GBRC contributes to improve quality and to ensure safety of building.

GBRC

General Building Research Corporation of Japan

一般財団法人
日本建築総合試験所

GBRC contributes to improve quality and to ensure safety of building.

General Building Research Corporation of Japan (GBRC) was established in 1964 with the mission to improve the building quality, secure the safety and contribute to the public welfare through the tests and the researches related to general building matters. Since then, GBRC has been contributing to the society as a fair and neutral trusted third party by providing high-quality and reliable tests, researches, evaluations, examinations and authorizations.

Research & Testing Center conducts high-level testing and research activities overall building technologies. Various testing are conducted based on the Building Standard Law of Japan, JIS, and other regulations. Furthermore, cutting-edge research is conducted to support the development of new technologies and materials of buildings.

Building Confirmation & Evaluation Center conducts the confirmation inspections and the performance evaluations based on the Building Standards Act, housing performance evaluation based on the Housing Performance Indication Standard of Japan and the operations including the building technology authorisation and certification conducted as its original operations.

Structure Judgment Center conducts structural calculation conformity judgment based on the Building Standard Law.

Product Certification Center, designated as the certification/registration body based on the new JIS mark system, conducts JIS marking certification based on the Japanese Industrial Standardization Law.

GBRC provides technical **education and training** courses for engineers in developing countries in cooperation with the Japan International Cooperation Agency (JICA) Program. We also arrange several training courses for Japanese building engineers.

GBRC advances to develop new business fields in accordance with drastic changes of the society.

History

1964.04	The Corporations approved by the Minister of Construction and started operations.
1965.04	Oyodo Testing Lab opens.
1972.08	The Corporation is set under the control of both the Ministry of Construction and the Ministry of International Trade and Industry.
1977.12	Sakai Testing Lab opens.
1981.04	The Corporation is appointed to an Accredited Inspection Organization by the Ministry of International Trade and Industry.
1981.09	Kyoto Testing Lab opens.
1982.05	Kakogawa Testing Lab opens.
1996.04	Kobe Testing Lab opens.
1997.04	System Certification Business Division is set up.
1998.07	Product Certification Center is set up.
1998.10	The Corporation is approved as a Designated Approval Organization under the Industrial Standardization Law by the Ministry of International Trade and Industry.
1999.04	Building Confirmation & Inspection Center is set up. The Corporation was designated to an Accredited Testing Laboratory (JNLA) under the Industrial Standardization Law.
1999.07	Offices of Building Confirmation & Inspection Center and System Certification Center are set up at Osaka Office opens at Chuo-ku, Osaka City.
1999.10	The Corporation is appointed to a Designated Confirmation Inspection body based on the Building Standard Law by the Ministry of Construction.
2000.04	Building Confirmation & Evaluation Center is set up.
2000.06	The Corporation is appointed to a Designated Performance Evaluation Organization and a Designated Authorization body based on the Building Standard Law from the Ministry of Construction.
2000.08	System Certification Center is authorized as one of Quality Management System Assessment and Registration body by the Japan Accreditation Board for Conformity Assessment (JAB).
2000.10	The Corporation is appointed to a Designated Performance Evaluation Organization and a Designated Authorization body based on the Housing Quality Assurance Act by the Ministry of Construction.
2003.09	The Corporation is accredited as a Force Calibration Laboratory under the Japan Calibration Service System (JCSS) by National Institute of Technology and Evolution (NITE).
2003.10	The Corporation is accredited as a Testing Laboratory under the Concrete Construction Method System by Osaka Prefecture Building Administration Liaison Conference.
2004.04	Tokyo Contact is opens at Minato-ku, Tokyo.
2005.02	The Corporation is accredited as a Testing Laboratory under the Japan National Laboratory Accreditation System (JNLA) by National Institute of Technology and Evolution (NITE).
2005.10	The Corporation is accredited as a Designated Certification Body under the Industrial Standardization Law by the Ministry of Economy, Trade and Industry.
2007.04	Structure Judgment Center is set up at Osaka Office Annex.
2007.06	The Corporation is appointed to a Designated Structural Calculation Conformity Judgment Body based on the Building Standard Law.
2010.02	Osaka Office and Osaka Office Annex were unified and relocated to Chuo-ku, Osaka.
2010.02	Product Certification Centre was relocated from the Headquarters to Osaka Office.
2012.04	Reorganised as a general incorporated foundation.

