.

II. THEORETICAL BASIS

It is given to know the analysis of current legislation in Ecuador on consulting, in the same way the analysis of the ANSI/TIA on structured cabling.

A. *Organic Law of the National System of Public Procurement*

According to the Organic Law of the National System of Public Procurement, the items that have to do with consultancy services are the following:

Art. 37.- Exercise of the Consulting.- The consultancy will be exercised by natural or legal persons, national or foreign, to conclude contracts with the entities subject to the present law, must be entered in the register only of suppliers outermost regions.

Art. 38.- Natural persons who may exercise the consulting.- for that individual consultants, national or foreign, can exercise consulting activities, must have at least third-level professional title conferred by a Higher Education Institution of Ecuador, or abroad, in which case it shall be recognized in the country according to law.

Art. 39.- legal persons who may exercise the consulting.- For a national company can exercise consulting activities, shall be constituted in accordance with the Companies Act and having in his social object including this activity.

Universities and polytechnics, as well as foundations and corporations may exercise the consultancy, in accordance with the legal provisions or rules that regulate their legal existence, provided that they have relationship with research topics or specialized assistance punctual in those who demonstrate their capacity.

To exercise their activity, consulting firms hired and demonstrate that have individual consultants, who must meet the requirements laid down in this Law.

Art. 40.- amounts and types of recruitment.- The celebration of consultancy contracts shall be subject to the following provisions:

Direct contracting: When the referential budget of the contract is less than or equal to the value that is found by multiplying the coefficient 0.000002 by the amount of the initial budget of the State of the relevant financial year. The selection, qualification, negotiation and award will be undertaken by the highest authority of the contracting entity in accordance with the procedure laid down in the regulation of the law;

Recruitment through short list: When the referential budget of the contract exceeds the set in the previous number and is lower than the value that results from multiplying the coefficient 0,000015 by the amount of the initial budget of the State for the financial period; and,

Recruitment through public competition: When the referential budget of the contracts is equal to or greater than the value that results from multiplying the coefficient 0,000015 by the amount of the initial budget of the State of the relevant financial year.

The provisions governing the procedures precontractuales identified in the previous numbers, shall be included in the regulation of this Law.

By referential budget of the contract" means one who has determined the institution, dependency, entity or agency concerned, from the date of the initiation of the process.

Art. 41.- Selection Criteria for consulting.- consulting services will be selected on the basis of criteria of quality and cost. The consulting offerings will be presented in two (2) separate envelopes, the first containing the technical aspects on which it will assess the quality and, the second, the economic aspects, on that will qualify the cost.

The selection process will be made between consultants of the same nature; thus between individual consultants, between consulting firms, or between agencies that can meet and are in a legal capacity to provide consultancy services.

The recruitment procedures include the following stages: qualification, selection, negotiation and adjudication.

With the proponent that get the highest weighted score of the technical and economic bid, you will proceed to the negotiation of the technical terms and contractual and economic adjustments arising out of such negotiations.

If agreement is not reached, the negotiations will be terminated and will begin with the qualified consultant in the next place, continuing with the same procedure described in the preceding paragraphs.

Art. 42.- Technical Commission.- For the realization of public competitions and recruitment by short list, the unit, entity or body concerned comply, in each case, a Technical Commission to take charge and responsibility to carry out the processes envisaged for each contest, which shall act in accordance with the specifications approved for the effect. If necessary it may set up one or more subcommittees of support to the Technical Commission.

Corresponds to the highest authority of each unit or entity to convene the contest of consultancy, approve in harmony with this Law and its general Regulation, the spreads, terms of reference, budget referential and other documents of the contest. Are powers of the Technical Commission, qualify, select and negotiate with the consultants bidders.

In certain cases, owing to the complexity and magnitude of the consultancy work required, the highest authority of the institution may convene pre-qualification processes of consultancy or presentation of expressions of interest. The Regulation of the present law shall establish the rules to facilitate these processes.

B. General Rules of the Organic Law of the National System of Public Procurement

Art. 32.- Exercise of the consultancy.-In the selection processes of consultancy, the contracting entity shall determine the nature of the participants: are individual consultants, consulting firms or bodies that are authorized to offer consulting services. The recruitment processes will be between consultants of the same nature.

In the case of natural persons, the title of third level conferred by a higher education institution, must also be registered in the SENECYT; except the exception provided for consultancies whose term is of up to six months and to be carried out by individual consultants foreigners or by individual national consultants whose titles have been obtained abroad, in which case just the presentation of the title conferred by the corresponding institution of higher education abroad.

Art. 33.- Participation of foreign consulting.- The initial determination of a lack of technical skills or experience of the national consulting, will be the responsibility of the contracting entity, for whose effect shall refer the documentation to the SERCOP so that it can issue the corresponding certification in the form prior to the procedure and electronically.

