

# Electrical Devices Joint Stock Company No. 1 (VINAKIP), Vietnam

**Country:** Vietnam

**ISO member body:** Directorate for Standards, Metrology and Quality (STAMEQ).

The study has been undertaken by the Vietnam Standards and Quality Institute (VSQI) which operates under the authority of STAMEQ.

**Project team:**

**Project leader:** Mr. Pho Duc Son (Director, VSQI)

**Consultant:** Ms. Man Thuy Giang (VSQI)

**Member:** Ms. Bui Ngoc Bich (VSQI)

**ISO Central Secretariat advisor:** Reinhard Weissinger

**Duration of the study:** October 2010 – March 2011

## **6.1 Objectives and organization of the pilot project**

This pilot study is based on the selection of one company in Vietnam in order to assess the economic benefits the company obtained from using standards. Before introducing the company, we give a short overview of standardization activities in Vietnam to demonstrate the relevance of the study.

### **6.1.1 Standardization activities in Vietnam**

Standardization activities in Vietnam have taken place for nearly 50 years. They have contributed to trade and industry development and to solving some of the socio-economic development needs of the country.

With the globalization of trade comes increasing awareness of the important role of standards and the benefits they bring. Standards are seen as technical tools to improve product quality, enhance competitiveness, facilitate domestic, regional, and international trade, speed up innovation and enhance technology transfer. They also help in providing solutions to global issues such as social responsibility, societal security, and environment and climate change.

However, in Vietnam, there has been no systematic study of the impacts and benefits of standards. While the benefits are mentioned in some scientific documents there are no quantitative figures available. It was recognized that participation in this pilot project would help the NSB to address the issue of the economic benefits of standards to :

- Enable private and public sector stakeholders to appreciate the economic and social impact of voluntary consensus standards better

- Raise the awareness of policy makers and business leaders of the importance of standardization.

Applying the ISO project methodology was an excellent means of describing and quantifying the benefits of standards. This is extremely important for monitoring and prioritizing standardization activities, and for raising awareness, improving communication, promoting the use of standards and encouraging stakeholder participation.

The project was focused on the electrical equipment industry and includes a case study of an electrical equipment manufacturer. The main objectives were to:

- Apply the ISO methodology to assess the impact of standards in one sub-sector of the electrical equipment industry
- Evaluate the results to obtain the EBIT impact of standards on one company in the sector
- Expand the results from company to industry level, and then cover the entire economy in a later project.

The Vietnam Standards and Quality Institute (VSQI) conducted the project, from September 2010 to March 2011, under the authorization of STAMEQ, the national standards body of Vietnam.

### **6.1.2 Economic policy context**

One of the ASEAN common market's activities is to provide common technical specifications for products and services based on regionally harmonized standards as well as international standards.

Electric and electronic products are among the first in this harmonization process. As a result, standardization activities in the sector are a main focus in Vietnam. In parallel with economic growth, industrialization and modernization in Vietnam, the electrical equipment manufacturing industry is also growing quickly and has a very high potential of development.

According to experts<sup>1</sup>, the industry has a roadmap and significant development opportunities due to the huge potential for consumption in the country and abroad.

### **Growth perspectives**

- **for the domestic market**: According to development plans approved by the government for the period 2015-2025, the industry will grow to meet increases in demand of 70 % for line equipment and transformer stations, and 55 % for electric motors and some types of commonly used generators. Manufacturers are expected to produce and supply complete electrical systems for power lines, transformer stations, and meet 50-60 % of the demand for 110-220 KV transformers.
- **for export markets**: By 2015 exports are forecast to reach 30-35 % of production to fulfill the demand for electrical meters, instruments, systems to monitor the safety of the power grid, plus a complete range of power station equipment. Exports in manufacture of high quality electric wire and cable will reach around 20 % of production and attain an annual increase of around 35 %. In addition to the traditional markets, the electrical equipment manufacturing industry sees huge potential markets in neighboring Laos and Cambodia. Vietnam has made commitments to these two markets in the form of a memorandum of understanding and a cooperation and investment agreement to develop the electrical sector.

