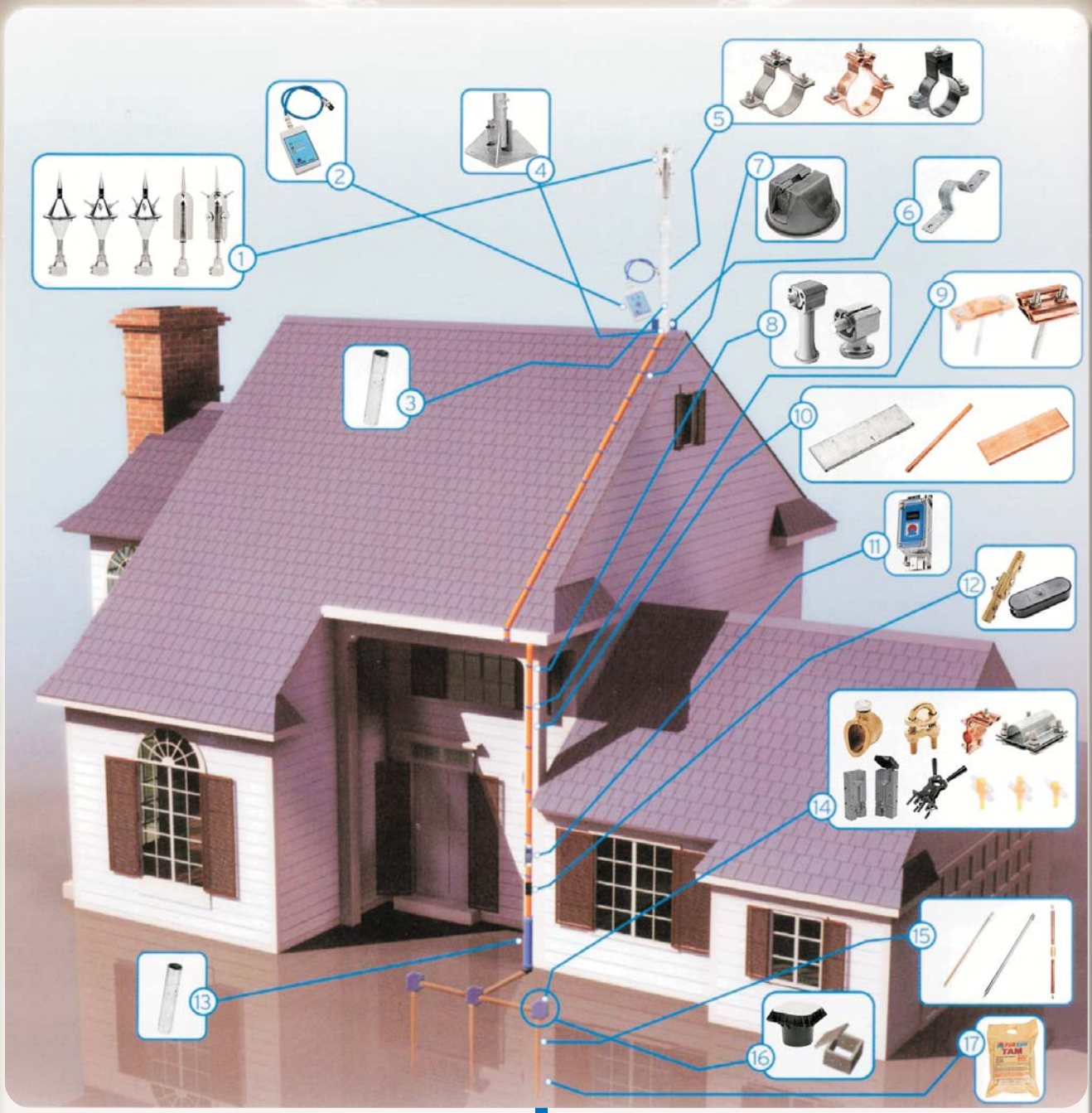
FOREND

FOREND ELECTRICAL MATERIALS & FOREIGN TRADE CO.

