STANDARDIZATION AND TRANSFER OF TECHNOLOGY

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Developing countries constitute 70 percent of the world population but generate less than 11 percent of industrial production and have only 2.5 percent of the world's science and technology resources. The gap between the developed and the developing countries in terms of science and technology resources is further widening. Developing countries are anxious to minimize their technological dependence on developed countries as they want to reduce the outflow of foreign exchange for the acquisition of technology. In this context, standards form one of the most valuable sources for acquisition of technology freely.

1. INTRODUCTION

The twentieth century has been an era of remarkable scientific and technological development. Equally significant are the fields of learning which deal with man's own relationship with modern science and technology. The last four decades have also seen standardization emerging as a special discipline and now considered as an inevitable and basic tool for industrial and economic development of every country.

Standardization envelops Science and Technology. What is Science? In simple words, Science is knowledge attained through systematic study or practice. What is technology? Technology is the application of Scientific knowledge to practical purposes in any given field.

Now then what is Standardization? In brief Standardization is the process of formulating and applying rules for an orderly approach to a specific activity based on the consolidated results of Science, technique and experience. It determines not only the basis for the present but also for future development and keep pace with the progress. Standardization activity is conceived as a tool for development and mobilization of resources, knowledge and experience of various sectors of commerce, industry, agriculture and the scientific and technical institutions of a country.

The developed countries have all the wherewithals - financial, scientific, personnel, equipment and the necessary environment - for technological development in all spheres of human activity. On the other hand, the developing countries suffer from one or more of these resources thus affecting the technological progress. Further, it would be futile for the developing countries to undertake original research or development of the modern technology from scratch in these areas where such technology is already available as a result of the development that has taken place in other developed countries. Therefore, if the developing countries have to catch up with the rest of the world, the quickest and the appropriate methodology would be transfer of technology by suitable means from the more advanced countries. However, it is well known that in many cases, it may not be possible for the transfer of such technology in its original form to the developing countries and thus an appropriate technology suitable for each developing country will have to be developed.

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2. STANDARDIZATION AND TRANSFER OF TECHNOLOGY

2.1. Standardization an essential basis for transfer of technology

The very methodology for development of standards includes consultation among all concerned (the producers, consumers, scientists, technologists, and others) and based on consolidated results of science, technique and experience. Then such standards have to be so developed that they not only form the basis for the present but also for future development. Standards have to be dynamic and keep pace with progress.

Therefore it is easily seen that standards provide the necessary infrastructure for incorporating the appropriate technology presently developed and applied successfully in practice. Further, the methodology for preparing standards also ensures that the requirements, processes, methods of tests, etc. specified in the standards take note of the economic aspects as well. Therefore, standardization provides one of the very important means for transfer of technology between the countries.

2.2 Standardization and appropriate technology

The standards developed need adaptation to the level of developing countries. Since this level varies from one country to another, international standards would have to provide for different levels of complexity which will enable the countries concerned to make the necessary selection.

2.3 International Standards

The active participation and interest of developed countries in the work of International Organization for Standardization means that ISO standards represent an international consensus on optimum technological solutions to problems related to standardization. In developing countries because of existence of collaboration arrangements with countries having different background , the formulation of standards becomes a difficult problem. The existence of international standards, in such circumstances enables decisions which are acceptable to industries having different collaboration agreements.It may be pointed out that until recently,standards of other countries were in effect the only vehicle for the transfer of standards technology from developed to developing countries.This situation is now being gradually changing by International Standards.It is to be noted that the technology contained in the International Standards is freely available without restriction to the developing countries.

2.4 Adaptation of imported technologies

Another aspect which needs attention and is partially resolved by standardization is that several problems faced during the building of technologically sophisticated complexes for the core industries intended to form the infrastructure of the national economy. Whereas so far the problems were related to the transfer of technology from different countries, the new dimension on the horizon is the technology transfer from indigenous sources to indigenous receivers and that is the major concern for the future. It is also found that vertical transfer of technology exists between existing technology in industries or in organizations on the one hand and the standards implemented on the other. The transfer of technology from foreign sources is mostly of a horizontal nature. In this respect the interfacing of national and international standards has proved the most effective way for eliminating the problems arising out of the technology transfer especially those from developed countries which fortunately take active interest in international standardization.