---

1 <http://www.bsc.com.vn/NewsDetail.aspx?NewsID=109904>  
*Electrical equipment manufacturing industry: Many big market waiting for* (in the seminar "The potential and opportunities for Vietnam's power sector equipment" was held recently in Ho Chi Minh City) (ven.vn – 02/09/2010 7:45:00) (last accessed on 10th January, 2011)  
[http://www.baohobinh.com.vn/12/46866/Thiet\\_bi\\_dien\\_Nganh\\_hap\\_dan\\_htm](http://www.baohobinh.com.vn/12/46866/Thiet_bi_dien_Nganh_hap_dan_htm)  
<http://www.business.gov.vn/newsevents.aspx?id=8678>  
<http://ven.vn/news/detail/tabid/77/newsid/15024/seo/Nganh-thiet-bi-dien-Viet-Nam-la-mot-trong-nhung-nganh-hap-dan-dau-tu-nhat-trong-khu-vuc/language/vi-VN/Default.aspx>

## 6.2 Introduction to the selected company

The electric equipment manufacturer **Electrical Devices Joint Stock Company No. 1 (VINAKIP)**<sup>2</sup> has been selected as the subject of this study. Established in 1967, the company is a subsidiary of the Vietnam Electrical Equipment Corporation, a joint stock company of which 36,03 % are owned by the Ministry of Industry and Trade, and 63,97 % by private stakeholders.

VINAKIP is located in Xuan Khanh Dist., Son Tay Town, 70 km from Ha Noi City. The company has about 540 employees and seven branch offices in Ha Noi, Quang Ninh, Nghe An, Quang Binh, Da Nang, Ho Chi Minh, Buon Ma Thuot, and 19 distributors.

Key products are sockets, wire and cable, electromagnetic ballasts, plugs, switches, lamp holders, electrical boards, circuit breakers, magnetic contactors, and fuses.

Currently, the market for electrical products in Vietnam is expanding at around 16 % per annum, so there is high demand and good prospects for company sales. At present, VINAKIP produces only for the domestic market, but intends to export in the future. An "indirect" form of export of some VINAKIP products has occurred through construction projects in other countries in the South East Asian region. Apart from household appliances, the company provides a significant amount of product for the construction and electricity generation industries. In view of the very high rate of development of the industry, VINAKIP enjoys a high potential for growth.

The company's total revenue in 2010 was 196 billion Vietnamese Dong (VND) (approx. USD10,1 million).

---

<sup>2</sup> <http://www.vinakip.vn>

There are several other large manufacturers in the domestic market that produce the same type of products as VINAKIP. These include Power Engineering JSC (PEC), part of Electricity of Vietnam; Hanoi Transformer Manufacturing and Electric Material JSC; Electric Equipment Corporation (THIBIDI); Vietnam Electric Wire and Cable JSC (CADIVI); Vina LS Cable Co.; DongAnh Electrical Equipment Manufacturing JSC, and the HANAKA Group JSC.

In recognition of the severity of such competition, VINAKIP has decided to focus on customers with average to low income. Compared with other companies producing the same type of electrical equipment, VINAKIP dominates in terms of quality, with products manufactured and tightly controlled in conformity with the ISO 9001:2000 quality management system standard. As such, the company provides assurance of quality to meet customer expectations.

To maintain quality, VINAKIP is careful to invest in equipment and technology, and to focus on research, development, and product improvement, to support its motto "always listen and constantly improve". The company undertakes market studies, researches competitive products and services, and designs new products to increase its competitiveness in the market.

All strategic decisions and production processes are implemented in connection with standards.

