

BRAZILIAN WALL TILES AND INTERNATIONAL QUALITY.

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- Experience in quality control, product development, design, technical assistance, management and direction.
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1. BRAZILIAN CERAMIC PRODUCTION

Brazil has a population of 150 million and the Brazilian production of ceramic tiles reached 219 million square metres in 1989. Thus, Brazil is among the three largest producers of ceramic tiles in the world. The greater part of its production in the last decade was absorbed by the internal market, where the intense demographic growth has produced a backlog of 15 million dwelling places. Half of the present day population of Brazil is less than 18 years old and for this reason a future growth in the internal market is inevitable during the next 18 years.

2. TECHNOLOGICAL PROFILE OF BRAZILIAN PRODUCTION

Brazil produces practically all types of ceramic tiles produced in the world with the exception of porcelanatto (due to the excessive price). For example Brazil produces:

- Single and double fired pieces
- Pressed and extruded
- For residential, commercial and industrial uses
- For interiors and exteriors
- Stoneware and porous pastes
- Floor tiles, wall tiles and floor and wall facings
- Sizes from 2.5x2.5cm to 50x50cm
- Floors for residential use and "HIGH TRAFFIC " floors

The variety of products manufactured in Brazil is extremely large, there being some thousands of different products on the market- ranging from the very primitive moulded craftwork to bathroom tiles decorated with intricate designs and precious metals, or anti-acid products for industries.

3. LOCATION OF THE CONSUMER MARKET

The 150 million population of Brazil is concentrated in an area 500km wide along the length of the Atlantic coast. The large Brazilian construction industry is principally located in the South-eastern states of Sao Paulo, Rio and Minas Gerais.

Sao Paulo is the biggest Brazilian city with 12 million inhabitants, a market of apartment blocks. The state of Sao Paulo has a population of 25 million (approximately that of Argentina) and constitutes 10% the total Brazilian internal market. Sao Paulo city contains some thousands of skyscrapers and many more Brazilian cities have the same tendencies to grow in terms of apartment blocks.

Salvador, a city lying in the North-east, is noted for its revolutionary use of colour in the architecture of its buildings, (architect: Fernando Peixoto). Brasilia, the federal capital, is also famous for its avantguard architecture which is shown in the spacial forms of its buildings.

4. PRODUCTION FACILITIES OF THE CERAMIC SECTOR

In Brazil there are ceramic tile production installations on a grand scale, many of which surpass 1 million square metres per month. Many of these facilities are identical to those of Italian technology since they were acquired from the Italian "impiantistas" companies or from Italian manufacturing companies of production equipment which operate with affiliated firms in Brazil.

There are for example, enormous factories of single-fired or stoneware and or monoporosa, which operate with modern atomizers, hydraulic presses, one layer trayless kilns, computer-regulated, cycles of less than one hour, electronic classification and packaging by the wrap-around system.

The majority of the world colours manufacturers are also present in Brazil, where frits and colours are made using technology from the USA, Italy, Germany and Holland. Some Brazilian manufacturers are beginning to produce single-fired porous tiles using Spanish technology. A world wide list exists of 4000 ceramic tile producers prepared by "Andare per Ceramiche nel mondo". This Italian list shows that many among the world's largest manufacturers are Brazilian.

5. LOCALISATION OF THE BRAZILIAN SECTOR.

Although the main consumer centre is to be found in Sao Paulo, the main production centres are in the state of Santa Catarina, 1000 km to the south of Sao Paulo and in Mogi Guaçu, 180 km from the capital. The city of Criciúma is, for Florianopolis, capital of Santa Catarina something like Mogi is for the city of Sao Paulo. (A similar analogy would be between Castellon and Valencia, and Sassuolo and Bologna).

