

Renewables

Wind Certification



Empowering Trust™

About us

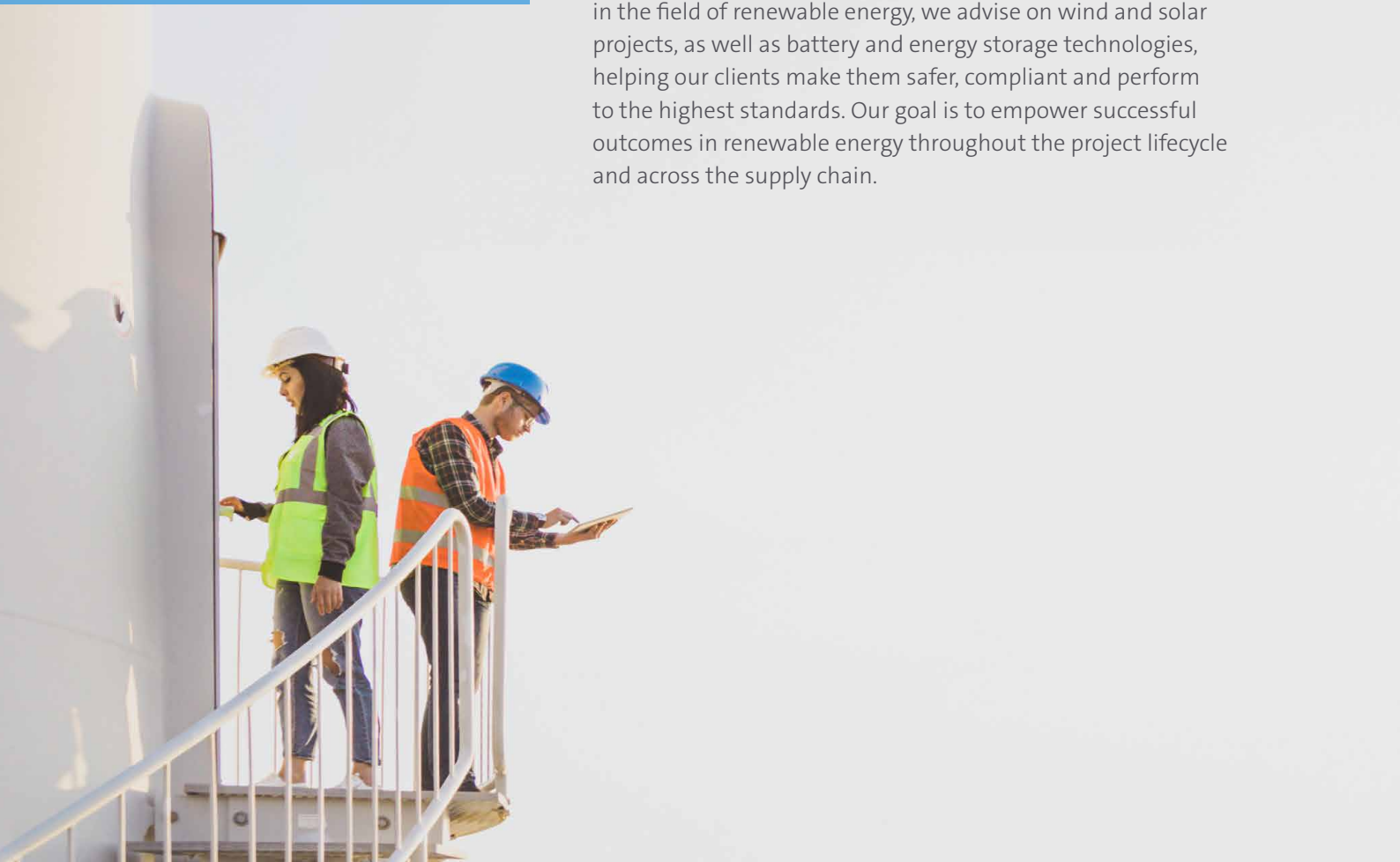
Leaders in global services for renewable energy

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UL is a trusted independent advisory, testing, inspection and certification body for a broad range of industries. In the renewable energy space, UL works to help manufacturers, developers, owners, operators, investors, lenders, utilities and policy makers navigate the risk and complexity associated with renewable resources. We have become a trusted advisor by providing access to proven science and expert engineering, and by offering innovative solutions to meet the unique challenges of the renewable energy industry. We pride ourselves on being accessible, flexible and keenly responsive to the needs of our clients.