ISO 14001
OHSAS 18001

ISO 9001:2008

FOREND E.S.E. INSTALLATION DETAILS



1- Forend E.S.E. Lightning Conductors (Forend EU, Forend EU-M, Petex-S, Petex-M and Petex-L)
2- Forend LC Tester
3- Galvanized Mast
4- Mast Base
5- Mast Clamp
6- Mast Clip
7- Plastic Holders for isolated floors / roofs
8- Plastic Holders for isolated walls
9- Wall Holders
10- Down Conductors
11- Forend Lightning Strike Counter
12- Test Clamps
13- Protection Pipe
14- Earthing Rod Clamps or Exothermic Welding Connection
15- Earthing Rods
16- Plastic or Concrete Inspection Pits
17- TAM (Technical Additive Material)

The Details of External Lightning Protection Systems

1- E.S.E. Lightning Conductor Head

Early Streamer Emission Lightning Conductor for large area protection.

2- Lightning Conductor Mast

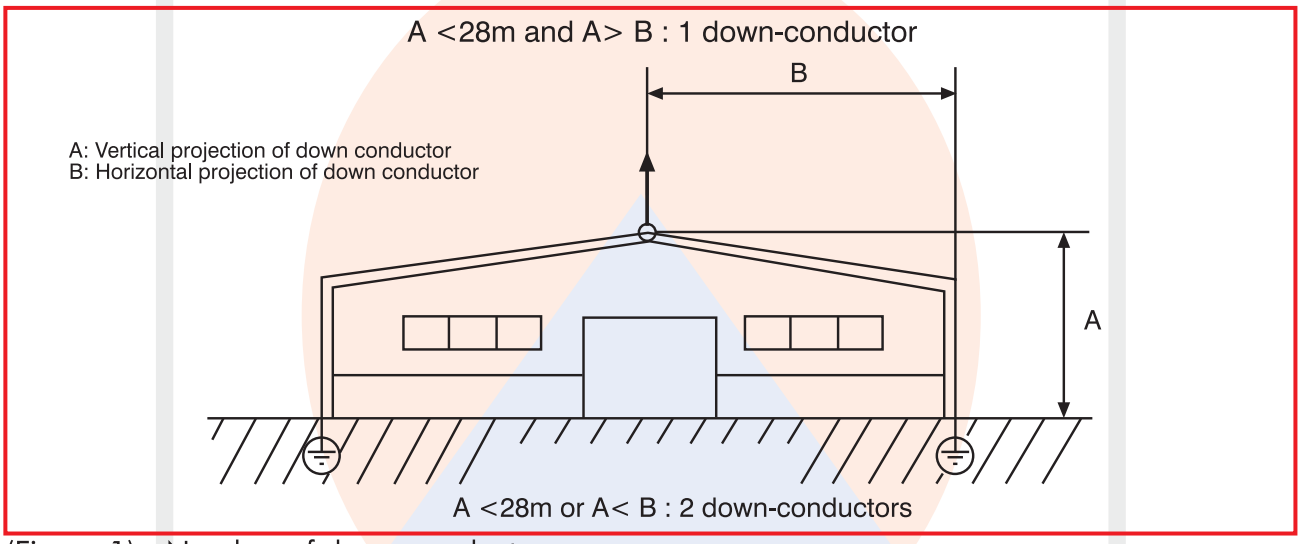
The E.S.E. Lightning Conductor height may be increased by means of an elevation mast.We recommend, Lightning Conductor Mast should be galvanized steel, is to be min. 3 m in length and 60 mm in diameter, down conductors must be fixed with 1 meter max. distance between the conductor spread along the vertical plane.

3- Down and Grounding Conductors

Number of Down - Conductors

Each E.S.E. Lightning Conductor should be connected to the earth termination system by at least one down conductor. Two or more down-conductors are required when:
- The horizontal projection of the conductor is larger than its vertical projection.
- External Lightning Protection is installed on any structures higher than 28m.

