REFERENCES & SYSTEM DESCRIPTIONS OF ZINGA® APPLICATIONS ON REBARS

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UNIQUE CHARACTERISTICS AND ADVANTAGES OF ZINGA

ZINGA is in fact much more effective than any other existing anti-corrosion system.
This efficiency is based on a number of unique characteristics and advantages, as explained in the following summary.

1. ZINGA protects the metal against rust in two ways: an active, cathodic, galvanic protection due its high zinc content and a passive barrier protection due to the zinc salt on top of the surface, and due to the binder in ZINGA that reduces the disintegration of the zinc.

2. The application of ZINGA is very easy. It can be painted onto the surface with a brush or a roll. It can also be sprayed with a pistol, and it can be applied in a bath. There is no need for sophisticated equipment that can only be found in a workshop. ZINGA can be applied on site, even by non-professionals.

3. ZINGA can be applied in a wide range of weather conditions. ZINGA can be applied on a damp surface (but not on drops of water). Humidity can even intensify the cathodic action and accelerate the formation of the zinc salts on the surfaces that offer the barrier protection. ZINGA can be applied at very high or low temperatures (up to 40° C or 104° F and down to -15° C or 5°F).

4. The surface preparation can be reduced to a minimum: the metal must be clean (free from dirt, grease, oil, salts, paint, and mill scale) and rough. It is not always necessary to grit-blast the metal first.
   - Application on bare metal: Mostly grit-blasting is necessary, but in some cases the substrate already has the required roughness degree due to former grit-blasting or due to corrosion.
   - Application on top of hot-dip galvanisation: Old and corroded hot-dip only needs to be cleaned and already has the required roughness degree. New hot-dip can be treated in order to obtain the required roughness.
   - Application on an old ZINGA layer: When ZINGA is applied on an old ZINGA layer, then the surface just needs to be cleaned.

5. ZINGA is always applied under ambient temperatures, so that delicate metal structures cannot be deformed. Even dipping is done in ambient temperature. No energy is wasted to warm up ZINGA, which is necessary for hot-dip galvanisation wherefore you need temperatures up to 460 °C.

6. ZINGA has a quick drying time. A new layer of ZINGA can be applied after 1 hour. Topcoats can be applied after 6 to 24 hours, depending on layer thickness and atmospheric conditions.

7. ZINGA does not peel off and is not brittle. In case of mechanical damage the ZINGA layer will be compressed or squashed, but it will not crack due to its flexibility.

8. One of the most decisive advantages of using ZINGA is that the zinganisation system can be recharged. Each new layer of ZINGA blends perfectly with the previous one. Additional layers all blend to one single, homogeneous ZINGA layer. There is no risk for accumulation of layers that are different in structure, which could cause peeling off. You cannot distinct different layers, as is the case with galvanising by hot-dip. Moreover, this capacity of recharging reduces the surface preparation to an absolute minimum. Other coating systems, for instance with paints, demand an elaborate and often expensive surface preparation before the application of a new layer.

9. This property of recharging can be of use if you still have to do some drilling or welding on the surface, or if the structures still have to be transported. In that case the first layer is meant as a primer. It can intercept possible damages. Even welding is possible on top of ZINGA. Afterwards, the final layer of ZINGA can be applied and local damages can be repaired. The new layer makes the former layer liquid again and the result is one homogeneous ZINGA layer. When there is no need to recoat the whole structure, you can apply a small quantity of ZINGA on the damaged spots and the whole structure is free from rust again. Repairs will be invisible after a certain time.

10. Structures that have been metallised or galvanised by hot-dip will begin to rust after a certain period. Such worn-out and damaged structures can also be recharged by ZINGA.

11. ZINGA has a zinc content of 96 % in the dry layer. The zinc is pure to 99.995 %. In order to obtain a real cathodic protection you need at least 92 % of zinc in the dry layer. That is scientifically proven. The so-called zinc-rich paints do not meet this condition.

12. Moreover ZINGA is based on protected zinc. The zinc particles are protected by a special resin that allows the formation of the galvanic couple, but that also gives an additional protection. Therefore protection with ZINGA is a superior alternative for galvanisation by hot-dip.

13. The zinc granules have been specially shaped so that they have a bigger contact surface through which they can attach to one another. For your information: the zinc used in ZINGA is made by the Belgian company Umicore, well-known all over the world, since they are the number 1 manufacturer in the world of these atomised zinc dust pigments, further electronically prepared for Zingametall. This atomisation process provides unique qualities and a very high zinc purity. This is also one of the reasons why ZINGA does not have one single true competitor in the world.

14. ZINGA is uniquely characterised by the fact that it sacrifices itself or that it is “consumed”. Together with the quality of not peeling off, this results in the depletion of each applied layer: between 2 – 15 µm per year depending on the environmental conditions.
This is an important factor in monitoring the application and the evaluation of the lifetime of the system. Hence, it is a true benefit in terms of maintenance and budget scheduling.

15. With ZINGA, a customized and personal solution can be offered. Customers are not always in need of a long term corrosion protection or don’t have the budget for it. In case of a limited budget and desired protection time of for instance only 5 – 7 years, the layer thickness can be reduced and this will have an effect on the price per m². In other words: ZINGA is the most “flexible” customized solution.

16. ZINGA can be topcoated by a large number of compatible paints. Such duplex systems will more than double the lifetime of ZINGA. In order to reinforce the duplex qualities of the ZINGA system a topcoat can be applied. We can supply you with different compatible paints: acryl, epoxy, polyurethane; with or without micaceous iron oxides, the so-called MIO's. These paints can be applied directly on ZINGA (using the mist/full coat technique).

17. These topcoats can be bought from the same supplier. You just need to speak to one contact person and only that one company can be held responsible for the total application.

18. ZINGA is composed of non-toxic elements according to European Standards and can be used in contact with potable water (BS 6920).