UL now delivers an even more extensive portfolio of renewable energy services through the acquisitions of AWS Truepower (2016) and DEWI/DEWI-OCC (2012). With offices in over 140 countries, a team of over 500 experts and 35 years of experience in the field of renewable energy, we advise on wind and solar projects, as well as battery and energy storage technologies, helping our clients make them safer, compliant and perform to the highest standards. Our goal is to empower successful outcomes in renewable energy throughout the project lifecycle and across the supply chain.





UL operates in more than

140
COUNTRIES

200,000+ MW

Total megawatts assessed

500+

RENEWABLE
ENERGY EXPERTS

35+ *years of*

EXPERIENCE IN
RENEWABLE ENERGY



ADVISED 90%

OF THE WIND INDUSTRY'S TOP
PROJECT DEVELOPERS AND
PLANT OWNERS



INDEPENDENT/OWNER'S
ENGINEER FOR

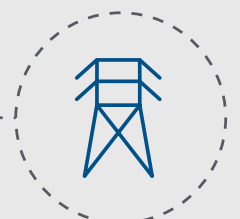
500+

WIND AND SOLAR PROJECTS
SINCE 2012

Forecast provider for

70+ GIGAWATTS

OF INSTALLED RENEWABLE
ENERGY PROJECTS





Certification Services

UL offers comprehensive certification services for wind turbines, components and systems according to international and national standards and regulations (e.g., IEC 61400 series, GL guidelines, UL 6141 and IECRE). We address customer needs by aligning our wide range of services to find a combination of solutions that most rapidly and efficiently brings their product to market.

Accreditations and Quality Agreements

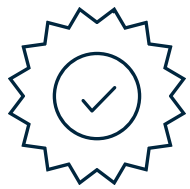
UL is dedicated to technical excellence and quality across the globe. Our DAKKS accreditation is proof of our commitment to quality and competence for activities as a conformity assessment body according to internationally harmonized standards. For the wind industry the DAKKS accreditation helps ensure that once tested, components, parts and wind energy technology are accepted everywhere making wind energy technology safe, compliant and cost effective. Certificates are available upon request or at www.dakks.de.



National and International Committees

UL is a member of major national and international committees that are defining wind energy standards including:

- IEC – International Electrotechnical Commission
- IECRE – International Electrotechnical Commission Renewable Energy
- AWEA – US National Standards Development
- DKE – Deutsche Kommission Elektrotechnik Elektronik-Informationstechnik in DIN und VDE
- DPInst – Committee of German Certification Bodies for Wind Turbines
- BSH – German Federal Maritime and Hydrographic Agency
- FGW – Federation of German Windpower and other Renewable Energies



350+ TYPE CERTIFICATES
ISSUED

on over 150 wind turbine configurations

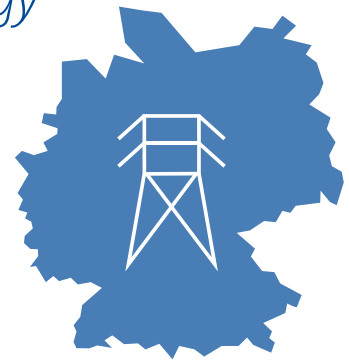


FOR 30+ OEMs

*FGW authorized to issue power generating systems
certificates for decentralized energy technology*

ISSUED UNIT CERTIFICATE

*for one of the largest PV inverters
according to German grid code*



50+
COMPONENT
CERTIFICATES ISSUED

for 10+ OEMs

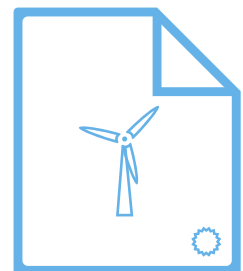
1200+
Conformity
Statements Issued

For 65+ OEMs



*Issued conformity statements
for leading OEMs in India
confirming that wind turbines*

**MET INDIAN GRID
CODE REGULATIONS**





Type and Component Certification

The type and component certification process provides confirmation that the wind turbine type, components and systems have been designed, manufactured and tested in conformity with the requirements as mandated by international standards and site-specific conditions.