The down-conductors should be installed on two different main walls.



(Figure 1) - Number of down-conductors

Down-conductors consist of strips, braided cables, or round sections.Their minimum cross-sectional area of 50 mm^2 is defined in below table.

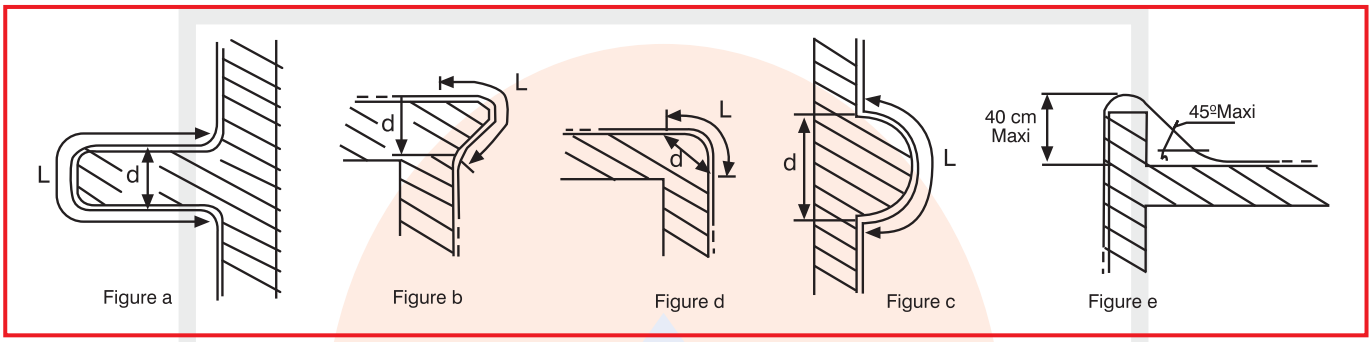
Down-conductors		
Material	Remarks	Minimum dimensions
Bare or tin-plated electrolytic copper (1)	Recommended for its good conductivity and corrosion resistance	Strip: 30x2 mm Round section: 8 mm dia.(2) Braided cable: 30x3,5 mm
18/10–304 stainless steel	Recommended in certain corrosive environments.	Strip : 30x2 mm Round section: 8 mm dia.(2)
A 5/L aluminium	To be used on aluminium surfaces (cladding,curtain- walls)	Strip : 30x3 mm Round section : 10 mm dia.(2)

Notes :

(1) Tin-plated copper is recommended in view of its physical,mechanical and electrical properties (conductivity,malleability,corrosion resistance, etc.)

(2) As the lightning current has an impulse characteristic, the flat conductor is preferred to the round conductor since its outside surface area is larger for a given cross-sectional area.

It must be a fixed mounting surface with conductor fixing internal distance is 1m. It should be installed in such a way that its path is as direct as possible. It should be as straight as possible along the shortest path without sharp bends or upward sections. As seem figure, It is connected d/L. (Figure 2)
Where; d: safety distance, L: the length of conductor according to shock voltages the average max. value, approximately is not be a jumping danger for L < 20 d.
The down conductors should not be routed along or across electrical conduits. However, when electrical conduit crossing is unavoidable, the electrical conduit should be placed inside a metal screen which extends 1 m beyond the point of crossing. The screen should be connected to the down conductor.
Routing round parapet walls should be avoided. Provisions should be made to ensure that down conductors paths are as direct as possible.
However, a maximum height increase of 40 cm is permissible for passing over a parapet wall with a slope of 45° or less. (Figure 2)



(Figure 2)

4- Protective Cover

It protects the down-conductors against mechanical damages. You can use U profile or pipe. To prevent the lightning charge down, conductors must be connected to pipe or to U profile.

5- Lightning Strike Counter

When a lightning strike counter is used to match the number of lightning stroke it should be installed on the most direct down conductor above the test clamp and in any case at height of about 2m. above the ground level.

6- Test Clamp

According to down conductor, covered plastic, is provided to measure the earth resistance, in an accessible position on each main earthing conductor between earthing electrode and must be over protective tube.