19. ZINGA is heat resistant up to 120° C. ZINGA can also intercept occasional and short thermal shocks up to 150° C.

20. a) ZINGA has an unlimited pot and shelf life.
b) ZINGA is a one component coating.

OVERVIEW OF MAIN REPORTS OF TESTS PERFORMED WITH ZINGA

to download the actual reports, please visit www.zinga.eu

ZINGA quality label

SGS Systems & Services Certification (Belgium)

Certificate ISO 9001 for quality management

The company Zingametall has implemented a quality management system that is based on the standard ISO 9001. Hereby we commit ourselves to strive for continuous improvement and customers' satisfaction.
(http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=46486)

British Board of Agrément (BBA) (United Kingdom)

BBA certificate n° 03/4047

After thorough evaluation (effect on water quality, fire propagation, surface spread of flame, welding, resistance to abrasion, weathering, etc.) ZINGA received the approval from the BBA, which is the UK's major approval body for new construction products and installers. The BBA, in collaboration with SGS Coating Services, carries out regular inspections of the manufacturing process of ZINGA. This includes all the procedures involved with the production and the control of the delivered raw materials as well as of the quality of the final product. Traceability of the delivered product is assured by means of a specimen of each production batch.
(http://www.bbacerts.co.uk/)

Australian Paint Approval Scheme (APAS) (Australia)

APAS certificate n° 0180

After a thorough research of test reports, applications in Australia and a visit to the factory in Belgium, Zingametall BVBA was acknowledged as a recognized manufacturer by the APAS.
"APAS (Australian Paint Approval Scheme) is the largest and most widely recognized paint scheme in the world".
(http://www.apas.gov.au/index.asp)

NATO Approval (International)

Manufacturer's n°: BE0421689088; NSN for ZINGA: 8030131137027

In 1989 Zingametall received a Manufacturer's card and a NATO Stock Number for ZINGA. A NATO Stock Number is recognised as a stock number of the armies of the member states. Every product that is accepted by the NATO can be used by all the armies of the NATO member states without the necessity or obligation to test the product again.
(http://www.nato.int/structur/ac/135/ncs_guide/english/e_1-6-5.htm)

Engineers India Limited (India)

Based on reports, test certificates from independent European and Chinese test organisations combined with other information documents, the 'Engineers India Limited' sees ZINGA as an effective protective coating system in various corrosive environments.
They state that ZINGA would be a 'better replacement' for inorganic zinc silicates and hot dip galvanisation.
(http://engineersindia.eil.co.in/)

London Underground (United Kingdom)

ZINGA has been accepted by the 'London Underground' for use as a protective system on ferrous metals and as alternative to hot-dip galvanisation or metallisation. They sent us this Certificate after extensive study of existing documents in combination with doing tests on ZINGA's behaviour in contact with fire themselves.
(http://www.tfl.gov.uk/corporate/modesoftransport/1574.aspx)

ZINGA galvanic protection

ISO 12944-6 (COT bv) (Netherlands)

Test according to the ISO 12944-6 standard

ZINGA applied in 2 layers of each 90µm DFT got the classification:
C5I-High/C5M-High
and Im2-Medium/Im3-Medium.
ZINGA applied in 2 layers of each 60µm DFT got the classification:
C5I-Medium/C5M-Medium or C4-High.
and Im2-Medium/Im3-Medium.
ZINGA applied in 1 layer of 60µm DFT + Alufer N applied in 1 layer of 80µm DFT got the classification:
C5I-High/C5M-High

NORSOK Certificate (COT bv) (Netherlands)

Test according to the NORSOK standard M-501, rev. 5, system 7

ZINGA has passed the 4200 hours seawater immersion test and the 4200 hours cyclic test without any formation of rust, blisters, cracks, flakes or cathodic disbondment. The pull-off adhesion test on ZINGA resulted in values of more than 7MPa.

Det Norske Veritas (DNV) (Norway)

Ballast Tank test

ZINGA was applied on blast-cleaned test panels that were placed in a ballast tank filled with sea water with wave movement and cyclic heating. Other test panels were placed in a condensation chamber. No corrosion of the steel substrate could be demonstrated. Based on the results of the testing, ZINGA meets the requirements of a B3 classification. In the report is stated that ZINGA has a beneficial corrosion protective performance.

Field test (Sintef) (Norway)

ZINGA duplex system compared to TSZ/TSA

This report gives the field test results of visual inspection of the panels after 5 years marine atmospheric exposure started in September 2002 and terminated in May 2008. The system that was tested was ZINGA + Alufer N + Alufer WR and performed excellently compared to systems based on TSZ/TSA (metallisation).

Bodycote Materials Testing (United Kingdom)

Cathodic Disbondment test

ZINGA applied at 60 µm DFT was exposed during 26 weeks at -1,0 volt. The results was no cathodic disbondment at all.

Potential Performance Test (COT bv) (Netherlands)

Determining the galvanic protection

The results showed active behavior of this film (-1110mV using Ag/AgCl). This means that it will provide cathodic protection to damaged, uncoated or improperly coated metal surfaces.

Trial protection of Crevices on Młyńskie bridges in Wrocław (Poland)

Crevice Corrosion field test

On the basis of an agreement between IBDiM in Warsaw and The Administration of Roads and Local Services in Wrocław trial application tests of various systems for the protection of crevices on Młyńskie Bridges in Wrocław were conducted.
Upon this test ZINGA was approved for use on bridges in Poland.

ZINGA in comparison with hot-dip galvanisation

University of Ghent (RUG) (Belgium)
Measurement of the short circuit current flow of ZINGA in comparison to hot-dip
In this test (based on electro-chemical measurements) is demonstrated that ZINGA offers cathodic protection equal to that of hot-dip.