Research & Testing Center

Research & Testing Center carries out multi-field research and testing related to building engineering.
We secure high-level reliability on the testing to satisfy the needs of customers.

Research & Testing Center, accredited as a testing laboratory based on testing laboratory accreditation system (JNLA) under theJapanese Industrial Standardization Law by the Accreditation body (IAJapan), consistently maintains test quality management system conforming to ISO/IEC 17025 (JIS Q 17025); "General requirements for the competence of testing and calibration laboratories".

Certificate of Accreditation (JNLA)

This Logo mark is based on the Japanese Industrial Standardization Law, and "Z90119JP" is the accreditation number of our Research & Testing Center in Head Office. IAJapan, which operates JNLA, is a signatory to mutual recognition arrangements (MRA) of APLAC and ILAC.

Research & Testing Center

Quality Management Department
- Management Division
- Calibration Division

Structural Engineering Department
- Structure Lab
- Building Investigation Division
- Soil & Foundation Lab

Environmental Engineering Department
- Heat & Acoustics Lab
- Fire Engineering Lab
- Wind Engineering Lab

Materials Department
- Materials Lab
- Construction Materials Lab, Central
- Branches of Research & Testing Center (Sakai, Kyoto and Kobe)

Technology Development Consulting Division

Quality Management Department

●Calibration Division

■Calibration & Verification

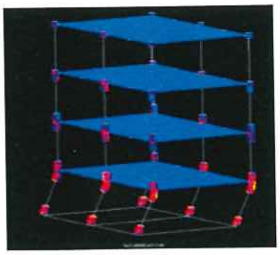
Calibration Division calibrates uni-axial force testing machines, electronic balances, caliper and outside micrometers to ensure reliability and trace ability of measurement.
We also verify the accuracy of rebound hammers and test anvils used for the estimation of concrete strength of structures.

This Logo mark is based on the Measurement Law, and "0138" is the accreditation number of our Calibration Laboratory.
The accreditation body (IAJapan) which operates JCSS is a signatory to mutual recognition arrangements (MRA) of APLAC and ILAC.

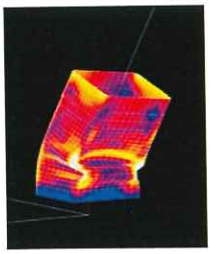
Technology Development Consulting Division

■Technology development consulting and numerical analysis

We provide our clients with assistance for the desired technology development. In order to cope with various technology development needs timely and precisely, we organise a specialist team in response to the object of the technology development and the content of the project and present the optimal guideline (cost and time-wise) to attain the goal.
Technology Development Consulting Division has in its organisation Numerical Analysis Group, which supports the operations of New Technology Development Consulting Division through numerical analysis.



Collapse analysis of 4-story building



Local buckling of the column at the 1st story

Research & Testing Center

Structural Engineering Department

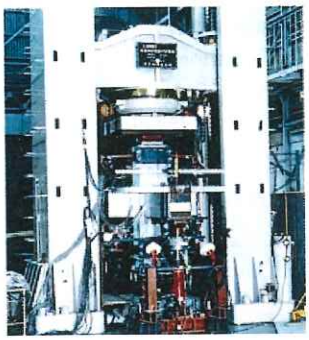
We conduct structural tests, earthquake resistance and durability examination and diagnoses and soil and foundation tests.

●Structure Lab

■Structural Test

Structural Laboratories carry out various tests on structural performance of full-scale members, building elements and materials to contribute to the development of cutting-edge structural technologies.