7- Earth Termination

You should use reliable earth electrodes according to EN 62305-3. They shall be extensible and driven as deep as possible in earth starting from a minimum depth of 50 cm in the earth and located at such distance from one and other that maximum current likely to flow through one as they do not significally effect the potential of the other's (5 m). Earth Resistance is less than 10 Ohm.

8- Mounting

It must be checked after corrosion between different materials and avoided using different materials as much as possible. The wall's surface must not be destroyed to fixing the carrier pole,conductor clips. It must be provided both canal digs for grounding system and ground on which a building must be rebuilt for grounding system.

9- Project

It must be projected to mounting in truth.

10- Test Report

After the installation is finished, earth resistance must be measured by the authorized personel and than it must be reported and approved by an authorized engineer.

Some examples of our installations

Project: Golden Horn, Metro Bridge, Istanbul in Turkey

Project: FECT at 33.4 Km south direction on Wugu-Yangmei high bridge Free Way in Taiwan

Some examples of our installations

Project: Novosibirsk, Administration Building, Dimitrov Prospekt 2 in Russia

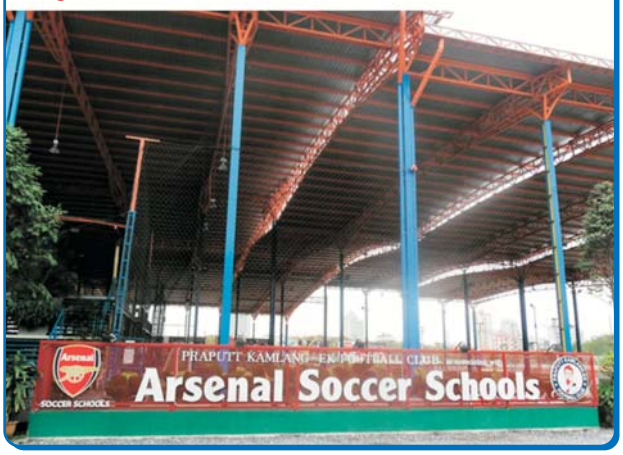
Project: Novosibirsk, Administration Building, Krasny avenue, 17 in Russia