BNF Fulmer Research Centre (United Kingdom)
Electrochemical tests on ZINGA in comparison to hot-dip
The open circuit voltage and galvanic current between the galvanising layers and the bare steel were measured. The conclusion of the report is that ZINGA offers galvanic protection to steel comparable to that offered by hot-dip galvanisation. In other words: a layer of ZINGA is a completely metallic layer exactly like a hot-dip galvanising layer, and will behave as such in all aspects. Moreover, this test demonstrated that the corrosion rate of ZINGA is 1/3 of the corrosion rate of hot-dip galvanising under similar (immersion) conditions.

Forschungs- und Materialprüfungsanstalt Baden-Württemberg (FMPA) (Germany)
Different tests on the efficiency of ZINGA in comparison to hot-dip: potential measurement and short circuit current measurement
In this test is demonstrated that the electrochemical behaviour of ZINGA is similar to that of a hot-dip layer.

South African Bureau of Standards (SABS) (South Africa)
Salt spray test on ZINGA in comparison to hot-dip (loss in weight)
In this test is demonstrated that the loss in weight of ZINGA is 1/10 of the loss in weight of hot-dip galvanising after a 400 hours salt spray test. The layer thickness of ZINGA diminishes because ZINGA is being consumed, contrary to a paint that will start to peel off after a certain period of time. This illustrates the fundamental difference between a paint and a galvanising system.

Direction Départementale de l'Equipement – Service Maritime de la Vendée (France)
Field test on the efficiency of ZINGA in comparison with hot-dip on sea buoys
Two buoys (one treated with ZINGA, the other one hot-dip galvanised) have floated in the Atlantic Ocean for four years. After those four years, the buoy treated with ZINGA showed no trace of rust while the hot-dip galvanised buoy was severely corroded in several places.

ZINGA on rebars

Steel Authority of India (India)
Measurement of corrosion rate by salt spray and immersion tests
A comparison was made between uncoated steel rebars, fusion bonded epoxy coated rebars (FBEC), hot-dip galvanised rebars (HDG) and zinganised rebars (ZINGA). The corrosion rate per year was measured after immersion and salt spray. This test demonstrated several advantages of ZINGA: the greater degree of galvanic protection, the lower sacrificial zinc consumption due to the dispersion of zinc dust in the binder and the additional barrier protection created by the binder.
➔ ZINGA **>** FBEC **>** HDG **>** Uncoated

Jadavpur University (India)
Different tests on the efficiency of ZINGA in comparison with other coatings on rebars
A comparison was made between uncoated steel (Mild steel and Stainless steel) rebars, fusion bonded epoxy coated rebars (FBEC), hot-dip galvanised rebars (HDG) and zinganised rebars (ZINGA). The salt spray test pointed out that the zinganised rebars have a corrosion resistance that is about 2 times higher than that of hot-dip galvanised rebars. ZINGA is also least susceptible for stress corrosion cracking.
➔ in NACE solution: ZINGA **>** HDG **>** FBEC **>** Stainless steel **>** Mild steel

Amirkabir University Poly Technic Tehran (Iran)
Different tests on the efficiency of ZINGA in comparison with uncoated rebars
The zinganised rebars passed the 500 hours salt spray test without formation of rust, peeling or blistering, not even in places where the coating was mechanically damaged. The rebars that were not zinganised were heavily corroded.

Bend test (COT bv) (Netherlands)
Bend test of ZINGA in layer thickness of 50µm DFT over 12 mm
ZINGA, dry film thickness about 50 µm, shows no cracks when bending on a cylindrical mandrel with a diameter of 12 mm.

University of Ghent (Belgium)
Pull-out test on zinganised rebars
A pull-out test was performed to evaluate the influence of a ZINGA layer on the bond strength of the rebar with the concrete. The conclusion was that coating with ZINGA does not negatively affect this.

Adherence of concrete to zinganised rebars at B-Holding (Belgian Railways)
Adherence of concrete to zinganised rebars
The conclusion of the report is:
It is clearly more difficult to cleave the rebar bloc containing the steel rod protected by Zinga. The adherence of the concrete to the steel rod is better. The actual cleavage happens in the concrete.

Other tests on ZINGA

❖ Reports concerning health

National Institute of Public Health (Poland)
Use of ZINGA on the inside of potable water storage tanks
Conclusion is:
ZINGA is approved for covering the inner surfaces of steel containers designed to store potable water.

Water regulations Advisory Scheme (United Kingdom)
Test on the influence of ZINGA on water quality
These tests were performed according to the standard BS 6920 to determine whether or not the quality of potable water is affected when it is in contact with a ZINGA layer. The water was analysed on taste, appearance, growth of micro organisms, extraction of harmful substances and extraction of metals. The obtained results complied with the requirements and ZINGA was found suitable for contact with potable water.

EDF - Gaz De France (France)
Toxicological advise
A positive toxicological advise was written and distributed in the company EDF-Gaz De France concerning the national use of ZINGA.

❖Reports concerning reliquification

University of Ghent (Belgium)
Test on how successive ZINGA layers blend with each other
This test demonstrates that a newly applied ZINGA layer makes the former layer liquid again so that both layers blend together to one single homogeneous layer. The new layer recharges the old one. The ZINGA film galvanising system is very easy to maintain and to recharge: there is no need for grit-blasting, contrary to the surface preparation that is required when a traditional paint has been used.

Stangers Consulting Engineers and Scientists (United Kingdom)

Tests a.o. how successive ZINGA layers blend with each other

ZINGA is easy to apply by brush and resoftens caked Zinga or dry Zinga films as claimed by the manufacturer. This property enables ZINGA to be built up into thick composite layers avoiding the discrete films achieved with conventional coatings.
Their end conclusion was: It is evident that the product has special properties which place it, as far as we know, into a unique category.

❖ Report on the surface spread of flames

SGS Yarsley Technical Services (United Kingdom)

Test on the fire propagation on ZINGA

The results of the test according to the BS 476: part 6 show that ZINGA has a class 0 surface. ZINGA did not ignite during exposure to heating.