6. QUALITY IN BRAZIL: THE ABNT TECHNICAL STANDARDS

The Brazilian Association of Technical Standards, (ABNT) was established in 1940 and has dictated thousands of norms during these years. Up to 1991 the Brazilian technical standards for ceramic tiles were extremely similar to those of the EN (European Norms), regulating such matters as:

- Surface abrasion with the PEI apparatus
- Test cutting with pressurized steam
- Water absorption through boiling
- Chemical resistance
- Mechanical resistance to flexing

- Thermal expansion by dilatometer
- Thermal shock through abrupt temperature variation
- Visual quality
- Dimensional quality

Before the existence of the EEC the DIN were frequently used as a yardstick for the carrying out of tests.

7. BRAZIL PARTICIPATION IN THE ISO STANDARDS

In its role as one of the world's largest manufacturers of ceramic tiles, Brazil was asked by the ISO to take part in the WG1 and WG2 committees, which drew up the first international tiles norms. Taking part in these projects were the 3 largest producing countries (Italy, Spain and Brazil) and the 7 largest importing countries (USA, Canada, UK, France, Germany, Holland and Australia).

The principal improvements and innovations which are being introduced to the international standards are:

A higher class of abrasion which is being already introduced in Brasil, stain tests before (which will produce a world-wide improvement in quality), and resistance to the flexing characteristics of the piece (in addition to the characteristic module of the ceramic body), friction, impact through restitution and others. All of these new demands are being introduced to the Brazilian ABNT norms.

8. THE NEW BRAZILIAN 1992 STANDARDS WILL BE IDENTICAL TO THE ISO'S

The next logical step to the participation of Brazil in the ISO was the bringing together of its norms with those of the rest of the world. In 1991 The Brazilian Committee of the Technical Standards of the ABNT and the Technical Committee of the Association of Brazilian Ceramic Tile Manufacturers (ANFACER) jointly decided that Brazilian and International qualities would be the same.

In 1991 the ceramic tile committee of the ABNT rigorously set to work to accelerate the putting into effect in Brasil of the specifications and testing methods demanded by the ISO.

The reasons for such urgency are the following:

- 1) Brazil wishes the publication of the new ABNT standards to coincide with the publication of the first ISO international norms.
- 2) The ABNT (Brazilian technical norms) and the ANFACER (manufacturers) wish to extend to the ceramic industry the process of quality certification which already exists in the cement industry and they wish to do so in such a way that, through the identity of the Brazilian norms to those of the ISO, the ABNT certification will, in all practicality amount to a certification of conformity with the ISO.

This is the best use that Brazil can give, to the international level of its facilities and to the awareness it has of the international quality of its products.

9. BRAZIL AND CERTIFIED QUALITY

Quality certification has existed in Brazil since 1969, the year in which external quality control began to take effect in the cement industry. In order to proceed with the issuing of the Conformity to the norms Mark, it was necessary to provide all of the following:

- 1) Fitting out of a control laboratory outside the companies.
- 2) A national network of sample collection.
- 3) Standard control equipment- identical in all laboratories.

- 4) Control books- identical in all companies.
- 5) Cross-verification between internal and external laboratories.
- 6) Triple collection of samples (internal,external and a reserve sample in the case of dispute)

10. EVALUATION OF COMPANIES FOR CERTIFIED QUALITY

The Brazilian Association for Technical Standards (ABNT) is carrying out an evaluation of the quality systems of those ceramic companies who are presenting themselves for external control, using the following guidelines:

- 1) Internal quality guide of the company
- 2) A list of controllers and their instruction grade
- 3) How reports are made.(flow chart of quality decisions)
- 4) A list of quality control equipment available
- 5) Collection of the control forms used
- 6) Control of the suppliers, process and finished product.
- 7) Testing frequency, standards used and accepted limits.

11. BRAZILIAN LABORATORIES FOR EXTERNAL COMPANY CONTROL

After having evaluated the quality systems of the company interested in having external quality certification,the next step towards approval will be the monthly collection of samples and the carrying out of external quality control tests in laboratories established by the ABNT.