The SERCOP on the basis of the statements submitted by the contracting entity shall publish in the portal www.compraspublicas.gov.ec the requirements to receive expressions of interest from domestic suppliers, the same that will be analyzed in order to authorize or not the participation of foreign suppliers. However in the call will not be restricted national participation.

In the certification of foreign participation, the SERCOP may recommend minimum percentages of national participation that should contemplate compulsory spreads.

Art. 34.- In all recruitment process, the determination of consultancy costs shall take into account in its composition the direct and indirect costs required for the implementation of the project, as described below:

Direct costs: defined as those that are generated directly and exclusively in function of each consultancy work and whose basic components are, among others, the remuneration, benefits or social burdens of work equipment, the travel and per diem costs; subcontracts and miscellaneous services, leasing and rental of vehicles, equipment and facilities; supplies and materials; reproductions, editions and publications;

Indirect costs or overheads: are those who recognize the consulting firms and other organizations which are authorized to perform consulting, to meet its expenses of a permanent nature related to their professional organization in order to enable the timely and efficient supply of their professional services and that cannot be attributed to a study or project in particular. The indirect cost will consider only the fees or business utility recognized to legal persons consultants, by the entrepreneurial effort, as well as by the risk and responsibility they assume in the provision of consultancy service that is contracted.

Art. 35.- subcontracting in consultancy.-In consultancy contracts that provide for the implementation of support services that cannot be provided directly by the consultant, they may be outsourced in the percentages laid down in the negotiation, without any limit to that.

C. *Regulation of determination of stages in the process of execution of works and provision of public services*

In the Art 12 of the Rules of Procedure of determination of stages in the process of execution of works and provision of public services refers to the control that will be responsible for the continuous monitoring of the work in order to ensure the compliance of the design project, among the most important objectives of the audit we

- Monitor and take responsibility for the faithful and strict compliance with the terms of the construction contract, in order that the project was run according to their final designs, technical specifications, work programs, recommendations of designers and applicable technical standards.
- Fittingly detect errors and/or omissions of designers, as well as handed techniques that require immediate corrective actions to plot his the situation.
- Ensure the good quality of the work carried out.
- Get in a timely manner is den technical solutions to problems encountered during the execution of the contract.
- Get the computer and technical staff of the contractors will be suitable and sufficient for the work.

- To obtain statistical information about personnel, materials, equipment, weather conditions, time worked, etc. of the project.
- Ensure that the executives of the contracting entity are kept duly informed of the progress of the work and problems encountered in the implementation of the project.

For that the objectives can be met within the agreed deadlines and with scheduled costs and the control is assigned the following, among other functions, depending on the type of work, magnitude and complexity of the project:

- Revision of the basic parameters used for designs hired and elaboration or approval of plans for construction, if necessary;
- Periodic assessment of the degree of implementation of the programs of work;
- Revision and update of the programs and schedules submitted by the contractor;
- Locate on the ground all the necessary references for the correct implementation of the project;
- Suggest during the constructive process the adoption of corrective measures and/or technical solutions as it deems necessary in the design and construction of the works, including those relating to constructive methods;
- Measure the amounts of work executed and with them develop, verify and certify the accuracy of the forms of payment, including the application of the formulae of readjustment of prices;
- Carefully examine the materials to be used and check their good quality and of the items of work, through laboratory tests to be run directly or under the supervision of its staff;
- Resolve the doubts that may arise in the interpretation of the drawings, specifications, constructive details and on any technical issue concerning the project;
- Prepare periodic audit reports addressed to the contracting parties, which shall contain at least the following information:
 - Analysis of the state of the project implementation, in response to the economic aspects, financial and progress of work;
 - Calculation of amounts of work and determination of accumulated volumes;
 - Reports of the results of the laboratory tests and comments thereon;
 - Analysis and opinion on the quality and quantity of the equipment provided for in work;
 - Analysis of the contracting staff;
 - Statistical report on the climatic conditions of the project area;
 - Reference of communications made with the contractor; and,
 - Other important aspects of the project;

- To qualify for the technical staff of the constructors and recommend replacement of staff that does not meet the necessary requirements;
- Periodically check that the computers are the minimum required contractually and are in good conditions of use;
- Note In the Book of work the observations, instructions or comments that his criterion should be considered by the contractor for the better development of the work. Those who have special importance shall be entered additionally by regular ex officio;
- Verify that the contractor has all the designs, specifications, programs, licenses and other contractual documents;
- Coordinate with the contractor, in representation of the contractor, the most important activities of the constructive process;
- Participation as an observer in the Receptions provisional and definitive report on the quality and quantity of the work carried out the legality and correctness of payments made.

D. Structured Cabling Standards

1) ANSI/TIA 568 C.0 Standard Generic Telecommunications Cabling for Customer Premises

Aims to enable the planning and installation of a structured cabling system for all types of facilities. This specific rule a system that supports generic telecommunications wiring

2) ANSI/TIA 568 C.1 Standard Commercial Building Telecommunications Cabling

Provides information about the planning, installation and verification of structured wiring for commercial buildings.