❖ Reports concerning friction coefficient

KTA-TATOR (United States of America)

Test on the friction coefficient of ZINGA

The slip coefficient of ZINGA applied at 100µm DFT is 0,52.

China National Construction Steel Quality Supervision and Test Center (China)

Test on the friction coefficient of ZINGA

The slip coefficient of ZINGA applied on steel plates and bolts, ranges from 0,54 to 0,67.

❖ Report concerning weldability

University of Ghent (Belgium)

Test on the influence of ZINGA on welding steel

A set of 3 x 2 plates, covered with a layer of Zinga, the thickness of which was respectively 15µm DFT, 40µm DFT and 60 µm DFT.
After a polymerisation period of seven days the two plates covered with the same coating thickness were welded together by hand.
The conclusion was:
None of the 3 specimens shows any deficiency, neither in the welding seams nor in the steel itself.

www.zinga.be

OVERVIEW AVAILABLE REFERENCES

Please find hereafter an overview of our references. Some of the references are enclosed. All other mentioned references can be obtained upon request.

Reference structure:

First letter: ISO letter of the country of the ZINGA application
Following letters: Theme references

Example: FI-AG-FO- Cattle and Pigfarm

FI:	Finland (country)
AG:	Agriculture (theme)
FO:	Food (theme)
Cattle and Pigfarm:	Title of the reference

AG: Agriculture

1.	COW SHED BEAMS - BELARUS	*BY-AG-Cow Shed*
2.	DAIRY FARM VITEBSK - BELARUS	*BY-AG-Dairy farm*
3.	MARTENS DIRK – AGRICULTURAL MACHINERY - BELGIUM	*BE-AG-OL-TE-Martens*
4.	CATTLE- AND PIGFARM - FINLAND	*FI-AG-FO-HD-Cattle and Pigfarm*
5.	GRAIN SILOS NADOR CEREALES – MOROCCO	*MA-AG-HD-TA-Grain Silos Nador Cereales*
6.	YUZHNY GREENHOUSE FARM - RUSSIA	*RU-AG-HD-Yuzhny*
7.	KENSINGTON PALACE SUNKEN GARDENS – UNITED KINGDOM	*UK-AG-AM-CI-TP-Kensington Palace Sunken Gardens*
8.	EDEN GREENHOUSE DOME – UNITED KINGDOM	*UK-AG-HD-HT-TP-Eden*

AL: Alu ZM

1.	FENCE SUNNY EUROPE – BELGIUM	*BE-AL-CR-HD-Fence Sunny Europe*
2.	RENOVATION SCHOOL SAINT-JOSEPH – LEVIS QUEBEC	*CA-AL-AM-HD-Saint-Joseph*
3.	SEOUL AIR CONDITIONING – SOUTH KOREA	*KR-AL-PI-Seoul Air Conditioning*
4.	HIGHWAY DEPARTMENT - THAILAND	*TH-AL-Highway Department*

AM: Historical and recreational buildings

1.	MUSEUM HOTEL IN WENDAKE - QUEBEC	*CA-AM-CO-Wendake*
2.	BIRD'S NEST - CHINA	*CN-AM-Bird's Nest*
3.	GENT - KIOSK – BELGIUM	*BE-AM-CO-OL-Gent Kiosk*
4.	METRO – MINSK – BELARUS	*BY-AM-LT-TC-Metro*
5.	RENOVATION SCHOOL SAINT-JOSEPH – LEVIS QUEBEC	*CA-AL-AM-HD-Saint-Joseph*
6.	PARLIAMENT BUILDING - QUEBEC	*CA-AM-Parliament Building Quebec*
7.	EGLISE SAINTE THERESE – CHURCH – CANADA	*CA-AM-Eglise Sainte Thérèse*
8.	WALT DISNEY – HONG KONG	*CN-AM-TE-Walt Disney HK*
9.	NATIONAL GRAND THEATRE BEIJING - CHINA	*CN-AM-MA-Theatre Beijing*
10.	OHENE DJAN SPORT STADIUM LIGHT POLES - GHANA	*GH-AM-HD-PY-OheneDjanStadium*
11.	KENSINGTON PALACE SUNKEN GARDENS – UNITED KINGDOM	*UK-AG-AM-CI-TP-Kensington Palace Sunken Gardens*
12.	ROYAL TRAIN SHED – UNITED KINGDOM	*UK-AM-CI-RoyalTrainShed*
13.	ZIMBALI CONDOMINIUM – WORK OF ART – SOUTH AFRICA	*ZA-AM-Zim Condomin*

AP: Airports

1.	GUANGZOU NEW BAIYUN AIRPORT - CHINA	*CN-AP-HD-Baiyun*
2.	DÜSSELDORF - AIRPORT - GERMANY	*DE-AP-CO-HD-OL-TE-Düss.Airport*
3.	MUMBAI DOMESTIC AIRPORT - INDIA	*IN-AP-Mumbai Domestic airport*
4.	SUVARNABHUMI – AIRPORT - THAILAND	*TH-AP-DI-SuvarnabhumiAirport*

AR: Armies and military organisations

1.	NATO – NATO PUMP STATIONS - BELGIUM	*BE-AR-OL-PI-TE-NATO*
2.	BELGIAN ARMY - NAVY SHIPS AND ANTENNA - BELGIUM	*BE-AR-OL-PY-SH-Belgian Army*
3.	USNS ZEUS CABLESHIP - USA	*CA-AR-MA-HD-SH-USNS Zeus Cableship*
4.	POLES ARMY TENTS - UNITED KINGDOM	*UK-AR-DI-Poles Army Tents*
5.	US ARMY - ARMY VEHICLES - UNITED STATES OF AMERICA	*US-AR-HD-OL-TE-TR-US Army*
6.	MISSISSIPPI DEPARTMENT OF TRANSPORTATION BILOXI BRIDGE – UNITED STATES OF AMERICA	*US-AR-BR-TE-MDOT*
7.	NEXRAD TOWER – UNITED STATES OF AMERICA	*US-AR-PY-Nexrad Tower*