Testing setup for simulated earthquake loading on columns or beams



10MN compression and bending testing machine

Test of R/C corner joint

Test of timber frame joint

Shear test of timber wal

Shaking table test of electric equipment

●Building Investigation Division

■Seismic Capacity, Durability and Fire Damage

Utilizing the wide knowledge and experiences of our corporation, we conduct investigations and diagnoses of buildings and foundations related to seismic capacity, durability and fire damage.

In addition, we can organize the committee gathering the experts and review the item that requires the special examination and judgment, and also provide the technological assistance to the other corporations.

Field investigation
(Investigation of external wall)

On-site test regarding
(Performance test of external wall)

●Soil & Foundation Lab

■Soil mechanics and Foundation Test

Soil mechanics and Foundation test improvd soil test under unconfined compression test following to JIS and JGS (Japanese Geotechnical Society) standard tests may be carried out. Quality control test of reproduced roadbed materials as well as performance tests of water permeability with artificial drainage mat for retaining wall are able to be carried out in our laboratory.

Unconfined Compression test of improved soil

Friction test of drainage mat for retaningwall

Research & Testing Center

Environmental Engineering Department

Environmental Engineering Department investigates the comfort and the safety for a building under natural/artificial phenomena such as sound, heat, fire, wind and rain.

●Heat & Acoustics Lab

■Acoustic test

Sound insulation test, sound absorption test, floor impact sound test of building parts and materials in the lab and noise and vibration test in the field are conducted.

■Thermal test

Thermal insulation test, dew condensation test, thermal transmittance test, moisture permeability test and moisture absorption and desorption test in the lab, and research for air-tightness and dew condensation of actual buildings are conducted.

Dew condensation test (Thermal test)

Floor impact sound test (Acoustic test)

●Fire Engineering Lab

■Fire test (construction)

Test on fireproof and fire preventive structure (column, beam, floor, wall, roof, door, window and penetration seal, etc.) are conducted.

■Fire test (material)

Heat release test, non-combustibility test, gas toxicity test, ignitability test, reduced scale model box test and external fire exposure test of roofing materials are conducted.

Fire preventive test (window)

Heat release test

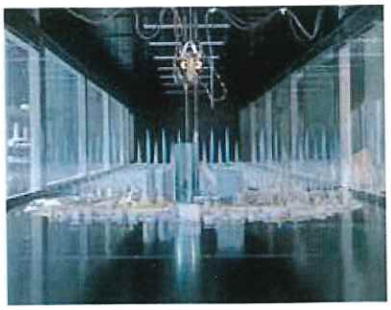
●Wind Engineering Lab

■Wind Tunnel test

Wind environment test around a high-rise building, wind pressure and wind force measurement, analysis of wind-induced oscillation of high-rise buildings and wind observation in the field are conducted.

■Aerodynamic test

Wind resistance test, air-tightness test, water-tightness test, relative story displacement resistance test, door opening-closing cyclic test, metal roof thermal stretch resistance test and wind pressure resistance test of slates are conducted.



Measurement wind velocities around high-rise buildings (Wind tunnel test)

Test on Deformation Capacity of exterior wall (Aerodynamic test)

Materials Department

Materials department provides tests on various properties and tests for quality control of building materials.

●Materials Lab

Materials department conducts tests on various properties, tests for quality control and various analyses of mainly concrete and various materials for concrete, finishing materials and others.

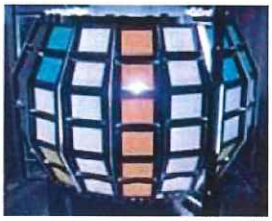
■Tests of concrete

- Various concrete tests with mixing
- Tests on the durability of concrete
- Water content measurement per fresh concrete (Continuation RI method)
- Tests for Alkali-silica reactivity: Evaluation of potential reactivity of aggregates and concrete such as chemical method and mortar-bar method, expansion measurement test of drilled cores of concrete , composition analysis of gel, etc.
- Test for chloride content in hardened concrete
- Various analyses of aggregates (rocks), hardened concrete, etc.: Quantitative and qualitative analyses of components (distribution of chemical elements, compounds, minerals), estimation of mix proportion of concrete, analysis by using EPMA, etc.