3) ANSI/TIA 568 C.2 Standard Balanced Twisted-Pair Telecommunications Cabling and Components

Details the specific requirements of the twisted pair cable balanced, at the level of its components and transmission parameters.

4) ANSI/TIA 568 C.3 Standard Optical Fiber Cabling Components

Specifies the components of fiber optic cable, including mechanical aspects, optical and compatibility requirements.

5) ANSI/TIA 569 C Standard Telecommunications Pathways and Spaces

The standard ANSI/TIA/EIA-569-B, brings with guidelines for the design of the facilities and infrastructure of the building for the telecommunications wiring for the following sections:

- Entrance facilities

- Equipment Room.
- Vertical Cabling
- Telecommunications Room
- Horizontal Cabling
- Work area.

6) ANSI/TIA 606 B Standard Administration Standard Telecommunications Infrastructure

Provides a uniform management scheme that is independent of the applications that will give to the wiring system, which can change several times during the existence of a building.

Mainly focuses on the labelling of the wiring and the documentation of the network in terms of registration and maintenance, where each termination of hardware will possess a unique identification.

7) ANSI/TIA 607 B Standard Telecommunications Bonding and Grounding (Earthing) for Customer Premises

Specifies the basic outline and the necessary components to provide electrical protection to users of a telecommunications infrastructure through the use of an earthing system installed and configured properly.

III. DEVELOPMENT OF THE AUDIT PROCESS AND DEVELOPMENT CONTROL FORMS

A. Audit in a telecommunications infrastructure

It is given to know everything concerning the audit in a work of telecommunications infrastructure.



Fig. 1. Diagram of functions of the audit.

Source: The author

The audit in a telecommunications infrastructure either a building or any other structure is no more than to give approval

after performing a thorough check on the aspects stipulated in the contract, these aspects can be technical or economic to ensure the quality of the work carried out.

B. *Role of watchdog*

There is no work more important and demanding than the control of a work for a network infrastructure. All the knowledge and experience of the inspector in the performance of their duties, determines the success or failure of the programs and objectives within the institution which represents.

When the inspector works as is due, its role can be summarized or generalized into two categories or classes of responsibilities extremely than their role broadens real, are simply different facets of one and the same activity, cannot exercise one without the other. These facets are follow the principles of the audit and apply the methods or techniques of the audit.

C. *Profile of the Inspector*

Under the current conditions of operating the industry in general, the inspector must be a professional in any of the related careers to the construction, i.e. Electrical Engineering, Mechanical Engineering, Electronic Engineering, Engineering in Electronics and Communications Networks and the construction (Architecture or civil engineering), although you can also be technologist in any of the races before mentioned, if the experience accredits, with sufficient capacity to monitor compliance with the contractual commitments and monitor the development of the work. In response to these requirements it is deduced that the inspector must be a professional with the following features: Experience, organizational capacity, seriousness, honesty, Technical Criterion

D. *Basic elements to undertake an audit*

They are called basic elements of audit, to those that constitute a contribution to the time to carry out an inspection of the work performed, between some of which we can mention.

1) *Documents*

Are all the rules, manuals, specifications, bases of the contract, in order any document that provide information or regulation to perform the work, as for example:

- Design and technical specifications of the installation to be made or carried out.
- The spreads of Recruitment
- The Audit Manual refers to this document by which is expected, it helps to understand and run an audit in the most appropriate manner.

2) *Instruments for the Audit*

Among the instruments that can help to run the audit work we have the following:

- Tape measure or Flexómetro preferably 2m in forward.
- Pocket Calculator
- Notebook
- Security Instruments
- The Audit Manual
- Any other type of useful instrument for the control.
- Camera

3) *Logistical Support*

No audit activity can be done without the logistical support of the company this is an indispensable requirement for the inspector. For this the Inspector could require the following aspects

- A suitable vehicle to move to the point where is the construction to be carried out.
- The support and backing of the authorities of the company to the audit.
- The assistance of the resident or residents of works for the revision and control of the smart building both in the constructive stage such as the completion of this in the case of work in progress.

4) *Documents from the result of the Audit*

The Inspector to what visit and monitors the building will have positive or negative results of this, all this information must be very clear in:

- A form of audit report and evaluation of physical progress of the building.
- The or the reports that will be made available to the authorities of the Company, one of the main documents required to carry out a good audit is to coordinate the delivery of reports already are per day if the work is of short duration, i.e. 30 days, or monthly if the work is of long duration.
- The recommendations and observations of the most relevant of the audit that was carried out in the building intelligent, these will be written and signed, by the Superintendent of work and the inspector, these recommendations or comments must go with date, time and photographic record, to be treated in meetings of work with all the parties.