AS: Automatic spraying lines

8.	REBAR SPRAYING INSTALLATION TEHRAN HARA - IRAN	*IR-AS-RE-AutomSprayLine*

AZ: Aquazinga

1.	FLOREAC – COAL FUNNEL – BELGIUM	*BE-AZ-HT-OL-Floreac*
2.	CARSID - BELGIUM	*BE-AZ-HT-OL-TE-Carsid*
3.	J.M. INDUSTRIAL – RACKS, METAL EQUIPMENT AND STRUCTURES IN BRICK MANUFACTURING FACTORIES- BELGIUM	*BE-AZ-CE-HU-OL-TE-JM Ind*
4.	YUEHAI PASSAGE TRAIN FERRY PIER TERMINAL - CHINA	*CN-AZ-MA-RW-YuehaiTrainFerry*
5.	SULTAM – CHIMNEY - ISRAEL	*IL-AZ-HT-OL-Sultam*
6.	DERBY – TURBINE EXHAUST STACKS - UNITED KINGDOM	*UK-AZ-HT-OL-TE-Derby*
7.	PORT ELISABETH ELECTRICITY DEPARTMENT - FUEL TANKS AND EXHAUST – SOUTH AFRICA	*ZA-AZ-HT-TA-Port.El*

BR: Bridges

1.	MOLISSON STREET BRIDGE- AUSTRALIA	*AU-BR-Molisson Street Bridge*
2.	QUEENSLAND RAILWAY BRIDGES - AUSTRALIA	*AU-BR-RW-QR Railway Bridges*
3.	REYNELLA BRIDGE - AUSTRALIA	*AU-BR-TC-Reynella Bridge*
4.	EUROPEAN TECHNICAL ASSOCIATION FOR PROTECTIVE COATINGS - BELGIUM	*BE-BR-OL-TE-ETAPC*
5.	DE BRANDT – FENDER CONSTRUCTIONS - BELGIUM	*BE-BR-IM-OL-De Brandt*
6.	MELLE BRIDGE - BELGIUM	*BE-BR-OL-TC-Melle Bridge*
7.	GENT - KEIZER BRIDGE - BELGIUM	*BE-BR-CR-OL-Keizer Bridge*
8.	WEGENFONDS BRIDGE - BELGIUM	*BE-BR-OL-Wegenfonds*
9.	RUMST BRIDGE – BELGIUM	*BE-BR-Rumst Bridge*
10.	RAILWAY OFFICE - BENIN	*BJ-BR-OL-RW-Chemins Fer*
11.	DR QUESNELL BRIDGE EDMONTON CANADA	*CA-BR-Dr Quesnell Bridge Edmonton*
12.	CONFEDERATION BRIDGE - CANADA	*CA-BR-OL-Confederatie*
13.	BC FERRY TERMINALS - CANADA	*CA-BR-MA-OL-TE-BC Ferry*
14.	OVERLANDER BRIDGE - CANADA	*CA-BR-OL-TE-Overlander*
15.	HANGZHOU BAY BRIDGE - CHINA	*CN-BR-RE-Hangzou Bay*
16.	BLANICE RIVER BRIDGE – CZECH REPUBLIC	*CZ-BR-OL-Blanice*
17.	EL SALAAM BRIDGE - EGYPT	*EG-BR-MA-PI-TE-Salaam*
18.	AUTOMATED PARKING SYSTEMS SILODAM AMSTERDAM – NETHERLANDS	*NL-BR-CO-Automated Parking Systems Silodam Amsterdam*
19.	KALVOYA BRIDGE - NORWAY	*NO-BR-MA-OL-TE-Kalvoya*
20.	BRIDGE GIRDERS – POLAND	*PL-BR-Girders*
21.	FOOTBRIDGES AND PROTECTION BARRIERS BYDGOSZEZ - POLAND	*PL-BR-CR-Bydgoszez*
22.	RENOVATION OF THE SIERKIERKOWSKI BRIDGE IN WARSAW, NATIONAL ROAD- POLAND	*PL-BR-CR-Sierkierkowski Bridge*

23.	ST PAUL – JETTY – REUNION	*RE-BR-MA-St. Paul*
24.	TEMVAR BRASOV BRIDGE – ROMANIA	*RO-BR-PI-Temvar Brasov Bridge*
25.	NEWARK MARINA BRIDGE - UNITED KINGDOM	*UK-BR-OL-Newark Mar.*
26.	TAXI BERTH BRIDGE IN CARDIFF BAY - UNITED KINGDOM	*UK-BR-Taxi Berth*
27.	MISSISSIPPI DEPARTMENT OF TRANSPORTATION BILOXI BRIDGE – UNITED STATES OF AMERICA	*US-AR-BR-TE-MDOT*

BW: Breweries

1.	KBL LTD – BREWERY - BOTSWANA	*BW-BW-KBL*

CE: Cement factories and brick manufacturing companies

1.	HOLCIM GRANULATS - CEMENT FACTORY - BELGIUM	*BE-CE-OL-TE-Holcim*
2.	J.M. INDUSTRIAL – RACKS, METAL EQUIPMENT AND STRUCTURES IN BRICK MANUFACTURING FACTORIES- BELGIUM	*BE-AZ-CE-HU-OL-TE-JM Ind.*
3.	PAESEN - CONCRETE MILL - BELGIUM	*BE-CE-TA-Paesen*
4.	SCHWENK – CEMENT FACTORY - GERMANY	*DE-CE-OL-TE-Schwenk*
5.	SIAM CEMENT - THAILAND	*TH-CE-SiamCement*
6.	THE INFRASTRUCTURE OF THE COMPANY LAFARGE – SOUTH AFRICA	*ZA-CE-OL-Lafarge*