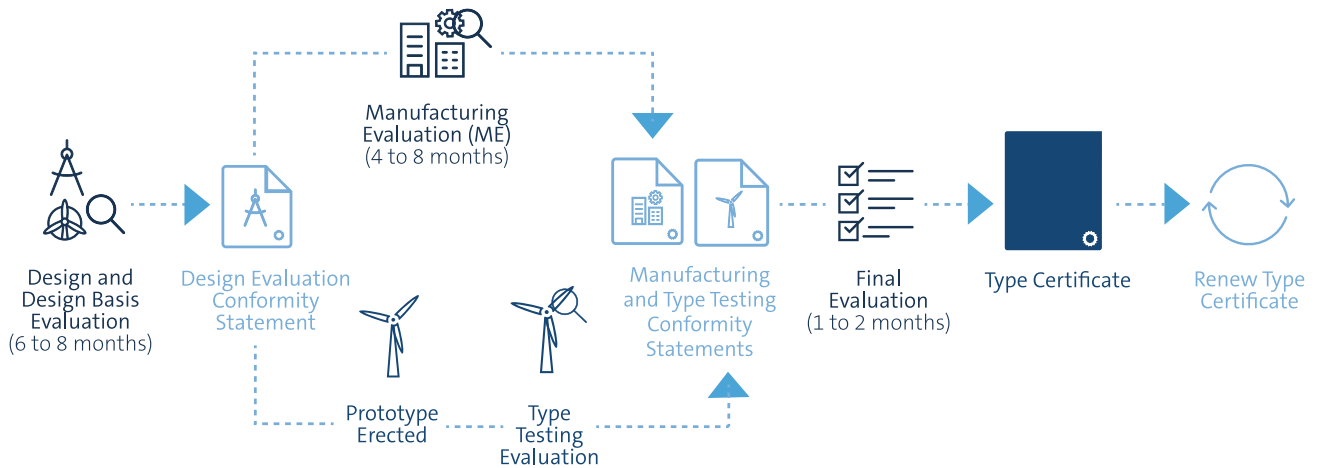
Component certification

A component certificate is applicable to the major structural, mechanical and/or electrical components of the wind turbine, e.g. the frequency converter, transformer, generator, tower, rotor blade and gearbox. UL confirms that the specific component is designed, documented, manufactured and tested in conformity with the applicable design requirements, specific standards and other technical requirements. Component certification is a useful tool for component manufacturers to provide OEMs traceability to their design assumptions, testing and manufacturing processes and sites. A certified component can easily be integrated into the supply chain of OEMs.

Type certification

The purpose of type certification is to confirm that a wind turbine type is designed, documented and manufactured in conformity with specific standards and site conditions. In addition, type certification covers the erection procedures, installation and maintenance of the wind turbine. A type certificate denotes a fully independent assessment of the completeness, correctness and safe functioning of a wind turbine for its design lifetime. Finally, a type certificate provides the traceability for the applicable documentation for design, testing and manufacturing.

Type Certification Process



Design Evaluation

The purpose of the design evaluation is to evaluate the wind turbine type as designed and documented in conformity with design requirements, specific standards and other technical requirements including:

- Load assumptions
- Safety systems
- Rotor blades
- Mechanical and structural components
- Electrical systems
- Tower
- Foundation

Manufacturing Evaluation

The manufacturing evaluation is to ensure that a specific wind turbine type and its components are manufactured in conformity with the certified design. It is also a useful tool to provide traceability between designer, supplier and manufacturing sites. Evaluation includes:

- Components, including gear boxes, generators, nacelles, towers, rotor blades, etc.
- Substructure and foundation

Type Testing Evaluation

The purpose of the type testing evaluation is to verify such variables as wind turbine function, safety, structural integrity, power performance, power quality, and acoustic noise emission characteristics. Services include:

- Mechanical load measurements
- Power performance measurements
- Safety and function test
- Power quality measurements
- Low voltage ride through (LVRT) test
- Acoustic noise measurements

Inspection includes:

- Static and dynamic blade test
- Gearbox field test
- Converter and generator type test
- Commissioning

Final Evaluation and Certificate

UL issues a specific type/component certificate once the certification process is complete and the final evaluation is satisfactory.