E. *Audit process for telecommunication infrastructure in buildings*

For the control of a telecommunications infrastructure in buildings you must follow a process that can be seen in the following figure.

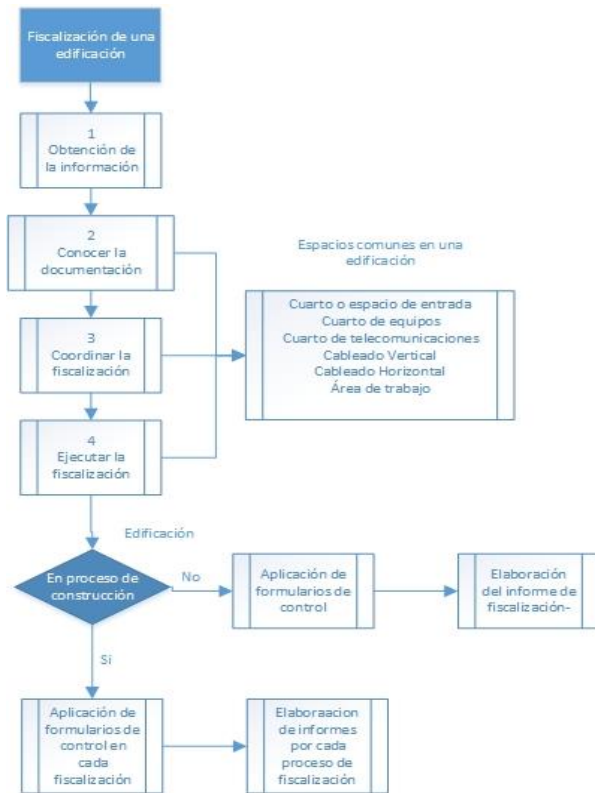


Fig. 2. Audit process according to the common areas in a commercial building

Source: The author

1) *Obtaining the information*

Obtaining the information i.e. spreads of recruitment where are the terms of reference that contain the norms with which will be built the building and very important to possess the construction schedule of the work in same that must be adopted in the contract. If the work has already been constructed will perform the audit of the installed in the building according to the rules laid down in the contract.

2) *Know Documentation*

There should be a thorough and careful research and review of all the documentation associated with the work, building plans approved, specifications of the structural elements or those required by other areas, technical standards used for the installation of the various systems either electrical data , among others.

3) *Coordinate Audit*

Contact with the authorities involved in the execution of the work, with the object of coordinating the management of control assembly to the entity that builds the building, this must be made according to a consensus, to go touring work both investors, developers and control, to make decisions on any changes that need to be done or give knowledge of progress and finished the work.

4) *Run Audit*

The Inspector to be presented in the work shall contain the following:

- Planes in the case if necessary.
- The technical specifications.
- Schedule of execution of the work
- If the work has already been completed the audit part only will verify the correct application of the rules in the systems installed.

F. *Forms for control of works according to standards ANSI/TIA*

These forms will help both the staff responsible for carrying out the audit and the technical staff of the company that is responsible for installing the structured cabling systems since it can be controlled in a better manner in compliance with the rules.

1) *Formats*

The formats of forms of control is carried out on the basis of the structured cabling standards ANSI/TIA 568 C.0 568 C.1 568 C.2 568 C.3, 569 C, 606 B, 607 B.

We have seven forms of control that are:

Control Form no. 1 based on the standard ANSI/TIA 568 C.0 has as objective the control of a generic cabling system for all types of facilities.

FORMULARIO DE CONTROL Nº 1			
ANSI/TIA-568-C.0			
Norma para el Cableado de Telecomunicaciones Genérico para instalaciones de Clientes			
Parámetro	Especificaciones	Verificación	Observaciones
Topología	Estrella y No debe haber más de dos distribuidores entre Distribuidor C (DC) y Salida de Equipos (EO).		
Salida de Equipos	WA (Área de trabajo)		
Distribuidores	Distribuidor A		
	Distribuidor B		
	Distribuidor C		
Subsistemas de cableado	Subsistema de cableado 1		
	Subsistema de cableado 2		
	Subsistema de cableado 3		
Medios de transmisión	Cableado de par trenzado balanceado de 100 ohmios.		
	Cableado de fibra óptica multimodo		
	Cableado de fibra óptica monomodo		
	Otros medios especificados en otros estándares		

Figure 3. Control Form ANSI/TIA 568 C.0

Source: The author

Control Form no. 2 based on the standard ANSI/TIA 568 C.1 will be responsible for the control over the installation of structured wiring for commercial buildings.