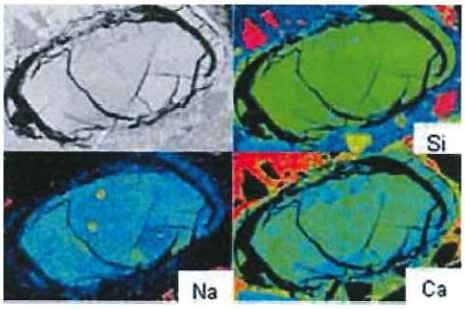
■Tests of finishing materials

- Finishing materials subject to test: Building boards, Coating materials for textured finishes, internal finisihing materials, floor covering materials, cement materials, etc.
- Test items: Tests on mechanical peformance, the durability and other

Measurement of water content in fresh concrete using radio isotope meter on site.



Light-exposure test of internal finishing materials (Enclosed carbon-arc type)



Example of alkali-silica gel analysis by using EPMA

●Construction Materials Laboratories (located at Suita, Sakai, Kyoto, and Kobe)

■Construction Materials Tests

Various tests on construction materials for inspection of construction works. GBRC is approved as a designated testing laboratory by local governments.

- Test of concrete compression, bending, split-tearing tensile strength and static bending coefficients
- Compression, carbonisation test and static bending coefficient test of concrete core
- Test on aggregates based on the JIS requirement.
- Tensile and bending test on profile steel, rebar and welded joint.
- Tensile, bending and macro tests of reinforced joints including compression and welding
- Tensile, bending and static bending coefficient test of steel materials

Automatic compression test system for concrete cylinder specimens.

Tensile test on rebar joint.

Sampling and test on aggregates at ready mixed concrete plants.

Building Confirmation & Evaluation Center

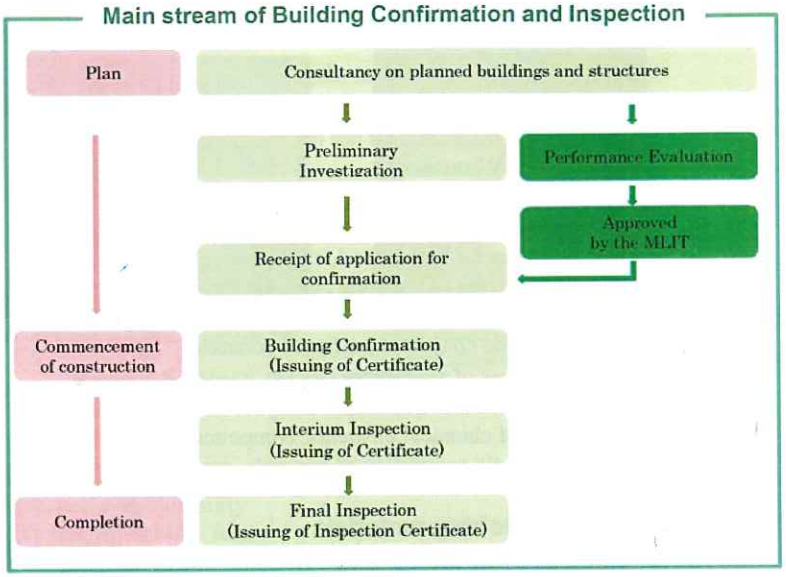
Confirmation & Inspection Division

Confirmation & Inspection Division performs confirmation and inspection on building as well as housing performance evaluation in accordance with the Building Standard Law and provisions related to building regulations.

■Building Confirmation and Inspection

As a designated confirmation and inspection body, we carry out confirmation and inspection whether buildings and structures comply with the rules and the provisions related to building regulations.