Other supported certification schemes and requirements:

- US: UL 6141 (large WT), UL 6142 (small WT)
- Japan: JSWTA0001 (small WT)
- UK: IEC 61400-2, MCS (small WT)
- German type approval (DiBT)
- Korean type approval (KEA Scheme)



Project Certification

After completing the type certification process, project certification is the next step in the development of an onshore or offshore wind farm. It proves that the type-certified wind turbines and the particular substructure and foundation designs meet site-specific conditions and are in conformity with applicable local codes, official regulations and other site-specific requirements. A project certificate confirms that the structural integrity of the type-certified wind turbines should remain safe under the influence of site-specific conditions, e.g. wind, sea, soil and electrical networks. The project certification process also evaluates the manufacturing of structural components to be installed at a specific wind farm, as well as the transportation, erection and commissioning.

Project certification is typically applied to offshore wind farm projects because they are highly complex. Offshore projects pose more challenging environmental conditions and require additional planning and logistics. For this reason project certification is an important instrument for risk mitigation, thus may be requested by financiers, insurers and/or permitting authorities. UL has over a decade of experience in offshore wind farm certification and is able to support the project development process from early design to the design, manufacturing, transportation, installation and commissioning phases. Further risks during the operation of the offshore wind project can be reduced by an independent, third-party certification of the operations and maintenance phase.

Project Certification Services

Site Conditions Evaluation

- Wind and marine, soil, electrical power network and other environmental conditions

Design Basis Evaluation

- Design parameters and methodologies
- Applicability of codes and standards
- Wind turbine type
- Support structure concept
- Requirements for manufacturing, transportation, installation and commissioning
- Requirements for operations and maintenance
- Requirements for grid connection

Integrated Load Analysis

- Independent modelling of integrated structure consisting of wind turbine and support structure including foundation and soil conditions
- Calculation and application of wind and hydrodynamic loads as well as other loads as required, e.g. earthquake, sea ice or hurricane/typhoon conditions
- Independent parallel calculation of wind turbine, support structure and foundation design loads

Site-Specific Wind Turbine Design Evaluation

- Review of type certificate and evaluation of load comparison between site-specific and type-certified design loads for the wind turbine or the rotor nacelle assembly (RNA)
- Evaluation of site-specific electrical systems, if required

Site-Specific Support Structure and Foundation Design Evaluation

- Evaluation of site-specific design of monopile and transition piece including the grouted or bolted connection
- Evaluation of site-specific jacket design including foundation piles and grouted connection
- Evaluation of secondary steel, scour protection, corrosion protection, etc.
- Evaluation of gravity base foundations and pre-stressed concrete structures
- Evaluation of manufacturing, transportation, installation and maintenance plan

Other Installation Design Evaluations

- Offshore substation (OSS) topside design evaluation:
 - Fire and explosion protection
 - Access and transfer
 - Emergency response
 - Structure/foundation
- Power cable design evaluation

Wind Turbine/RNA Manufacturing Surveillance

- Manufacturing surveillance of rotor blades, structural and mechanical machinery components
- Evaluation of quality system of manufacturing locations
- Manufacturing inspections

Support Structure Manufacturing Surveillance

- Manufacturing surveillance of wind turbine towers, support structures and foundation piles, and pre-cast concrete structures
- Evaluation of quality systems at manufacturing locations
- Manufacturing inspections

Other Installations Manufacturing Surveillance

- Manufacturing surveillance of offshore substation topsides, substructures, and foundations as well as power cables and cable accessories
- Evaluation of quality systems at manufacturing locations
- Manufacturing inspections

Project Characteristics Measurements

Optional conformity evaluation of project characteristics measurements including:

- Grid connection compatibility according to grid codes
- Verification of power performance and/or verification of acoustic noise emission

Transport and Installation Surveillance

- Review of manuals and method statements
- Witness of load-out, offshore transportation and installation of RNA, towers, substructures and foundations
- Witness of load-out, offshore transportation and installation of OSS topsides, substructures, foundations and power cables
- Identify synergies between transportation and installation surveillance and the Marine Warranty Survey (MWS)

Commissioning Surveillance

- Evaluation of commissioning instructions
- Review of commissioning reports
- Witness of commissioning