 FORMULARIO DE CONTROL N° 2 ANSI/TIA-568-C.1 Norma para el Cableado de Telecomunicaciones en Edificios Comerciales		
Parámetro	Especificaciones	Verificación
Instalaciones de entrada	Punto de demarcación	
Cuarto de equipos (ER)	Puede proporcionar las funciones de un TR o TE	
	La MC o DC está situada en una ER	
	IC o DB, HC o DA pueden estar en un ER	
Cuarto de Telecomunicaciones (TR) y Cajas de Telecomunicaciones (TEs)	HC o DA está situado en un TR o TE	
	MC o DC, IC o DB puede estar situados en un TR	
Cableado de Fibra Óptica Centralizado	Un TR y cualquier TE deben estar situados en el mismo piso que las áreas de trabajo	
	Un TE puede ser utilizado en adición a la regla mínimo un TR por planta	
	<ul style="list-style-type: none"> • Alternativa a la conexión cruzada óptica situada en el TR o TE • Conexión desde las WA hacia las conexiones cruzadas centralizadas • Permite uso de cables pull-through • Uso de una interconexión o empalme en el TR o TE • Distancia máxima para un cable pull-through es de 90 m (295 ft.) 	

Fig. 4 control form ANSI/TIA 568 C.2

Source: The author

Control Form no. 3 based on the standard ANSI/TIA 568 C.2 will focus on the control of the twisted pair cable balanced, at the level of its components and transmission parameters.


 FORMULARIO DE CONTROL N° 3 ANSI/TIA-568-C.2 Norma para Componentes y Cableado de Telecomunicaciones de Par Trenzado Balanceado			
Parámetro	Especificaciones	Verificación	Observaciones
Canal	1 Salida de telecomunicaciones y el conector		
	1 Punto de transición		
	90 metros de cable		
	Una conexión cruzada (2 bloques o paneles)		
	10 metros de patch cords		
Enlace Permanente	Cable de distribución horizontal		
	Salida de telecomunicaciones y el conector o el punto de transición		
Categorías reconocidas	Componente de conexión horizontal cruzada incluyendo las conexiones acopladas		
	Cat 3 (16 Mhz)		
	Cat 5e (100 Mhz)		
	Cat 6 (250 Mhz)		
Parámetros de transmisión	Cat 6A (500 Mhz)		
	De acuerdo a los ANEXOS A- F del Manual		

Fig.5. Control Form ANSI/TIA 568 C.1

Source: The author

Control Form no. 4 based on the standard ANSI/TIA 568 C.3 has as purpose the control of the components of fiber optic cabling.


 FORMULARIO DE CONTROL N° 4 ANSI/TIA-568-C.3 Norma para Componentes de Cableado de Fibra Óptica			
Parámetro	Especificaciones	Verificación	Observaciones
Rendimiento del cable de transmisión	Cada fibra cableada deberá cumplir con las especificaciones de rendimiento de la Tabla 21 del manual.		
Requerimientos Físicos	Fibras individuales y grupos de fibras deberán ser identificables de acuerdo con los códigos de colores correspondientes		
Cables de planta interna	Cables de 4 o menos fibras para el Subsistema de cableado 1 tendrá un radio mínimo de curvatura de 25mm sin carga		
	Cables de 4 o menos fibras tendrá un radio mínimo de curvatura de 50mm con carga de 220N		
Cables interior-exterior	Resto de los cables deberán soportar un radio de curvatura de 10 veces el diámetro exterior del cable cuando no esté sujeta a carga y 20 veces cuando lo este		
	Cables con más de 12 fibras mínima resistencia de 2670N		
Cables interior-exterior	Cables con menos de 12 fibras mínima resistencias de 1335 N		
	Cables de fibra interior-exterior deberán soportar un radio de curvatura de 10 veces el diámetro exterior del cable cuando no esté sujeta a carga y 20 veces cuando lo este		

Fig. 6. Control Form ANSI/TIA 568 C.3

Source: The author

Control Form no. 5 based on the standard ANSI/TIA 569 C will be in charge of the control of the facilities and infrastructure required in the telecommunications wiring for commercial buildings.



 FORMULARIO DE CONTROL N° 5 ANSI/TIA-569-C Norma para Rutas y Espacios de Telecomunicaciones en Edificios Comerciales			
Parámetro	Especificaciones	Verificación	Observaciones
Requisitos de temperatura y humedad	En la tabla 23 del Manual se pueden apreciar los requisitos correspondientes de temperatura y humedad para los espacios de telecomunicaciones		
Requisitos comunes para cuartos	No seleccionar lugares que limiten la expansión		
	Acceso para entrega de equipos grandes, mínimo una de las paredes con 19mm (3/4 pulg) de madera contrachapada con dos capas de pintura ignifuga		
Requisitos comunes para cuartos	El tablero será de 1,2 m (4 pies.) X 2,4 m (8 pies.) montado verticalmente con la parte inferior de plywood montada 150 mm (6 pulg.) por encima del piso terminado.		
	Altura mínima del techo será de 2,4 m (8 pies) sin obstrucciones. La altura entre el piso terminado y el punto más bajo del techo debe tener un mínimo de 3 m (10 pies)		
Requisitos comunes para cuartos	Iluminación deberá ser como mínimo de 500 lux en el plano horizontal y 200 lux en el plano vertical medido 1 m (3 pies) por encima del piso terminado.		
	La puerta será de un mínimo de 0,9 m (36 pulg.) de ancho y 2 m (80 pulg.) de altura sin umbral de la puerta, con bisagras para abrir hacia el exterior (código lo permite). Una puerta doble 1,8 m (72 pulg.) de ancho por 2,3 m (90 pulg.) de altura se recomienda si se prevé la entrega de equipos grandes.		
Requisitos comunes para cuartos	No debe haber ventanas exteriores		