Main stream of Building Confirmation and Inspection



●Target Buildings and Structures

- Buildings and structures to be newly built with the approval by Minister of Land, Infrastructure and Transport.
- Buildings exceed 31 m in height
- Buildings exceed 2,000 sq m in total floor area
- Seismic isolated buildings
- Buildings designed based on the verification method for evacuation safety, fire-resistance and calculation of response and limit capacity
- Buildings evaluated with the fire safety design review
- Buildings and structures which require technical evaluation or judgment

●Work Area designated by the Minister of Land, Infrastructure and Transport

Osaka, Hyogo, Kyoto, Shiga, Nara, Wakayama, Aichi, Gifu, Fukui, Mie, Okayama, Hiroshima, Yamaguchi, Fukuoka Tokushima, Kagawa, Ehime and Kochi.

■Housing Performance Evaluation

Based on the evaluation method standard under the Housing Performance Indication Standard of Japan, we carry out the performance evaluation of newly built or existing residential building.

■Flat 35 Compliance Certificate

We grant a certification of the conformity with the technical standard of the securitization support operation (Flat 35) by Japan Housing Finance Agency.

■Examination on the plan for the new construction, etc., of a low carbon building

We make an examination on the plan for the new construction, etc., of a low carbon building under Low Carbon City Act. This examination is necessary before the application to the administrative agency with jurisdiction.

■Examinations of Long-life Quality Housing

We make an examination on the performance of the housing under the Act on the Promotion of Popularization of Long-life Quality Housing. This examination is necessary before the application to the administrative agency with jurisdiction.

■Evaluation of Building Energy-efficiency Labeling System (BELS)

We evaluate the energy conservation performance of newly built non-residential building under the Building Energy-efficiency Labeling System.

Evaluation & Approval Division

We conduct performance evaluations and examinations of special construction method such as high-rise buildings.

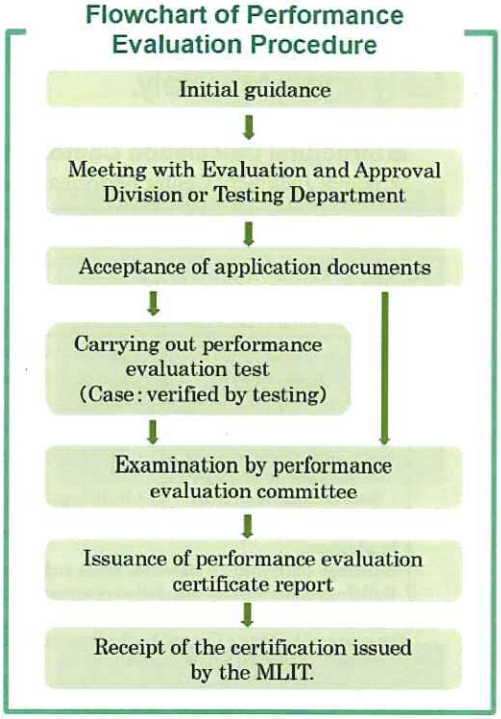
■Business as a Designated Performance Evaluation Body under the Building Standard Law of Japan

●Performance Evaluation

As a designated performance evaluation body, we examine the construction method and the building materials required for obtaining the approval by Minister of Land, Infrastructure and Transport. Test and Research Centre of GBRC carries out the tests of fire-resistive construction, fire preventive materials required for the performance evaluations.

- Evaluations of fire-resistive construction, fire preventive construction, fire preventive material and fire exposure test of roofing materials.
  - ▷ Comprehensive supports including tests
- Evaluation of high-rise buildings and seismic isolated buildings
  - ▷ Convening of the committee twice a month
  - ▷ Providing at any time for minor variation from the original approval
- Evaluation of designated building material (Concrete)
  - ▷ Convening of the committee in Osaka and Tokyo
  - ▷ Experienced in various evaluation
- Evaluation of evacuation safety and fire-resistance performance.
- Evaluation of foundation pile
- Evaluation of magnification factor of the bearing wall of wooden structures
- Evaluation of formaldehyde-emitting building materials
- Evaluation of operating performance of fire prevention equipment
- Other evaluations (Please contact us)

Flowchart of Performance Evaluation Procedure



■Business as a Designated Agency based on the Housing Quality Assurance Act

●Evaluation of special performances

We evaluate the performance of building materials and construction methods not-stipulated in the Performance Indication Standard of the Housing Quality Assurance Act.