### **6.3 Attitude of the company towards standardization**

In the past VINAKIP was a state-owned company forced to use standards, which, at that time, had the status of technical regulations. After the Law on Standards and Technical Regulations came into effect in January 2007, standards implementation became voluntary, except

in cases where mandatory use was required in technical regulations. The company continues to use standards as a foundation of its work. Therefore, using standards is a tradition in VINAKIP. Management and staff are well aware of the importance of standardization to its business. The company employs standards from the very beginning of production, at the product design phase. It uses standards to manage its business internally, and externally with suppliers and customers. At present, the company applies mainly national standards (TCVNs) and IEC standards. It has been certified to ISO 9001:2000 since 2003. According to VINAKIP top management, the main reasons for implementing standards are:

- To achieve higher reliability of the technology covered by the standards
- To achieve a higher degree of interchangeability and compatibility of products
- To support the organization of processes
- To meet requests from customers for conformity with standards
- To comply with legal requirements stipulating that product documentation, including labels, must contain information about applied standards, and that products subject to technical regulations must conform with the requirements of standards referenced in technical regulations
- To meet regulatory requirements for the use of health and safety standards.

As a result, VINAKIP has registered as a member of the standard information networks SICNET and TCVN-NET in order to receive updated information about national, foreign, regional and international standards. In addition, the company has also develop its own internal standards based on existing standards.

VINAKIP is not an official member (participating member) of any national technical committee (TC) but it regularly gives comments on drafts of TCVNs and sends representatives to participate in meetings during the development of national standards in the relevant fields.

## **6.4** Analysis of the value chain

### **6.4.1** Industry value chain

The electrical equipment industry is divided into three sub-sectors :

- Stable electrical equipment
- Rotational electrical machines
- Electrical devices.

VINAKIP is active in the electrical devices sub-sector which mainly uses the following production materials :

- Metal including cooper, aluminum, alloy, steel
- Plastic
- Insulated porcelain.

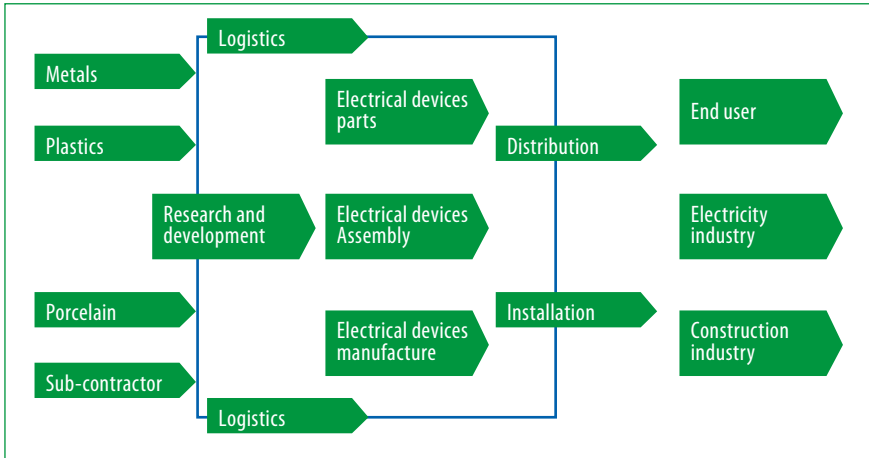
The company uses the following services for its business activities :

- Transportation
- Testing
- Installation
- Subcontractors for spare parts manufacture or special technologies such as plating or painting.

Users of products of this sector include the electricity and construction industries and consumers (end users).

The industry value chain can be illustrated as in **Figure 1** :





**Figure 1** Electrical devices industry value chain

### 6.4.2 Company value chain

In line with the ISO methodology, we applied the approach of Michael Porter to describe company activities as a value chain, and to categorize the company activities into different business functions.