In Brazil there are important laboratories which possess excellent facilities, state of the art instruments and national and international prestige to perform the conformity tests . Some of these are mentioned below:

- 1) The Institute of Technological Investigations IPT (Instituto de Pesquisas Tecnológicas) in Sao Paulo is one of the most well-known external testing laboratories in Brasil. It maintains links with the CNR- Centro Nazionale de la Ricerca and with the CCB- Bologna Ceramic Centre.
- 2) The ABCP- The Brazilian Association of Portland cement has a large laboratory in Sao Paulo with many years of quality certification experience.
- 3) The Mario Amato Ceramic College in Sao Paulo belonging to the SENAI (National Service to Industry) has splendid external control laboratories in addition to being a teaching centre for ceramic technology.
- 4) The Falcao Bauer Laboratory in Sao Paulo is the most famous civil construction material testing institute.
- 5). In the University of San Carlos, Sao Paulo state,and in the IPEN (Nuclear Investigation institute) there are important laboratories for the investigation of fine ceramics.
- 6) A ceramic materials laboratory is beginning to get under way in Santa Catarina University in Florianopolis and is considered to be of great importance due to it's location alongside the largest ceramic production centre in Brazil

A process of mutual recognition will take place between laboratories equipped for external control quality world-wide.

12. INTERNAL QUALITY CONTROL WITHIN THE BIG BRAZILIAN MANUFACTURERS.

CONTROL EQUIPMENT:

The large Brazilian manufacturers have modern and well organised quality controls, boasting the most advanced control equipment and instruments in existence.

- Dilatometers
- Autoclaves
- Abrasimeters
- Mechanical and flexibility resistance apparatuses
- Defrost / freeze freezers
- Chemical laboratories
- Thermal differential analysis apparatuses
- Thermoponderal analysis apparatuses
- Microscopes
- Laboratory kilns with thermal diagram via computer

The universities and external control institutes have X-ray, atomic absorption and micropunctual flow analysis machines which are also employed by the automobile, nuclear and space industries.

13. THE QUALITY SYSTEM

Nowadays the concern in quality of the big companies is no longer so much in the controls as before, but rather in the "control's control", that is to say, in the reliability and traceability of the quality system as a whole, it's "transparency" (the control graphs visible, the internal quality showrooms) and principally:

- The promptness of its preventive action
- The internal quality guide
- The faith in quality inspired by the management
- The quality flow-diagrams independent from production
- The CLIENT > CONTROL, CONTROL > PRODUCTION feedback
(in contra-flow to that of production)
- The "listen to the client" approach
- Corrective technical attendance, now transformed into prevention service
- The "exodus" of the technical department to the outside world to lend its after-sale, pre-tiling services.

14. QUALITY HARDWARE

The importance of the following physical facilities constitute what we might call the "quality hardware" of the companies.

- Electronic classification lines
- Electronic high-speed measurers for dimensions, calibre, squaring, curvature and deformation
- Tonal tables with equivalent sunlight cabins, panel vision and standards of colour
- Steel pieces as patterns of calibration for the speed measurers
- Complete instrumental control of the finished product

15. QUALITY SOFTWARE

In addition to the physical installations, which are here compared to "quality hardware", the best Brazilian companies also possess the best Quality Systems, and this is what is considered to be important nowadays.

- The traceability (Day,Shift,Hour,Batch,Person responsible)
- Statistical control of human errors, by individual,day and shift
- The rotation of inspectors when fatigue begins to set in
- The re-control and sampling of already classified pallets
- The banning of non-approved batches
- The measurement of reliability, which proves that this banning is, in practice, not necessary.

All situations and responsibilities must be perfectly described in the internal control guide, as must, also clearly indicated, the preventive actions which **take the place** of the corrective actions,for the uninterrupted production of assured quality .

The big Brazilian names possess quality engineering centres,some have their computer-accessed internal quality guide, many have technical norms which are more demanding than the external ones. All of this forms part of the Quality Systems.

16. GENERATION OF A CONSTANT FLOW OF ASSURED QUALITY

The best organised companies concern themselves more with preventive controls than with corrective ones and the information feedbacks to the source of quality sector need to be rapid and lucid.