■Technical Evaluation as a Private Organization

GBRC conducts evaluation and examination as a trusted third party.

●Evaluation of newly developed technologies

GBRC evaluates the performance of a newly developed technology for building construction from the third party's perspective and issues the certificate on the assessment of the performance achieved by the technology for building construction. This certificate helps the building official and others judge the adequacy of the application of a new technology.

●Fire safety design review

GBRC is registered as a Disaster Prevention Approval Agency by the Building Administration Liaison Council of Osaka Prefecture. We examine the disaster prevention plans for securing the safety in the context of fire prevention and evacuation as well as the capability of fire-fighting and rescuing. We also examine the buildings located in other Prefectures (Please contact us).

●Structural design review

We perform technical review of structural design on the request of building officials.

●Judgment of seismic diagnoses for existing buildings.

We make seismic diagnosis of existing buildings and judge the validity of seismic strengthening plan based on the Act on Promotion of the Earthquake-proof Retrofit of Buildings.

Beside the above-mentioned, we issue the certificate on the assessment of the performance achieved by the technology for connection joints of a wooden structure and production of concrete used on Precast concrete products for structural building member.

Structure Judgment Center

Structure Judgment Center performs structural calculation conformity judgment for buildings at the request of building officials or designated confirmation and inspection bodies under the Building Standard Low, rigidly, fairly and accurately.

■Structural Calculation Conformity Judgment

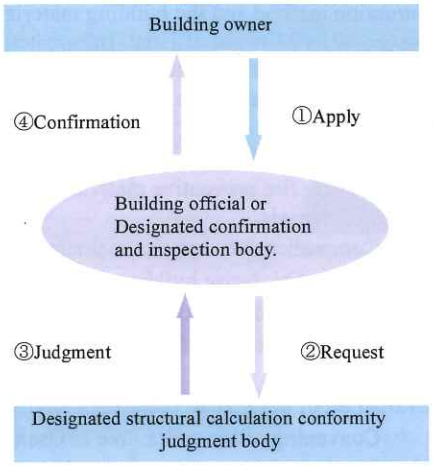
Structure Judgment Center performs structural calculation conformity judgment through examination of specification books or recalculation of objective building structures.

●Scope of Buildings

Structural system	Buildings
Wooden structure	・Buildings exceed 13 m in height. ・Buildings exceed 9 m in eaves height, etc.
Steel structure	・Buildings of 4 or more stories except underground stories, etc.
Reinforced concrete or Steel encased reinforced concrete structure	・Buildings exceed 20 m in height, etc.
In addition: Buildings confirmed by allowable stress and ultimate strength method. Buildings confirmed by calculation program approved by the relevant Minister.	

The scope of buildings (judged by the Structure Judgment Center) depends on the prefecture of the building cite
Buildings with the performance approved by the relevant Minister are excluded.

Flowchart of structural calculation conformity judgment



Product Certification Center

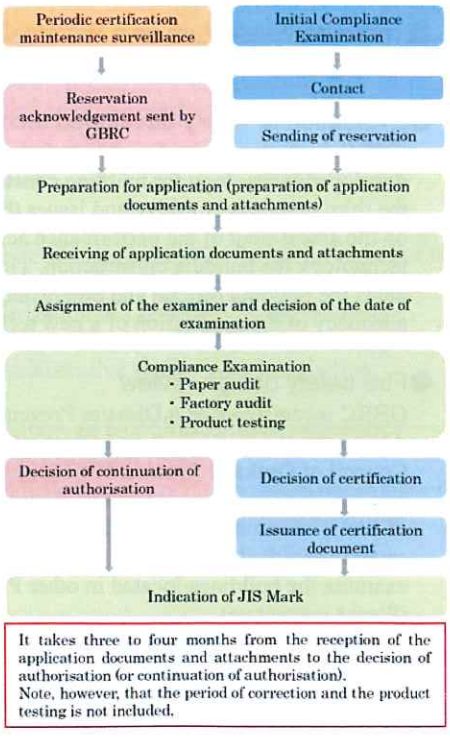
Product Certification Center contributes to establish the reliability of JIS (Japanese Industrial Standards)Mark

■Authorisation of JIS products

As an **authorization agency** registered by the government, GBRC conducts authorization operations related to JIS mark indication system based on the Industrial Standardisation Act. Utilising the techniques we have acquired through tests and researches in the construction domain, we deploy well-experienced examiners who can provide product authorisation operations based on their precise and speedy examinations.