CI: Cast iron

1.	DULLE GRIET - CANNON – BELGIUM	*BE-CI-TC-Dulle Griet*
2.	DE GIEY – THE FENCE OF THE CASTLE - BELGIUM	*BE-CI-CR-OL-De Giey*
3.	KLEIN KASTEELKEN – CAST IRON FENCE - BELGIUM	*BE-CI-CR-OL-TC-Klein Kasteelken*
4.	TEATRO MUNICIPAL - BRAZIL	*BR-CI-CO-TC-Teatro*
5.	FOUNTAINS IN PEOPLE'S PARK - DUBLIN – IRELAND	*IE-CI-Fountains*
6.	KENSINGTON PALACE SUNKEN GARDENS – UNITED KINGDOM	*UK-AG-AM-CI-TP-Kensington Palace Sunken Gardens*
7.	ROYAL TRAIN SHED – UNITED KINGDOM	*UK-AM-CI-RoyalTrainShed*

CN: Cranes

1.	ANTWERP - PORT CRANES – BELGIUM	*BE-CN-OL-Antwerp Port Cranes*
2.	HARBOUR OF GENK – BELGIUM	*BE-CN-OL-TE-KHG*
3.	MENGE – THE TOWER CRANE OF THE COMPANY MENGE, SPECIALISED IN RENOVATION OF CHIMNEYS - BELGIUM	*BE-CN-Menge*
4.	PACIFIC GRAIN ELEVATOR - CANADA	*CA-CN-MA-Pacific Grain Elevator*
5.	OFFICE TOGOLAIS DES PHOSPHATES PHOSPHATE MINE OFFSHORE - CHARGING CRANES - TOGO	*TG-CN-MA-OL-PE-Off.Togolais*

CO: Construction and engineering

1.	GENT - KIOSK – BELGIUM	*BE-AM-CO-OL-Gent Kiosk*
2.	DENDERMONDE - BACOB BANK – BELGIUM	*BE-CO-OL-Bacob*
3.	CNO – A COOLING TOWER - BELGIUM	*BE-CO-OL-CNO*
4.	BLANKENBERGE - PARAVENT – BELGIUM	*BE-CO-CR-MA-OL-Paravent*
5.	DUFERCO – A SHELTER – BELGIUM	*BE-CO-Duferco*
6.	LAFAUT – PRIVATE HOME FAMILY JOY – BELGIUM	*BE-CO-Lafaut*
7.	SE INDUSTRIES - CONSTRUCTION AND ENGINEERING – BELGIUM	*BE-CO-OL-SE Industries*
8.	TRACTEBEL – POWER STATION - BELGIUM	*BE-CO-EL-OL-TE-Tractebel*

9.	METAL CONSTRUCTIONS – VAN HEE - BELGIUM	*BE-CO-Van Hee*
10.	MAKO BETON - RACKS - BELGIUM	*BE-CO-Mako Beton*
11.	OPMETAAL - CHASSIS - BELGIUM	*BE-CO-Opmetaal*
12.	TEATRO MUNICIPAL - BRAZIL	*BR-CI-CO-TC-Teatro*
13.	ROHR – BUILDING INDUSTRY (SCAFFOLDING, TUBES, ...) - BRAZIL	*BR-CO-Rohr*
14.	TECHNICAL FAIR - BULGARIA	*BG-CO-TE-TechnFair*
15.	MUSEUM HOTEL IN WENDAKE - QUEBEC	*CA-AM-CO-Wendake*
16.	METRO VANCOUVER SKYTRAIN – CANADA	*CA-CO-Metro Vancouver Skytrain*
17.	DÜSSELDORF - AIRPORT - GERMANY	*DE-AP-CO-HD-OL-TE-Düss.Airport*
18.	SCHALKE 04 – FOOTBALL STADION - GERMANY	*DE-CO-Schalke*
19.	ZDF TELEVISION BROADCASTING STATION – CONSTRUCTION -GERMANY	*DE-CO-OL-ZDF*
20.	JEAN D'HUART - STEEL SUPPLIER AND APPLICATOR - FRANCE	*FR-CO-D'Huart*
21.	LE MANS CENTRE OF SPORTS AND CULTURE STEEL CONSTRUCTION FRANCE	*FR-CO-OL-Le Mans*
22.	RENAULT - CAR MANUFACTURING COMPANY - FRANCE	*FR-CO-OL-TE-TR-Renault*
23.	DUBLIN HOME – IRELAND	*IE-CO-DublinHome*
24.	MINISTRY OF PUBLIC WORKS – KUWAIT	*KW-CO-Ministry of Public Works*
25.	VENTILATION PIPES - MOROCCO	*MA-CO-Ventilation shaft*
26.	AUTOMATED PARKING SYSTEMS SILODAM AMSTERDAM - NETHERLANDS	*NL-BR-CO-Automated Parking Systems Silodam Amsterdam*
27.	CONTAINERS AND METAL GIRDERS - POLAND	*PL-CO-TA-ZREMB*
28.	LONDON – CARDINAL PLACE - UNITED KINGDOM	*UK-CO-Cardinal Place*
29.	EXXARO KUMBA GROOTGELUK COALMINE – SOUTH AFRICA	*ZA-CO-TE-UN-Kumba Mine*