Final Evaluation and Issue of Project Certificate

Operations and Maintenance Surveillance

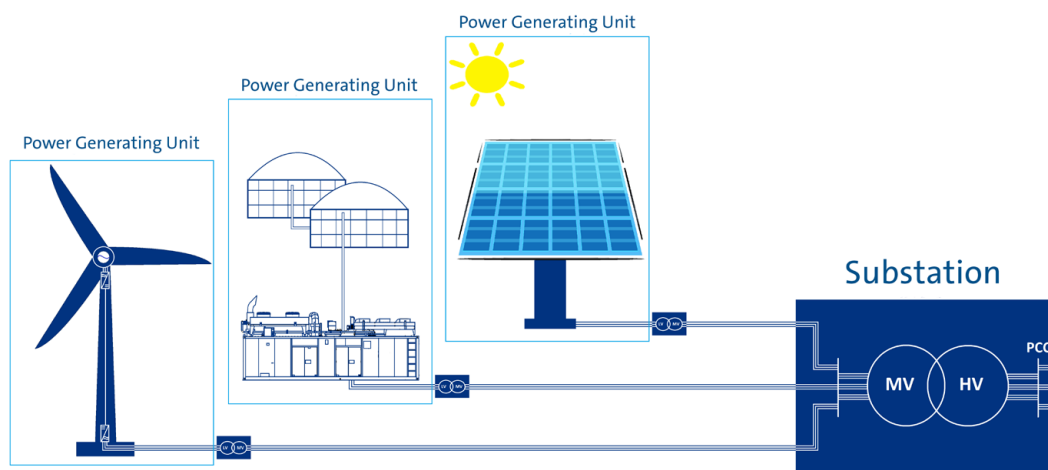
- Evaluation of operations and maintenance records/reports
- Status of outstanding findings from previous inspections
- Status of repair, modification and replacement (RMR)
- Evaluation of RMR records/reports

Grid Code Compliance Certification

Our experience and understanding of global grid codes helps ensure that power from renewable energy technology is safely transmitted onto the grid. UL is an independently accredited certification body according to DIN EN ISO 17065 and is accredited for grid code compliance certification. Our scope covers the German VDE-AR-N Standards for all voltage levels, the Indian Grid Code Notification and several international grid codes.

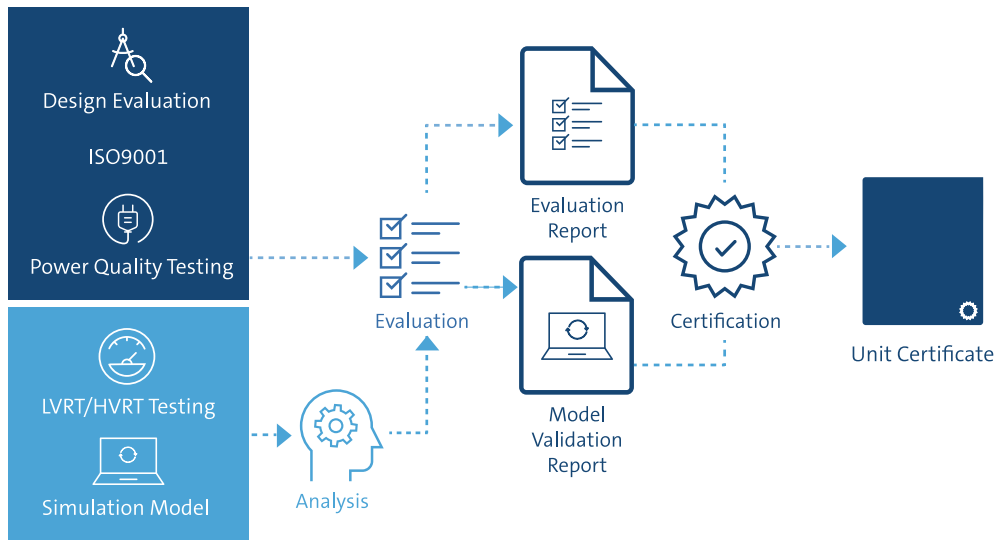
Certification of grid connection refers to local grid codes and requirements of the grid operators in a specific region. UL provides certification in accordance with several national and international grid codes. UL performs concept validations of Power Generating Units (PGU) and Power Generating Systems (PGS) during the research and development phase. Our experts are authorized by the Federation of German Windpower and other Renewable Energies (FGW) for power generating systems certificates by the German Grid Code and Standards. With over ten years of experience we have the ability to support our customers by offering customized solutions that support grid integration and energy systems.