●JIS MARK SCHEME
It is the system that authorises the manufacturing factory to indicate JIS mark by having a state-registered registration and **authorization agency** examine the quality control system at the manufacturing factory and confirm the compliance with JIS through the product testing.

Process of Product Authorisation Procedure



It takes three to four months from the reception of the application documents and attachments to the decision of authorisation (or continuation of authorisation).
Note, however, that the period of correction and the product testing is not included.

Training and Information Service

GBRC contributes to the advancement of building technology through wide range of activities including technical training services for engineers, international cooperation and information services.

■Training Service

● **Concrete Work Training**
GBRC provides training sessions designated by the Building Administration Liaison Council according to "Handling Guideline of Concrete Works" of Osaka Prefecture and training sessions designated by the Governor according to "Instruction Guideline of Concrete Building Methods" of Hyogo Prefecture.

● **Concrete Hi-TeC Lecture Series**
The Concrete High-Technology Promoting Committee offers advanced technology such as high performance concrete, deterioration prevention to concrete engineers.

● **Skill-up Training for concrete worker**
(SiTeC··· On-Site Testing of Concrete)
GBRC conduct a training course for concrete worker to upgrade the skill of testing and inspection for the quality control of concrete work.

● **Training for laboratory technician**
GBRC conduct a training course for laboratory technicians who work for precast concrete factories and ready mixed concrete plants. The proficiency of technicians is assessed and registered through the training and examination.

Training seminar

■Advisory activity

Special committee, which consists of specialists and authorities, offers the consultancy for the development of new construction technologies.

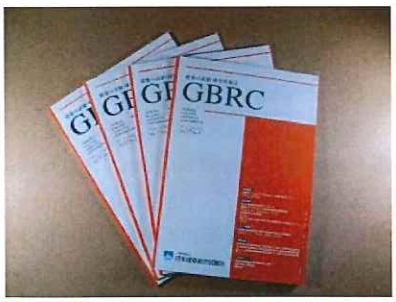
Certificate and license card of skillful concrete worker

■Research and Joint Research

Technical staffs, and sometimes together with external researchers, conduct research to develop new structural components and material for building as well as improved testing methods. Many achievements have been published in the journal "GBRC" and reported in special society or institute.

■International Cooperation

GBRC has a special technical training course for foreign engineers in cooperation with JICA. The training course is planned by our staffs to upgrade testing skill of construction engineers in many countries.



Journal "GBRC"

■Information

In order to promote various projects and services of GBRC, the Information Committee conducts information activities including;

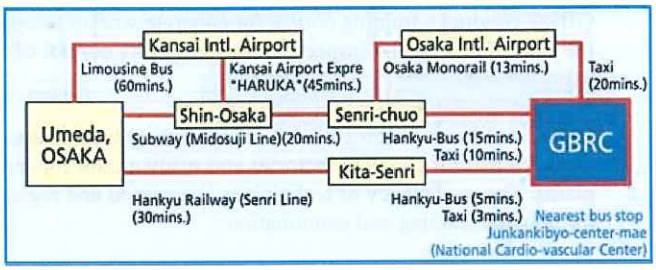
- Planning of briefing seminars of various building technologies for clients,
- Publication of the journal "GBRC" that contains researching report, new technology on construction, and report on performance evaluation,
- Homepage (http://www.gbrc.or.jp) introducing our projects & services and guidance of applications.

http://www.gbrc.or.jp

Address & Access

■Head Office (Research & Testing Center, Secretariat)