CR: Crash barriers, metal sheet walls, railings and fences

1.	FENCE SUNNY EUROPE – BELGIUM	*BE-AL-CR-HD-Fence Sunny Europe*
2.	BLANKENBERGE - PARAVENT – BELGIUM	*BE-CO-CR-MA-OL-Paravent*
3.	ANTWERP - CRASH BARRIERS – BELGIUM	*BE-CR-OL-Antwerp*
4.	INTERCOMMUNALE E3 - METAL CONSTRUCTIONS - BELGIUM	*BE-CR-OL-TE-Intercomm.*
5.	CALLUWAERTS - FENCE – BELGIUM	*BE-CR-Calluwaerts*
6.	CHIMAY – SIGN OVER THE HIGHWAY - BELGIUM	*BE-CR-Chimay*
7.	DE GIEY – THE FENCE OF THE CASSTLE - BELGIUM	*BE-CI-CR-OL-De Giey*
8.	SLAUGHTERHOUSE CHARLEROI - BELGIUM	*BE-CR-FO-HD-LT-OL-TE-Abattoir Charleroi*
9.	HERAS – A FENCE – BELGIUM	*BE-CR-OL-Heras*
10.	GENT - KEIZER BRIDGE - BELGIUM	*BE-BR-CR-OL-Keizer Bridge*
11.	KLEIN KASTEELKEN – CAST IRON FENCE - BELGIUM	*BE-CI-CR-OL-TC-Klein Kasteelken*
12.	ZEEBRUGGE - UNDERGROUND CROSSING - BELGIUM	*BE-CR-OL-Zeebrugge*
13.	NO-PARKING POSTS BRUSSELS	*BE-CR-TC-Amsterdammertjes Stad Brussel*
14.	ECOVIAS – CRASH BARRIERS - BRAZIL	*BR-CR-Ecovias*
15.	DÜSSELDORF HIGHWAY - CRASH BARRIERS - GERMANY	*DE-CR-OL-TE-Düss.Highway*
16.	CRASHBARRIERS ON OUM RABII BRIDGE - MOROCCO	*MA-CR-Bridge D'Oum Rabii*
17.	CRASH BARRIERS - TROST – THE NETHERLANDS	*NL-CR-Trost*
18.	FOOTBRIDGES AND PROTECTION BARRIERS BYDGOSZEZ - POLAND	*PL-BR-CR-Bydgoszez*
19.	RENOVATION OF THE SIERKIERKOWSKI BRIDGE IN WARSAW, NATIONAL ROAD- POLAND	*PL-BR-CR-Sierkierkowski Bridge*
20.	LAND TRANSPORT AUTHORITY - GUARD RAIL PANELS - SINGAPORE	*SG-CR-OL-Land Transport Authority*

DI: Dipping

1.	CAMPA – STEEL PANELS - BELGIUM	*BE-DI-Campa*
2.	SUVARNABHUMI – AIRPORT - THAILAND	*TH-AP-DI-SuvarnabhumiAirport*

3.	POLES ARMY TENTS - UNITED KINGDOM	*UK-AR-DI-Poles Army Tents*
4.	DURAPIPE STEEL PRODUCTION - SOUTH AFRICA	*ZA-DI-OL-Durapipe steel production*

DS: Do-it Yourself

EL: Electricity, Power stations

1.	ALCOA LTD - AUSTRALIA	*AU-EL-HD-LT-PY-Alcoa*
2.	TRANSEND NETWORKS - AUSTRALIA	*AU-EL-PY-TE-Transend Networks*
3.	TRANSGRID NETWORKS – NEW SOUTH WALES	*AU-EL-PY-Transgrid Networks*
4.	TRACTEBEL – POWER STATION - BELGIUM	*BE-CO-EL-OL-TE-Tractebel*
5.	FURNAS – ELECTRICITIY PYLONS - BRAZIL	*BR-EL-PY-TE-Furnas*
6.	CONTRACTOR – TURBINES - CHINA	*CN-EL-CWTW*
7.	KRASIKOV TRANSFORMER STATION - CZECH REPUBLIC	*CZ-EL-OL-PY-Krasikov*
8.	SLAVETICE TRANSFORMER STATION – CZECH REPUBLIC	*CZ-EL-PY-Slavetice*
9.	TEMELIN NUCLEAR POWER PLANT - CZECH REPUBLIC	*CZ-EL-OL-Temelin*
10.	RWE - AG – ELECTRICITY COMPANY - GERMANY	*DE-EL-OL-TE-RWE*
11.	PLN HIGH TENSION PYLONS – INDONESIA	*ID-EL-HD-PY-PLN High Tension Pylons*
12.	TRANSFORMERS – SOUTH KOREA	*KR-EL-Transformers*
13.	TRASH RACKS POWER PLANT – SOUTH KOREA	*KR-EL-IM-MA-TC-Trash rack*
14.	MINISTRY OF ELECTRICITY AND WATER – KUWAIT	*KW-EL-OL-TE-Ministry of Electricity and Water*
15.	NATIONAL GRID CORPORATION PHILIPPINES – PHILIPPINES	*PH-EL-HD-PY-National Grid Corporation Philippines*
16.	SANTA RITA BALFOUR BEATTY – PHILIPPINES	*PH-EL-HD-PY-Santa Rita Balfour Beatty*
17.	REDE ELECTICA NACIONAL POWER STATIONS AND SUPPLY LINES - PORTUGAL	*PT-EL-OL-PY-TE-REN*
18.	ENERGOPROJECT – TRANSMISSION TOWERS - QATAR	*QA-EL-OL-PY-TE-Energo*
19.	ELECTRICA - NATIONAL ELECTRICITY SUPPLIER - ROMANIA	*RO-EL-OL-TE-Electricia*
20.	ARAD POWER STATION - ROMANIA	*RO-EL-PY-Arad*
21.	GLOW ENERGY PUBLIC COMPANY MONOPOLES - THAILAND	*TH-EL-HD-PY-Glow Energy Public Company Monopoles*
22.	FORMOSA PLASTICS COMPANY TRANSMISSION TOWERS - TAIWAN	*TW-EL-HD-PY-TE-Formosa*
23.	POWER COMPANY – POWER PYLONS - TAIWAN	*TW-EL-HD-OL-PY-TE-TPC*
24.	POWER PLANTS - TAIWAN	*TW-EL-TC-ZC-Power Plants*
25.	CHERNOBYL NUCLEAR POWER STATION - UKRAINE	*UA-EL-Chernobyl*
26.	KIEV ENERGO POWER PLANT - UKRAINE	*UA-EL-HD-PY-Kiev Energo*
27.	ZUYEVSKAYA THERMAL POWER PLANT - UKRAINE	*UA-EL-Zuyevskaya*