The existence of a reliable preventive control network and of an instantaneous information system, allows the large Brazilian companies the reliable generation of guaranteed quality and thus avoids possible setbacks with the obtaining of external quality certification, the function of which is obviously not the constant generation of guaranteed quality nor that of banning batches.

17. JAPANESE QUALITY TECHNIQUES IN BRAZIL

A fact that is perhaps little known elsewhere is that Sao Paulo contains one of the largest Japanese populations outside Japan. Owing to this local Japanese influence, there exist today numerous Quality Control Groups (CCC). The groups serve to attain a "pride in quality" on the part of the producer, and consequently, his enthusiastic participation in the generation of quality, **self-controlled quality at source**.

Philosophies such as "zero defect quality " and "total quality" are extremely important in an industry which uses kilns. For many of the defects, the entrance to the kiln is the exit from the factory ! To produce without flaws is a motto which is being pursued more and more through a more and more complete network of process controls.

18. SPAIN AND THE INVESTIGATION INTO PROCESS CONTROLS

The investigations of the AICE in Spain have been of great importance in the improvement of preventive process controls and the managing of assured quality. The most complete network of controls available today, the emphasis on investigating practical matters, and a much more heightened awareness than before have meant an increase from 80% to 90% the performance of the best names in Italy, Spain and Brazil. What is needed to reach 100% obviously lies in those process controls as yet unknown or production processes whose auto-quality control needs to be computerized in order to reach zero defect. Spain is considered by many Brazilian ceramicists to be the leading country in **practical** investigation into process controls and in the manufacture of porous single-fired ceramics.

Furthermore Spain is a country which enjoys a very special relationship with Brazil. Both countries have in common and not by coincidence, the word "azulejo - wall-tile ", which does not exist in other languages. Spain and Brazil are countries of ceramicists for the same reason: The Arabs. The latter introduced tiles to Europe through Spain and Portugal. (The Portuguese tiles from centuries ago can still be admired in the beautiful churches of Bahia)

The Spanish language is almost identical to ours and this has special significance for our technicians. Technical books published in Spain can be read directly in their original language - something which does not occur in other languages.

19. ITALIAN,SPANISH AND BRAZILIAN KNOW-HOW

Nowadays, the arrival in Brazil of Italian or spanish technicians and consultants for work purposes is an everyday event as is the sending of technicians by Brazilian companies to the fairs in Bologna and Valencia.

The international traffic of technicians and consultants does not only occur between Brazil and the two afore-mentioned countries, but also between Spain and Italy. The technology of the 3 main ceramic producers is basically identical; the 3 empty roller trayless kilns. The ceramic technology of the world is becoming one.

20. SPECIFIC BRAZILIAN PROBLEMS

One of the big problems present in the Brazilian ceramic industry is the lack of professionalisation among its thousands of tile layers. It is estimated that there are 120 000 tile layers (both floor and wall) in Brazil, the vast majority of whom are **not** professionals. (This situation is in marked contrast to the high degree of professionalism existing among the technicians who work in the factories - ceramics, mechanics and electricians.)

Another serious problem in the Brazilian ceramic industry is the lack of gas pipelines. The most notorious contrast between Brazil and the European ceramic industry is the lack of a concentrated network of gas pipelines such as exists in the EEC.

Brazil is 20 years behind when it comes to natural gas and this fact contrasts strongly with the ultra-modern ceramic facilities. The first important gas pipeline between San Pablo and Rio was constructed in 1988. Today at last, natural gas is reaching San Pablo. Very shortly we will have natural gas in Criciuma and Mogi Guaçu which are our ceramic centres.

20. CONCLUSION: BRAZIL AND INTERNATIONAL QUALITY

To sum up , many Brazilian companies have ultra-modern production facilities, international quality products, guaranteed quality systems and European ceramic know-how with Japanese quality control systems. The brazilian deficiencies lie in the non-professionalism of its tile layers and in natural gas.

Of the 3 big world producers, Brazil alone has a population which will continue to grow in the 21st century and which will have abundant raw materials to supply its European sister countries.