International standards assist developing countries in establishing a programme for the orderly selection,import and adaptation of foreign technologies. If expensive machinery and capital equipment imported from the developed world can be ordered according to international standards, maintenance is simplified, cost of stocking spare parts are reduced and dependence on the country of origin is lessened.

3. STANDARDIZATION IN THE FIELD OF VACUUM TECHNOLOGY

3.1 Turning to our topic of the Seminar "Application of Vacuum in Industry and Science" it may be mentioned that the ISO set up a technical committee TC 112 Vacuum Technology in 1964 to deal with this subject with participation of many countries. UK holds the Secretariat. There are the following six subcommittees to deal with specific aspects of vacuum technology.

- SC1 Vacuum flanges and fittings
- SC2 Measurement of low pressures and vaccum gauge calibration
- SC3 Measurement of the performance characteristics of vacuum pumps
- SC4 Terminology
- SC5 Subject classification
- SC6 Gas tightness

Standards so far published by ISO TC/112 are given in Annexure I.

Some related National Standards Published in a few selected countries are given Annexure II.

4. CONCLUSION

4.1 The problems of transfer of technology are varied in the developing countries as appropriate matching with complimentary industries may not be readily available for an effective transfer of technology. The recipient country should have developed the requisite components and be equipped to receive, assimilate and utilize the new technology. As such, an interface system with its classification for technology transfer is a must and this area is filled up by a strong standards information activity at different levels such as international, national, association and company.

ANNEXURE I

<u>ISO</u>*

TC 112

ISO 1607/1-1980	Positive-displacement vacuum pumps - Measurement of performance characteristics - Part 1: Measurement of volume rate of flow (pumping speed)
ISO 1607/2-1978	Positive displacement vacuum pumps - Measurement of performance characteristics - Part II Measurement of ultimate pressure
ISO 1608/1-1980	Vapour vacuum pumps - Measurement of performance characteristics - Part 1: Measurement of volume rate of flow (pumping speed)
ISO 1608/2-1978	Vapour vacuum pumps - Measurement of performance characteristics - Part II: Measurement of critical backing pressure
ISO 2861/1-1974	Vacuum technology - Quick-release couplings Dimensions - Part 1:Clamped type
ISO 2861/2-1980	Vacuum technology - Quick release couplings Dimensions- Part 2: Screwed type
ISO 2529/1-1981	Vacuum technology - Vocabulary - Part 1: General Terms

ISO 3529/2-1981	Vacuum technology - Vocabulary - Part 2: Vacuum pumps and related terms
ISO 3529/3-1981	Vacuum technology - Vocabulary - Part 3: Vacuum gauges
ISO 3530-1979	Vacuum technology - Mass-spectrometer-type-leak-detector calibration

<u>IEC*</u>

312 (1969)	Methods of measurement of performance of vacuum cleaners for house hold and similar use.

* Copies of these standards can be obtained from:

1, rue de Varembé
Case postale 56
CH-1211 Genève 20
Switzerland/Suisse

ANNEXURE II

AUSTRALIA

1349-1973	Bourdon tube pressure and vacuum gauges
3153-1976	Vacuum cleaners

GERMANY, F.R.