Fig. 7. Control Form ANSI/TIA 569 C

Source: The author

Control Form no. 6 based on the standard ANSI/TIA 606 B will address the control in the identification of each of the subsystems of wiring.

 FORMULARIO DE CONTROL N° 6 ANSI/TIA-606-B Norma para la Administración de Infraestructuras Comerciales de Telecomunicaciones			
Parámetro	Especificaciones	Verificación	0
Visibilidad durabilidad	Etiquetas deben ser fáciles de leer y visibles durante el mantenimiento de la infraestructura Las etiquetas deben ser resistentes y deben tener una vida útil igual o mayor que la del componente marcado.		
Etiquetado	Las etiquetas no deben incluir identificadores completos. Sólo una parte de los identificadores necesarios para identificar el componente en el espacio que se encuentra son obligatorios.		
Clases	Clase 1: Menos de 100 usuarios con única Sala de equipos (ER)		
	Clase 2 : Más de 100 usuarios con uno o más TS en un solo edificio		
	Clase 3 : Más de 1000 usuarios		
	Clase 4 : Miles de usuarios y múltiples sitios o campus		
Texto	El texto en las etiquetas deberá ser generado por una máquina. Fig.8. Control Form ANSI/TIA 607 B		

Source: The author

Control Form no. 7 based on the standard ANSI/TIA 607 B has as purpose the control of grounding system.


 FORMULARIO DE CONTROL N° 7 ANSI/TIA-607-B Conexión y puesta a tierra de telecomunicaciones para sitios de clientes			
Parámetro	Especificaciones	Verificación	Observación
Componentes	Barra colectora de tierra principal para telecomunicaciones (TMGB);		
	Conductor de unión para telecomunicaciones (BCT);		
	Backbone de unión de telecomunicaciones (TBB);		
	Barra colectora de tierra para telecomunicaciones (TGB);		
	Ecuilibrador de conexión a tierra (GE).		
TEF (Instalación de entrada Telecomunicaciones)	TEF (Instalación de entrada Telecomunicaciones)		
Distribuidores	Distribuidor C debe tener mínimo un TMGB o TGB		
	Distribuidor A y B debe tener mínimo un TGB		
	TMGB Y TGB estarán situados dentro del distribuidor		
Cuarto de equipos	Cada cuarto de equipos contendrá un TGB o TMGB o malla BN		

Fig. 9. Control Form ANSI/TIA 606 B

Source: The author

IV. DEVELOPMENT OF THE MANUAL

The development of the manual was produced on the basis of the information gathered in the previous chapters as they are, the analysis of the legal framework relating to the control present on the regulation of determination of stages in the

process of execution of works and provision of public services and the Organic Law of the National System of Public Procurement that allowed to know the objectives of the audit as well as the articles involved for the company to be able to participate in the tender of contracts of this type , the analysis of the structured cabling standards of which are developed the forms that will help in time to carry out the audit as well as the process for Performed.

The audit manual consists of the following parts which are: objectives, scope, legal basis, audit, regulatory, forms and formats. The content of these parties is a compilation of the information contained in the preceding chapters.

A. Objectives

The objectives help to have a better appreciation of the purpose of the handbook.

B. Scope

The scope helps to know the limits of this manual.

C. Legal basis

The legal basis is aimed at knowing the functions of the audit in addition to the articles invoked with regard to consultancy services that are found in the Rules of Procedure of determination of stages in the process of execution of works and provision of public services and the Organic Law of the National System of Public Procurement respectively.

D. Audit

In audit details some important concepts as well as the elements and the process to be taken into account when carrying out the audit work.

E. Regulations

In regulations are performed an analysis of the structured cabling standards with the most important points to take into account at the time of audit to be carried out in a telecommunications infrastructure in buildings

F. Forms and formats

In forms and formats are collects the forms developed in the previous section.

V. PRACTICAL IMPLEMENTATION OF THE MANUAL

The audit process was able to simulate in a work of structured cabling of the company SINFOTECNIA in the building of postgraduate courses of the Technical University of the north.

