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 Standardi-
zation 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 vacuum 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

ISO*

TC 112


ISO 1607/2-1978 Positive displacement vacuum pumps - Measurement of performance characteristics - Part II Measurement of ultimate pressure


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

IEC*

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.

(draft)

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  Vacuum technology. Terms and definitions, vacuum drying and vacuum freeze drying.  (draft)

DIN 28401  Vacuum technology; graphical symbols, summary.

DIN 28403  Vacuum technology. Small flange connections (quick release couplings)
Vacuum technology. Flanges, dimensions.

Vacuum technology. Mass spectroscopy partial pressure measuring devices; terms, units, operating conditions.

Vacuum technology. Acceptance specifications for mass spectrometer-type leak-detector, term.

Vacuum technology. Calibration of vacuum instruments (gauges) within the range of $10^{-3}$ to $10^{-7}$ mbar general method: pressure reduction by continuous flow.

Vacuum technology. Measurement of throughput by the rotumetric method at constant pressure.

Vacuum technology. Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge.

Vacuum technology. Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge, ionization vacuum gauge.

Vacuum technology. Standard method for vacuum gauge calibration by direct comparison with a reference vacuum gauge, thermal conductivity gauges.

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 2842  Vacuum technology: acceptance specifications for getter ion pumps.

ISRAEL

957:19/6 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: Vacuum cleaners 
1972 (1978)

BS 5319: 1976 Specification for quick release vacuum couplings (screwed and clamped type)

BS 5415: Section 2.2 Vacuum cleaners wet and/or dry 
1976

BS 5719: Part 1: Measurement of volume rate of flow (Pumping speed) 
1980

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/AUTRALIE (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

ISRAEL

United Kingdom

NEW ZEALAND