Power Generating System / Power Plant



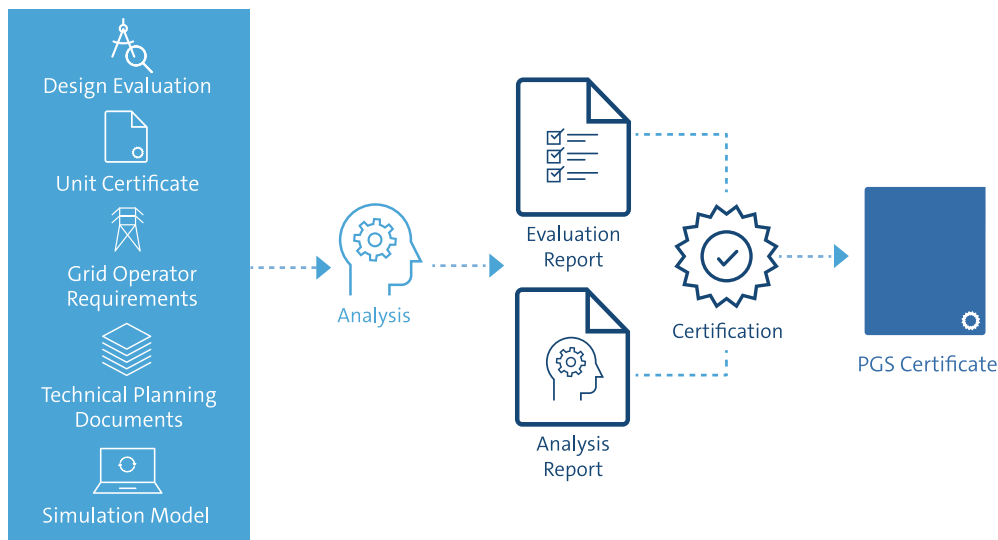
Certification for Power Generating Units

To conduct a certification for Power Generating Units (PGU), UL performs an evaluation and confirmation of the electrical characteristics of the PGU including active and reactive power, low and high voltage ride through (LVRT/HVRT), protection and control systems as well as power quality.



Certification for Power Generating Systems / Power Plants

To conduct a certification for Power Generating Systems/Power Plants (PGS) UL performs an evaluation and confirmation of the requirements of the applicable grid code. The requirements include load flow calculation of the reactive power capability, dynamic simulation of the LVRT/HVRT response and evaluation of the protection and control system of the PGS including all parameters at the point of common coupling.



Additional Grid Integration Services

- Quality assurance inspection of the PGU or PGS (especially substations) conducted during both the construction and commissioning phases to help ensure best possible project outcomes
- Commissioning and warranty transition inspections of PGU, PGS or parts of PGS (such as substations and cabling) for an expert view of the project and to help ensure required quality
- Grid studies to evaluate, analyze, calculate and simulate grid behavior
- Identify issues and perform tasks that help ensure the safety and reliability of the grid

Key Office Locations



AFRICA

Johannesburg, SOUTH AFRICA

ASIA PACIFIC

Beijing, CHINA
Suzhou, CHINA
Bangalore, INDIA
Ise, JAPAN
Tokyo, JAPAN
Seoul, KOREA

EUROPE

Lyon, FRANCE
Bremen, GERMANY
Cuxhaven, GERMANY
Hamburg, GERMANY
Oldenburg, GERMANY
Wilhelmshaven, GERMANY
Milan, ITALY
Ansoain (Navarra), SPAIN

Barcelona, SPAIN

Izmir, TURKEY

London, UNITED KINGDOM

LATIN AMERICA

Buenos Aires, ARGENTINA
São José dos Campos, BRAZIL
Rio de Janeiro, BRAZIL
Bogotá, COLOMBIA
Mexico City, MEXICO

NORTH AMERICA

Albany, New York, UNITED STATES
Northbrook, Illinois, UNITED STATES
San Diego, California, UNITED STATES
San Jose, California, UNITED STATES

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