Developed an audit report with the following observations:

- ✓ In the fourth of computers at the first floor we were able to establish that the temperature was high because it does not have air conditioning. The ANSI/TIA 569 C recommends that in the common requirements for

rooms must comply with the requirements of temperature and humidity that is specified in the section 4.1.5.6.1 of the manual.

- ✓ In the equipment room is in a place that limits the expansion in both the first and the second floor. The ANSI/TIA 569 C suggests that you should avoid select locations that are restricted by the construction of the components which constrain the expansion such as elevators, core, exterior walls or other fixed the construction of walls as mentioned in the section **¡Error! No se encuentra el origen de la referencia.** 4.1.5.6.2 of the manual
- ✓ The building does not have a room for the access of large teams. The ANSI/TIA 569 C advises that you must have a fourth of access of big teams in which a minimum of one of the walls should be covered by fire resistant painting as indicated in the section 4.1.5.6.2 of the manual.
- ✓ The height of the fourth teams from the first floor does not comply with the ANSI/TIA 569 C as this recommends that minimum height is 2.4 meters and the measure was of 2,25 meters as specified in the section 4.1.5.6.2 The manual.
- ✓ The door of the first floor does not comply with the requirements of the standard as the measure taken was 0.94 m wide and 1.85 m of height and the ANSI/TIA 569 C suggests that the minimum extent is 0.9 m wide and 2m in height as mentioned in the section 4.1.5.6.2 of the manual.
- ✓ In the fourth of computers on the ground floor and first floor with no ups the ANSI/TIA 569 C advised that in this room should be located UPS up to 100 kVA, if they exceed this measure it is suggested that this located in another room as indicated in the section 4.1.5.6.2 of the manual.
- ✓ The power strips do not have safety cap the ANSI/TIA 569 C recommends that you must have a safety plug to specify accidental shutdowns as specified in the section 4.1.5.6.2 of the manual.
- ✓ In the fourth of computers in the first floor does not comply with the dimensions since the measures were of 7.08 m² The standard ANSI/TIA 569 C suggests that the minimum dimensions is 3 m (10 ft.) long by 3 m (10 ft.) wide as mentioned in the section 4.1.5.6.3 of the manual.
- ✓ The planning of filling of the stairs is not performed as ANSI/TIA 569 C advised that the cable trays will be planned with a relationship of initial filling of 25 per cent to the value of maximum filling any cable tray will be 50 percent as indicated in the section 4.1.5.6.10 of the manual.

- ✓ The labelling does not performed in an appropriate manner as the nomenclature used does not belong to the ANSI/TIA 606 B and not all were tagged for example was not found labelling in fourth of telecommunications, in the rack, patch panels and areas of work the nomenclature was not appropriate as specified in the section 4.1.5.7.6 and 4.1.5.7.7 of the manual.
- ✓ There is no protection to land in the telecommunications components as racks, ladders conduits as patches the ANSI/TIA 607 B in the section 4.1.5.8.

It has some images as an example of the photographic report when running the control


	<p>It was noted that the temperature at the fourth of teams was high at the time of entering the same. In addition the fourth had a hole that in the case of having a suitable air conditioning will result in a leak of air by the same.</p>
<p>Fourth teams from the first floor</p>	<p>Comments</p>

Fig.10. Fourth teams from the first floor


	<p>Are located in places which constrain the expansion due to the fourth of computers on the ground floor and the first floor is next to the areas of work and a corridor that in case of expansion would impede the growth of the same.</p>
	<p>Comments</p>

Fig.11. Fourth computers on the ground floor and first floor.

VI. CONCLUSIONS

- ✓ Was given to know the terminology involved in the process of auditing in a telecommunications infrastructure on the basis of the technical terms used in the structured cabling standards analyzed in the present work of investigation.
- ✓ The analysis was made of the legal framework is present in the Organic Law of the National System of Public Procurement and in the regulation of determination of stages in the process of execution of

works and provision of public services, the same that allowed to know the articles involved in the processes of consultancy as well as the objectives and functions relating to the audit.

- ✓ The analysis of the structured cabling standards contributed to the manual has its technical support which helped to carry out in a better way the work of control.
- ✓ The development of forms of audit served as much help for the control of the technical aspects relating to the wiring regulations analyzed since its content is a synthesis of the same thus allowing accelerate the pace of audit.
- ✓ The development of the audit manual is made on the basis of the analysis of the legal regulations referring to the Organic Law of the National System of Public Procurement (LOSNCPP), the regulation of determination of stages in the process of execution of works and provision of public services, the technical regulations referring to the structured cabling standards commonly used in the installations in buildings as well as everything related to run the audit work.
- ✓ The audit manual was paramount to the time to carry out the inspection of the components installed in the building of graduate studies at the Technical University of the North by the company SINFOTECNIA, due to that the manual has a technical analysis concerning the rules of structured cabling thus allowing to carry out the relevant observations in the event of non-compliance with the parameters laid down in the analysis of the law.