	Business functions	Activities
A	Management and administration	<ul style="list-style-type: none"> <li>• Management review</li> <li>• Quality planning</li> <li>• Equipment management</li> <li>• Measurement equipment control</li> <li>• Training</li> <li>• Documents and records control</li> <li>• Correction, prevention and innovation</li> </ul>
B	Research & Development	<ul style="list-style-type: none"> <li>• Customer requirement review</li> <li>• Design</li> <li>• Prototype production</li> </ul>
C	Engineering	<ul style="list-style-type: none"> <li>• Material, semi-product and final products testing</li> <li>• Checking and calibrating equipment</li> </ul>

<b>D</b>	Procurement	<ul style="list-style-type: none"> <li>• Selection of suppliers</li> <li>• Negotiation and contracting</li> <li>• Raw materials procurement</li> <li>• Parts procurement</li> <li>• Services hiring</li> <li>• Monitoring</li> </ul>
<b>E</b>	Inbound logistics	<ul style="list-style-type: none"> <li>• Suppliers assessment</li> <li>• Material norms control</li> <li>• Storage management</li> <li>• In-house logistics</li> </ul>
<b>F</b>	Production/operations	<ul style="list-style-type: none"> <li>• Production planning</li> <li>• Material checking</li> <li>• Producing</li> <li>• Fitting</li> <li>• Testing</li> <li>• Control of non-conformity products</li> <li>• Traceability</li> <li>• Non-conformity correction and prevention</li> <li>• Production innovation</li> </ul>
<b>G</b>	Outbound logistics	<ul style="list-style-type: none"> <li>• Packaging and labeling</li> <li>• Warehousing</li> <li>• Distribution</li> <li>• Delivery</li> <li>• Transportation</li> </ul>
<b>H</b>	Marketing and sales	<ul style="list-style-type: none"> <li>• Market survey</li> <li>• Orders receiving and considering</li> <li>• Customer satisfaction measurement</li> </ul>
<b>I</b>	Services	<ul style="list-style-type: none"> <li>• After-sales services</li> <li>• Feedback from customers</li> </ul>

**Table 1** Company value chain of VINAKIP

### 6.4.3 Key value drivers

Value drivers are the capabilities of companies that give them an advantage over their competitors and are key to success in their business.

Below are the value drivers that company managers in VINAKIP identified as the keys to success.

Value drivers	Description
Safety and quality of products	Safety is the most important characteristic of electrical products, and of concern to all producers. Product safety will decide the reputation and position of the company in the market.
Continuous improvement	Product improvements will bring two competitive advantages to the company : Firstly, product improvement will help satisfy the highest demands of customers that switch brands regularly ; Secondly, in such a competitive market, improvement will help the company optimize its production activities leading to enhanced production efficiency, reduced cost and competitive advantage.
Price	Products that combine reasonable price with high quality gain a competitive advantage by appealing to medium income buyers.
Customer orientation	This is the decisive factor in the R&D function before new products are designed and produced.

**Table 2** Value drivers of VINAKIP

### 6.5 Scope of the pilot project assessment

For reasons of limited time and the need to base the study on the most important company activities, the project team and VINAKIP experts agreed to focus on assessing the economic benefits of standards for the following business functions :

- Inbound logistics
- Production.

However, we also addressed the following related business functions :

- Procurement

- Research and development
- Marketing and sales.

Although it had been our objective to include outbound logistics in the assessment, it was not possible to find quantifiable data for this business function, so further analysis was not pursued.

Furthermore, we decided that the assessment should focus on two types of products, electrical sockets, a product that has been produced by VINAKIP for many years and cables/wires, which is a new product in the portfolio of the company.

## **6.6 Use of standards in the company value chain**

Standards applied to company activities are mainly national standards (TCVN), although they are almost identical to ISO and IEC International Standards. The standards used in the company value chain of the two products investigated – sockets, and wire and cable - in the selected business functions are listed in the table in the annex of this report.

## **6.7 Selection of operational indicators to measure the impacts of standards**

Following is a list of operational indicators used to quantify the impacts of the standards. Most are related to the inbound logistics and production business functions.