Project: Fishing pier in Rufisque, Senegal

Project: Oil & Gas Factory in Indonesia

Some examples of our installations

Project: Arsenal Soccer Schools in Thailand



Project: Şükrü Saraçoğlu Stadium in İstanbul, Turkey

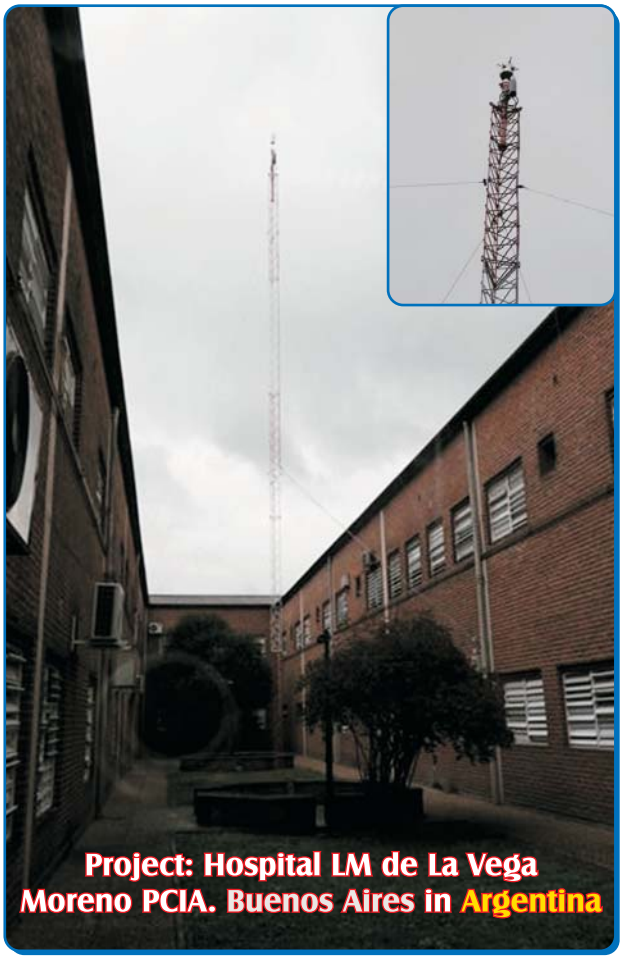
Project: Arena Khimki in Moskva, Russia

Project: Academy of FC Zenit - St. Petersburg Football Junior School of Olympic Reserve in Russia

Project: Tadika Chim School, Malaysia

Project: The Coca Cola Factory in Tarija, Bolivia

Some examples of our installations



Project: Hospital LM de La Vega
Moreno PCIA. Buenos Aires in Argentina

Project: Masjid Sungai Serai in Malaysia

Project: Vayalpad Temple-TTD in India

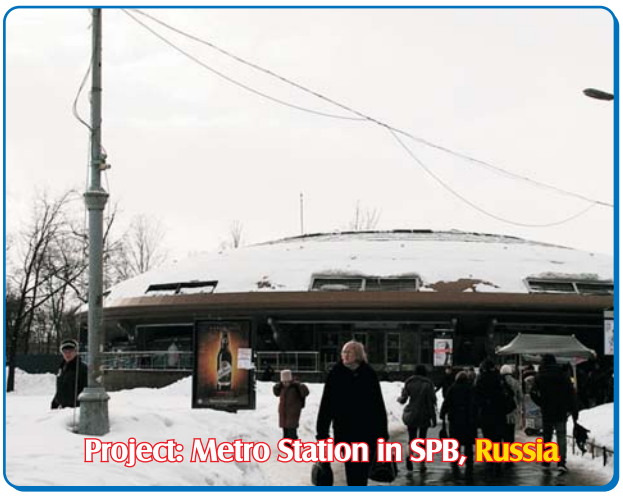
Project: Indian Institute of
Astro Physics India

Project: Kalutara Vihara Buddhist Temple, Sri Lanka

Some examples of our installations

Project: Residence in Shymkent Kazakhstan

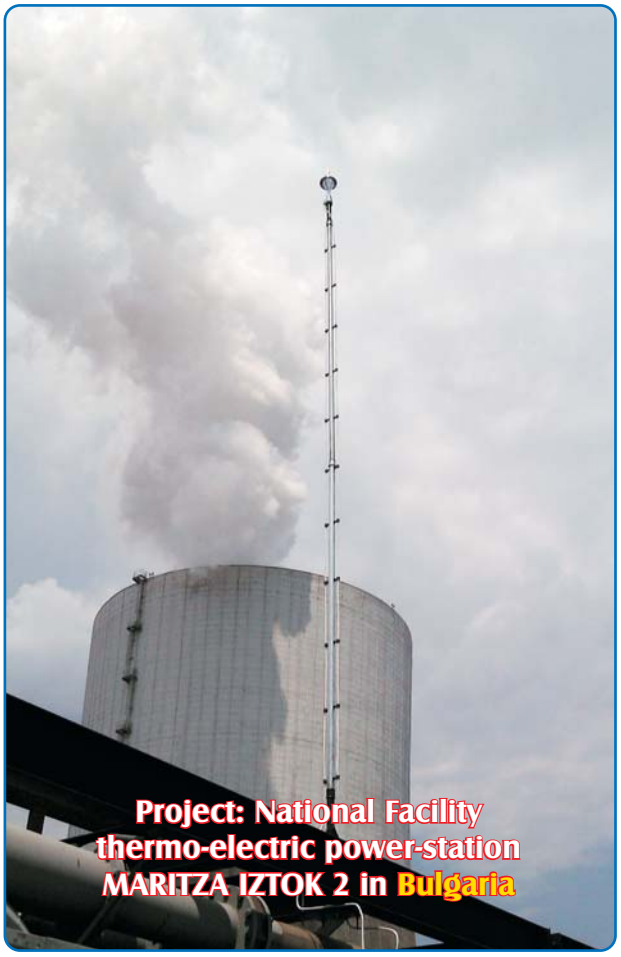
Project: SNO mineral water plant in Georgia