VII. RECOMMENDATIONS

- ✓ The company must continue the current legal regulations concerning public procurement to be able to participate in the tender of contracts relating to the control of projects.
- ✓ Training should be given to technical staff of the company so that you can become familiar with the terminology involved especially concerning to the structured wiring standards before studied so that you can run the application of manual in a more efficient way.
- ✓ It is suggested that the forms control technicians must be constantly updated according to the needs that are present in the contracts already that can be extended according to the terms of reference requested.
- ✓ It is recommended that the company at the time that you want to deploy the service of drug purchase all the necessary equipment such as light meter, temperature

and humidity meter for the technical staff perform more efficiently the control of works.

- ✓ It is recommended that the company socialize with the party contractor the importance of compliance with the rules of structured cabling in the case of private companies for the company to run the facilities with all the appropriate components.

REFERENCES

- [1] Cold Torres, A. X., & Velasteguí Cáceres, L. A. (2012). Audit Manual and control of work of the intelligent building of the Cemento Chimborazo. SANGOLQUÍ/ESPE/2012.
- [2] Walls Briones, R. I., & Chambers Gómez, F. A. (2014). Model of the administrative structure for the control of civil works in Quito-Ecuador.
- [3] Mosquera Tello, C. E. (2013). Deployment, structured cabling phase of the laboratory # 4 in category 6a as a contribution to the vocational training of the students of the CISC and CIN, applying standards inter-national generic wiring, routes and spaces of telecommunications ANSI/TIA/EIA-568-C. 0 and ANSI/TIA/EIA-569-B.
- [4] Peñaloza Gallardo, K. A., & Inga Lojano, G. M. (2014). Regulatory approach and design a tool to create a design model of the internal network of telecommunications services with fiber optics applied to housing solutions of the city of Cuenca for the company STAGE EP.
- [5] Guamán, G., & Xavier, E. (2012). Design of the communications infrastructure of voice, data and video to the PPA (Program for the provision of food). QUITO/EPN/2012.
- [6] Miño Robalino, P. A. Puenayán, M., & Carolina, L. (2014). Study and design of an Infrastructure Network Multiservicios for the Government Decentralized Autonomous Municipal de "San Pedro of Huaca" and its dependencies. QUITO/EPN/2014.
- [7] Zaldumbide Maldonado, J. E., & Valdivieso Romero, C. A. (2014). Implementation of a surveillance system with IP cameras on the building Santa Ana 1. Quito: EPN, 2014.
- [8] Jacome Zambrano, G. P., Chauca, Q., & Alejandra, L. (2013). Design of a network Multiservicios for the Rehabilitation Center Doctor No. 3 and the Provincial Directorate Mies-FNI in Portoviejo. QUITO/EPN/2013.
- [9] Rubio González, J. E. (2012). Analysis and design of a Data Center on the basis of the standards ANSI/EIA/TIA 606, 607 and 942 for the building of the Provincial Directorate of Health of Pichincha.

- [10] El Morocho, C., & Lucia, G. (2012). Analysis, study and design of the communication infrastructure for a Data Center in the Municipal Educational Unit of the Millennium bicentenary.
- [11] Cup, V., & Fernando, L. (2013). Implementation of a system of ground and documenting the administration of the structured cabling system of the laboratory# 4, applying international standards ANSI J-STD-607-A, ANSI/TIA-EIA-606a.
- [12] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 568 C.0. (2009). Standard Generic Telecommunications Cabling for Customer Premises
- [13] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 568 C.1. (2009). Standard Commercial Building Telecommunications Cabling
- [14] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 568 C.2. (2009). Standard Balanced Twisted-Pair Telecommunications Cabling and Components
- [15] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 568 C.3. (2008). Standard Optical fiber Cabling Components
- [16] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 569 C. (2012). Standard Telecommunications Pathways and Spaces
- [17] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 606 B (2012). Standard Administration Standard Telecommunications Infrastructure
- [18] American National Standards Institute (ANSI), the Telecommunications Industry Association (TIA) 607 B (2011). Standard Telecommunications Bonding and Grounding (earthing) for Customer Premises
- [19] Emplit, R. (December, 2014). Standards for unite and connect to ground the ICT systems. Ict today. Volume 35 (Number 6), p.7-P-12. Retrieved from: [Http://www.bicsi.org/uploadedfiles/pdfs/icttoday/2014novdec_espanol.pdf](http://www.bicsi.org/uploadedfiles/pdfs/icttoday/2014novdec_espanol.pdf)



Marco Hidrobo was born in Quito, Ecuador on 5 September 1990. He completed his secondary education at the Experimental Education Unit Teodoro Gomez de la Torre. Bachelor's degree of Engineering in Electronics and Communication Networks at the Tecnica del Norte University of North. Practice sports such as swimming and basketball. He is interested in topics related to communication networks as well as microcontrollers and digital systems. (marcohidrobo@hotmail.com)