No	Related business function / type of data measured	Operational indicators	Definitions
1	<b>Procurement</b> Type : Average savings per year	Reduction in supplier management costs	By applying standards for materials, the company can cooperate with more reliable suppliers and reduce the cost of supplier management in terms of time and human resources
2	<b>Inbound logistics</b> Type : average savings per year	Reduction in materials testing costs	By applying standards for materials, the company can save the cost of materials testing before production through a reduction in test frequency
3	<b>Production</b> Type : average savings per year	Reduction of waste (i.e. products that have to be disposed of and cannot be re-used or repaired)	By applying standards for materials, the rate of waste can be reduced
4	<b>Production</b> Type : average savings per year	Replacement costs for non-functional products (warranty)	By applying standards for products, the rate of product replacement can be reduced
5	<b>Production</b> Type : Average savings per year	Reduction in costs for testing finished products	By applying standards, the company can save the cost of testing finished products through a reduction in test frequency
6	<b>Production</b> Type : average savings per year	Saving in production costs through continuous improvements	By implementing a QMS according to ISO 9001 and applying continuous improvement processes to promote initiatives, the company can make significant savings in production costs in terms of time, human resources and materials, and can achieve product improvements
7	<b>Production</b> Type : average savings per year	Savings in production materials	By using materials conforming to standards the company has less production waste
8	<b>Research and development</b> Type : this is a one time saving (not an average saving per year)	Savings due to not needing to write specifications internally	Using existing standards for materials, products, processes etc., the company can make savings in money, time and human resources, which would accrue if internal specifications would have to be prepared

No	Related business function / type of data measured	Operational indicators	Definitions
9	<b>Sales and marketing</b> Type : average sales revenue increase per year	Increased revenue due to improved customer confidence as a result of using standards	Demonstrating that company products conform to external standards (national or international) increases customer confidence, which leads to increased sales

NOTE: **Indicator 8** expresses a one-time impact and does not represent annual averages.

**Table 3** Operational indicators used in the assessment

## 6.8 Calculation of the economic benefits of standards

Below is a calculation of the impact of standards expressed as annual impacts in 2010 (in Vietnam Dong (VND) and prices of 2010):

Revenue from the sales of sockets in 2010 was approximately VND 35 billion, and wire and cable around VND 37 billion, so total revenue from these two products was VND 72 billion.

Production costs for sockets were about VND15,3 billion, and about VND 21,5 billion for wire and cable - resulting in a total of approximately VND 36,8 billion.

Earning from these products before tax and interest payments was VND 35,2 billion.

The percentage of the total financial impacts on the **company EBIT** due to the use of standards **for the two products is 21,3%**, calculated as:

$$(VND 7 490 479 019 / VND 35 200 000 000) \times 100 = \mathbf{21,3\%}$$

The percentage of the total financial impacts due to the use of standards on the company revenue which is generated by **sales of the two products** is **10,4%** and is calculated as

$$(7.490.479.019 \text{ VND} / 72.000.000.000 \text{ VND}) \times 100 = \mathbf{10,4\%}$$

This is the percentage contribution of standards to company earning from two of its products derived from inbound logistics, production, marketing and sales, and R&D.

If we calculate the impacts as a **percentage of the total sales revenue** in 2010, then this equates to  $(\text{VND } 7.49 \text{ billion} / \text{VND } 196 \text{ billion}) \times 100 = \mathbf{3,8\%}$ .

## **6.9** Qualitative and semi-quantitative considerations

Within the scope of this study, several impacts of standards have been identified for which quantification was not possible. In particular, some of the benefits deriving from the use of standards cannot be directly quantified as indicated under Section 6.5, mainly because of lack of data. Below are some examples.

### **a) Production**

- With standardized specifications for specific components, the number of standardized products increases. Production becomes more efficient because of the reduced number of types of non-standardized products,. However, this cannot be quantified
- After introducing ISO 9001, internal information can be transferred faster, more efficiently and more precisely. Using standardized documentation and specifications means that internal information about products and services is passed on more efficiently within production. But there is no related data available

- Production staff can be trained better because relevant specifications are standardized, for both products and services. But there is no calculation of the effectiveness of training due to the presence of standards.