Project: Metro Station in SPB, Russia

Project: Zoo in Jagodina, Serbia

Project: Kapchagay Solar Power Plant in Kazakhstan



Project: National Facility thermo-electric power-station MARITZA IZTOK 2 in Bulgaria

Some examples of our installations

Project: Garages of Metro Line 12 in Mexico City, Mexico

Project: Bureau Of Internal Revenue (Bir) Delta in Quezon Ave. Quezon City, Philippines

Project: Telecom Tower in Ouagadougou, Burkina Faso

Project: Pylon Groupe Balloré Logistics Africa in Cameroon

Some examples of our installations

Project: Sulaymaniyah International Airport in Iraq

Project: Hyundai Motor Co. industrial zone of Kamenka, St. Petersburg in Russia

Project: Streamer International AG
Leningrad region, Vsevolozhsk district, village Nonoe Devyatkino in Russia

Quality Certificates

Active Lightning Conductors Tester

Forend active lightning conductors
can be checked by a Forend L.C. tester any time.

Lightning Strike Counter

To know you had a lightning strike!!!

Produced according to IP 65
Currents detected from 2 kA to 100 kA
Testable with 9 V battery

Pivoting Mast Bases For Lightning Conductors

For easy installations

Cable Lugs

Best quality and best price for your cables!

6 mm² - 240 mm²;
wide range of products

Conductor Plastic Fixing Clamps

Rustproof, light, easy montage

1x50 mm²

2x50 mm²

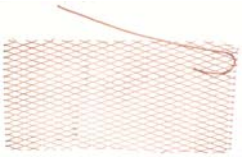
30x3 mm

2.0" - 2x50 mm²

Earthing Grids

The same performance but more economic and lighter than same dimension copper plates.

Dimensions
100x50 cm - 2.00 m



Inspection Pits

For easy resistivity control

- **Endurance against 5 tonnes**
- **Easily transportable**

TAM (Technical Additive Materials)

More effective material to solve
the toughest earthing problems

TAM comes in easy to handle 10 kgs bags.
TAM lowers resistance to earth.
TAM performs in all soil types.

Led Beacon Lights

Maximum Performance

Produced according to IP 65

	FLB-66	FLB-126	FLB-P3
Operation Voltage	24-250 V AC & 50-250 V DC & 12/24/48 V DC		
Power Consumption	4W		
Max. Operating Life	100 K		50 K
Luminous Flux (theoric) * Led manufacturer's data	7000 mCD*/ea. LED		max 50 lumen*/ea LED
Height x Diameter (mm)	220x120		
Operating Temperature (^{o}C)	-40 ^{o}C to + 85 ^{o}C		
Height x Diameter (mm)	220 x 120		
Weight (kg)	1,40		

Forweld Exothermic Welding System

For longer and stronger conductivity
than mechanical connection

Reference Countries

European Union
Bulgaria, Czech Republic, France, Germany, Greece, Ireland, Lithuania, Poland, Portugal, Romania, Slovakia,

Eastern European And Eurasian Countries
Azerbaijan, Georgia, Kazakhstan, Russian Federation, Serbia, Ukraine

North America
United States of America

Latin America
Argentina, Bolivia, Ecuador, Mexico, Peru

Asia
Hong Kong, India, Indonesia, Malaysia, Philippines,
Singapore, Sri Lanka, Taiwan, Thailand, Vietnam

Middle East
Iran, Iraq, Jordan, Lebanon, Oman, Syria, United Arab Emirates

Africa
Burkina Faso, Cameroon, Djibouti, Egypt, Ethiopia, Ghana, Ivory Coast, Madagascar, Morocco, Rwanda,
Senegal, South Africa, Tunisia

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