DIN 28400 Part 1 (draft)	Vacuum technology. Terms and definitions. General terms.
DIN 28400 Part 1	Vacuum technology. Terms and definitions. Fundamental terms, units, vacuum ranges, characteristic quantities, fundamental principles.
DIN 28400 Part 2	Vacuum technology; terms and definitions for vacuum pumps, accessories, arrangements and operation.
DIN 28400 Part 3	Vacuum technology.Definitions for vacuum systems, characteristic quantities of vacuum systems, vacuum gauges.
DIN 28400 Part 4	Vacuum technology; terms and definitions vacuum coating.
DIN 28400 Part 5 (draft)	Vacuum technology.Terms and definitions, vacuum drying and vacuum freeze drying.
DIN 28401	Vacuum technology; graphical symbols, summary.
DIN 28403	Vacuum technology. Small flange connections (quick release couplings)

DIN 28404	Vacuum technology. Flanges, dimmensions.
DIN 28410	Vacuum technology.Mass spectroscopy partial pressure measuring devices; terms, units, operating conditions.
DIN 28411	Vacuum technology. Acceptance specifications for mass spectrometer-type leak-detector, term.
DIN 28416	Vacuum technology.Calibration of vacuum instruments (gauges) within the range of 10^{-3} to 10^{-7} mbar general method: pressure reduction by continuous flow.
DIN 28417	Vacuum technology. Measurement of through put by the rotumetric method at constant pressure.
DIN 28418 Part 1	Vacuum technology.Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge.
DIN 28418 Part 2	Vacuum technology.Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge,ionization vacuum gauge.
DIN 28418 Part 3	Vacuum technology.Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge,thermal conductibility gauges.
DIN 28426 Part 1	Vacuum technology: acceptance specifications for rotary plunger vacuum pumps and sliding vane rotary vacuum pumps for the ranges of medium and deep vacuum.

DIN 28426 Part 2	Vacuum technology: acceptance specifications for roots vacuum pumps for range of deep vacuum.
DIN 28427	Vacuum technology; acceptance specifications for diffusion pumps and vapour jet vacuum pumps for pressures of the pump fluid lower than 1 mbar.
DIN 28428	Vacuum technology; acceptance specifications for turbo molecular pumps.
DIN 284:	Vacuum technology; acceptance specifications for getter ion pumps.

ISRAEL

957:1976	Vacuum cleaners (A.S. 1978)

NEW ZEALAND

BS 1780:Part 2 1971	Endorsed as suitable for use in New Zealand.

UNITED KINGDOM

BS 1780:1960	Bourdon tube pressure and vacuum gauges
BS 3456: Section 3.3:1979	Vacuum cleaners and water suction cleaning appliances.
BS 3636:1963	Methods for proving the gas tightness of vacuum or pressurized plant
BS 3711:1964	Railway vacuum brake cylinders,rolling ring type

BS 3999:Part 12: 1972 (1978)	Vacuum cleaners
BS 5319: 1976	Specification for quick release vacuum couplings (screwed and clamped type)
BS 5415:Section 2.2 1976	Vacuum cleaners wet and/or dry
BS 5719: Part 1: 1980	Measurement of volume rate of flow (Pumping speed)
BS 5719:Part 2: 1979	Method of measurement of ultimate pressure
BS 5758:Part 1: 1980	Method of measurement of volume rate of flow (pumping speed)
BS 5758:Part 2: 1979	Method of measurement of critical backing pressure
BS 5914:1980	Methods of calibrating leak-detectors of the mass-spectrometer type used in the field of vacuum technology.
BS 6077:1981	Specification for dimensions of quick release couplings of the screwed type used in vacuum technology.

Copies of the respective standards can be obtained from:

AUSTRALIA/AUSTRALIE (SAA)
Standards Association of Australia
Standards House
80-86 Arthur Street
North Sydney - N.S.W. 2060

GERMANY,F.R./ALLEMAGNE, R.F.(DIN)
DIN Deutsches Institut für Normung
Burggrafenstrasse 4-10
Postfach 1107 D-1000 Berlin 30

ISRAEL/ISRAEL (SII)

Standards Institution of Israel

42 University Street

Tel Aviv 69977

NEW ZEALAND/NOUVELLE-ZÉLANDE (SANZ)

Standards Association of New Zealand

Private Bag

Wellington

UNITED KINGDOM/ROYAUME-UNI (BSI)

British Standards Institution

2 Park Street

London W1A 2BS