## **b) Logistics**

There are many impacts of management standards on logistics activities although there are no figures available. They can be listed as follow :

- Standardized documentation, packaging, labels or supply tags make goods receiving more efficient. Savings of time and labour costs are evident, although it was not possible to quantify these.
- Acceptance and handling of supplies in inbound logistics can be conducted more efficiently due to the reduction in the number and type of supplies. In addition, with the greater availability of standardized products, fewer supplies need to be stored in the warehouse. They are put into production faster, and inventory time decreases
- After implementing ISO 9001, the transmission of logistics information must be strictly controlled as required under the QMS procedures
- Since training staff in the logistics function is mainly achieved on the job, the standardization of product and service specifications helps in raising training effectiveness
- Additional positive impacts are improved customer satisfaction and confidence.

## **6.10 Evaluation of the results**

The study results take the following limitations into consideration :

- Standards are seen as enabling and contributing to overall value creation, thus individual causes are difficult to identify separately



- Company assessments are based on estimates of perceived effects and not always on technical or managerial data
- The collected examples only cover the most relevant functions.

The basic limitation of the study approach is that most impact assessments have been based on the best estimates by the field study participants. Only in some cases could actual data be obtained and applied, while the estimates of participants are naturally influenced to a large extent by subjective perceptions.

Moreover, not all of the impacts could be quantified in all cases. Therefore, assumptions were required based on qualitative estimations.

In order to validate and refine the findings of this study, the sample should be extended and the data (most captured from interviews) refined through an iterative process.

However, the results of this case study using VINAKIP as an example clearly indicate that the economic impact of standards on the industry is substantial. By contributing to more than 20 % of the company EBIT and to nearly 4 % of the overall sales revenue, it is evident that standards have an important and integrative role to play in the growth and success of the company. Despite the limitations of the study, the outcome can be considered as meeting the objectives.

To further improve the impact of standards VINAKIP should take part in standards development more actively, even though the company has a history of using standards and is well aware of their role in its business. Indeed, VINAKIP seems - to a certain degree - to have under-invested in standardization activities if one considers the contribution and economic benefits they bring to the company.

## 6.11 Conclusions

The findings of the assessment reveal that standards play a very important role in the success of the company, however, their impact is not always measured quantitatively.

During the interviews all members of the company agreed that they could not conduct their business as well without standards. However, due to a lack of statistics, many activities could be found that were impacted by standards, but it was not easy to quantify them. Data included in the calculations was based mainly on estimates and on the interviewees experience.

Another difficulty was that data on total revenues, or related to activities such as manufacturing, purchasing raw materials, technical innovations, etc., were sometimes available but not for each category of company products.

Despite the limitations and difficulties, the basic project objective was achieved satisfactorily.

The project has brought valuable experience for the company and the project team which can be used in further expanding the study. Above all, the project provided strong evidence of the possibility to quantify those impacts despite the difficulties in doing so. It also helps National Standards Bodies and policy makers to gain convincing evidence of the effectiveness of government investments in standardization activities in Vietnam, and to demonstrate that these activities can bring even more positive impacts to help businesses, industries and the entire economy achieve stable and sustainable growth.