5-8-1 Fujishirodai, Suita-city, OSAKA, 565-0873 Japan
TEL ; +81-6-6872-0391 FAX ; +81-6-6872-0784



■Osaka Office (Product Certification Center, System Certification Center, Building Confirmation & Evaluation Center, Structure Judgment Center)

OSAKA U2 Building 5/6/7 F, 2-4-7 uchihonmachi, Chuo-ku, Osaka-city, OSAKA, 540-0026 Japan

■Tokyo Office (Product Certification Center)

TERAO Building 8 F, 2-8-4 Nishi-shinbashi, Minato-ku, TOKYO, 105-0003 Japan

■Branches of Research & Testing Center

● **Construction Materials Lab, Sakai**

2-1-34 Ishizu-cho-nishi, Hamadera, Nishi-ku, Sakai-city, OSAKA, 592-8333 Japan

● **Construction Materials Lab, Kyoto**

65 Maeyama-cho, Nakajima, Fushimi-ku, Kyoto-city, KYOTO, 612-8464 Japan

● **Construction Materials Lab, Kobe**

3-3-7 Minatojima Minami-machi, Chuo-ku, Kobe-city, HYOGO, 650-0047 Japan

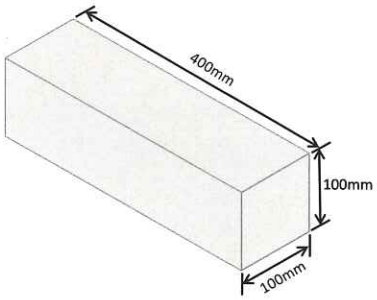
Method of acceleration test for concrete(JIS A 1153)

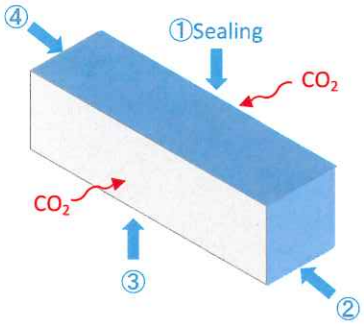
Specimen

Shape : 100×100×400mm

Nonber : 3 samples

Curing : After receipt of test specimens, underwater curing for 4weeks
(temperature at 20℃)
Arter taht aerial caring for 4weeks
(temperature at 20℃, relative humidity at 60%)
Seal other than two 400×100 parts





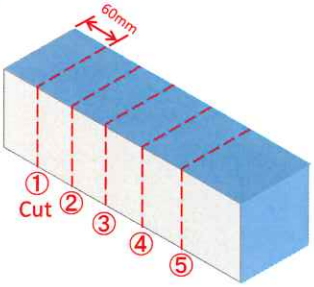
Test method

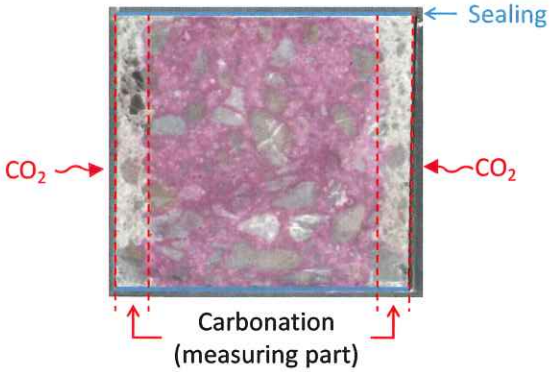
Acceleration conditions : temperature at 20℃, relative humidity at 60%,
carbon dioxide concentration at 5%

Measurement

Measurement period : acceleration When the acceleration period reached
1, 4, 8, 13, and 26 weeks

Measuring method : Cut it to 60 mm and spray the phenolphthalein solution
on the cross section and measure the non-colored part





Estimation

- The corbnation rate coefficient can be calculated from the test result and the corbnation depth can be estimated
- Depending on the type of estimation equation, some conditions such as materials and environments are required
- It is better to check compared with a specimen that can understand the corbnation rate coefficient