## ANNEX : List of standards implemented by VINAKIP relevant for the two selected products sockets and cables/wires

No.	TCVN number	Title	Identical with International Standards
<b>Product 1 : Sockets</b>			
1	TCVN ISO 9001:2008	Quality management system — Requirements	ISO 9001:2008
2	TCVN 1917:1993	Metric threads. Fit with gap. Tolerances	
3	TCVN 2244:1999	ISO system of limits and fits. Bases of tolerances, deviations and fits	ISO 286-1:1988
4	TCVN 2245:1999	ISO system of limits and fits. Tables of standard tolerance grades and limit deviations for holes and shafts	
5	TCVN 2246-1:2008	ISO general purpose screw threads. Basic profile. Part 1 : Metric screw threads	ISO 68-1:1998
6	TCVN 2246-2:2008	ISO general purpose screw threads. Basic profile. Part 2 : Inch screw threads	ISO 68-2:1998
7	TCVN 2250:1993	Metric screw threads. Interference fits	
8	TCVN 2253:1977	Metric taper threads. Basic dimension and tolerances	
9	TCVN 4683-1:2008	ISO general purpose metric screw threads. Tolerances. Part 1 : Principles and basic data	ISO 965-1:1998
10	TCVN 4683-2:2008	ISO general purpose metric screw threads. Tolerances. Part 2 : Limits of sizes for general purpose external and internal screw threads. Medium quality	ISO 965-2:1998
11	TCVN 4683-3:2008	ISO general purpose metric screw threads. Tolerances. Part 3 : Deviations for constructional screw threads	ISO 965-3:1998
12	TCVN 7582-1:2006	Technical drawings. Projection methods. Part 1 : Synopsis	ISO 5456-1:1996
13	TCVN 7582-2:2006	Technical drawings. Projection methods. Part 2 : Orthographic representations	ISO 5456-2:1996
14	TCVN 7582-3:2006	Technical drawings. Projection methods. Part 3 : Axonometric representations	ISO 5456-3:1996
15	TCVN 7582-4:2006	Technical drawings. Projection methods. Part 4 : Central Projection	ISO 5456-4:1996
16	TCVN 7583-1:2006	Technical drawings. Indication of dimensions and tolerances. Part 1 : General principles	ISO 129-1:2004

No.	TCVN number	Title	Identical with International Standards
17	TCVN 6099-2:1996	High-voltage test techniques. Part 2 : Test procedures	IEC 60-2:1973
18	TCVN 6188-1:2007	Plugs and socket-outlets for household and similar purposes. Part 1 : General requirements	IEC 60884-1:2002
19	TCVN 6190:1999	Plugs and socket-outlets for household and similar purposes. Types and main dimensions	
<b>Product 2 : Cables and wires</b>			
1	TCVN ISO 9001:2008	Quality management system — Requirements	ISO 9001:2008
2	TCVN 5933:1995	Electro-technical round copper wire. General requirements	
3	TCVN 6610-1:2007	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V. Part 1 : General requirements	IEC 60227-1:1998
4	TCVN 6610-2:2007	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V. Part 2 : Test methods	IEC 60227-2:2003
5	TCVN 6610-3:2000	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V. Part 3. Non-sheathed cables for fixed wiring	IEC 227-3:1997
6	TCVN 6610-4:2000	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V. Part 4. Sheathed cables for fixed wiring	IEC 227-4:1992, Amd. 1:1997
7	TCVN 6610-5:2007	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V. Part 5 : Non-sheathed cables for fixed wiring	IEC 60227-5:2003
8	TCVN 6612:2007	Conductor of insulated cables	IEC 60228:2004
9	TCVN 6613-1:2000	Tests on electric cables under fire conditions. Part 1 : Test on a single vertical insulated wire or cable	IEC 332-1:1993
10	TCVN 6483:1999	Round wire concentric lay overhead electrical stranded conductors	IEC 1089:1991
11	TCVN 6614-1-1 : 2000	Common test methods for insulating and sheathing materials of electric cables. Part 1 : Methods for general application. Section 1 : Measurement of thickness and overall dimensions. Tests for determining the mechanical properties	IEC 811-1-1:1993
12	TCVN 6614-1-2:2000	Common test methods for insulating and sheathing materials of electric cables. Part 1 : Methods for general application. Section 2 : Thermal ageing methods	IEC 811-1-2:1985

No.	TCVN number	Title	Identical with International Standards
13	TCVN 6614-1-4 : 2000	Common test methods for insulating and sheathing materials of electric cables. Part 1 : Methods for general application. Section 4 : Tests at low temperature	IEC 811-1-4:1985, Amd. 1:1993
14	TCVN 6614-3-1 : 2000	Common test methods for insulating and sheathing materials of electric cables. Part 3 : Methods specific to PVC compounds. Section 1 : Pressure test at high temperature. Tests for resistance to cracking	IEC 811-3-1:1985, Amd. 1:1994
15	TCVN 6614-3-2 : 2000	Common test methods for insulating and sheathing materials of electric cables. Part 3 : Methods specific to PVC compounds. Section 2 : Loss of mass test. Thermal stability test	IEC 811-3-2:1985, Amd.1:1993