FO: Food

1.	SLAUGHTERHOUSE CHARLEROI - BELGIUM	*BE-CR-FO-HD-LT-OL-TE-Abattoir Charleroi*
2.	SLAUGHTERHOUSES - BELGIUM	*BE-FO-OL-Goossens*
3.	IGLO OLA – METAL STRUCTURES - BELGIUM	*BE-FO-Iglo Ola*
4.	DOSSCHE – CATTLE FEED TANKS - BELGIUM	*BE-FO-TA-Dossche*
5.	QUARTES CATTLE FEED COMPANY - BELGIUM	*BE-FO-HD-OL-TA-TE-Quartes*
6.	VERDEGEM CATTLE FEED COMPANY - BELGIUM	*BE-FO-TE-Verdegem*
7.	CATTLE- AND PIGFARM - FINLAND	*FI-AG-FO-HD-Cattle and Pig farm*
8.	SLAUGHTERHOUSE NÎMES MARCHE GARE - FRANCE	*FR-FO-Nîmes*

HD: Applications on Hot-Dip

1.	ALCOA LTD - AUSTRALIA	*AU-EL-HD-LT-PY-Alcoa*
2.	CULVERTS - AUSTRALIA	*AU-HD-HU-IM-UN-Culverts*

3.	FENCE SUNNY EUROPE – BELGIUM	*BE-AL-CR-HD-Fence Sunny Europe*
4.	SLAUGHTERHOUSE CHARLEROI – BELGIUM	*BE-CR-FO-HD-LT-OL-TE-AbattoirCharleroi*
5.	QUARTES CATTLE FEED COMPANY - BELGIUM	*BE-FO-HD-OL-TA-TE-Quartes*
6.	DE LIJN – PYLONS – BELGIUM	*BE-HD-OL-PY-RW-De Lijn*
7.	SILOS DE COCK – BELGIUM	*BE-HD-TA-De Cock*
8.	SILO'S DUBO DEUREN – ERPE-MERE	*BE-HD-TA-Silo's Dubo Deuren*
9.	RENOVATION SCHOOL SAINT-JOSEPH – LEVIS QUEBEC	*CA-AL-AM-HD-Saint-Joseph*
10.	USNS ZEUS CABLESHIP - USA	*CA-AR-MA-HD-SH-USNS Zeus Cableship*
11.	MINISTRY OF TRANSPORT - QUEBEC	*CA-HD-TE-Ministry of transport*
12.	GUANGZOU NEW BAIYUN AIRPORT - CHINA	*CN-AP-HD-Baiyun*
13.	CHONGQING BROADCASTING COMPANY - CHINA	*CN-HD-PY-Chong Broad*
14.	DÜSSELDORF AIRPORT - GERMANY	*DE-AP-CO-HD-OL-TE-Düss. Airport*
15.	CATTLE- AND PIGFARM - FINLAND	*FI-AG-FO-HD-Cattle and Pigfarm*
16.	DIRECTION DEPARTEMENTALE DE L'EQUIPEMENT, VENDEE SEA BUOYS – FRANCE	*FR-HD-IM-MA-OL-TE-Sea Buoys*
17.	ZINGA ANTICORROSION DISTRIBUTOR - FRANCE	*FR-HD-TE-Guerin*
18.	OHENE DJAN SPORT STADIUM LIGHT POLES - GHANA	*GH-AM-HD-PY-OheneDjanstadium*
19.	PLN HIGH TENSION PYLONS – INDONESIA	*ID-EL-HD-PY-PLN High Tension Pylons*
20.	GRAIN SILOS NADOR CEREALES – MOROCCO	*MA-AG-HD-TA-Grain Silos Nador Cereales*
21.	TENAGA NASIONAL BERHAD - PYLONS - MALAYSIA	*MY-HD-PY-Tenaga Nasional Berhad*
22.	PHCN - POWER HOLDING COMPANY OF NIGERIA - NIGERIA	*NG-HD-PY-PHCN*
23.	NATIONAL GRID CORPORATION PHILIPPINES – PHILIPPINES	*PH-EL-HD-PY-National Grid Corporation Philippines*
24.	SANTA RITA BALFOUR BEATTY – PHILIPPINES	*PH-EL-HD-PY-Santa Rita Balfour Beatty*
25.	YUZHNY GREENHOUSE FARM - RUSSIA	*RU-AG-HD-Yuzhny*
26.	GLOW ENERGY PUBLIC COMPANY MONOPOLES - THAILAND	*TH-EL-HD-PY-Glow Energy Public Company Monopoles*
27.	LIGHT POLES – DON MUANG TOLL WAY – THAILAND	*TH-HD-PY-Don Muang Toll*
28.	FORMOSA PLASTICS COMPANY TRANSMISSION TOWERS - TAIWAN	*TW-EL-HD-PY-Formosa*
29.	POWER COMPANY – POWER PYLONS - TAIWAN	*TW-EL-HD-OL-PY-TE-TPC*
30.	EDEN GREENHOUSE DOME – UNITED KINGDOM	*UK-AG-HD-HT-TP-Eden*
31.	CULVERTS – UNITED KINGDOM	*UK-HD-HU-IM-UN-Culverts*
32.	KIEV ENERGO POWER PLANT - UKRAINE	*UA-EL-HD-PY-Kiev Energo*
33.	US ARMY -UNITED STATES OF AMERICA	*US-AR-HD-OL-TE-TR-US Army*
34.	LIGHT POLES, TERMINAL CUENCA DEL PLATA, PORT OF MONTEVIDEO, URUGUAY	*UY-HD-PY-Katoennatie Light Pole*

HT: High temperatures

1.	FLOREAC – COAL FUNNEL – BELGIUM	*BE-AZ-HT-OL-Floreac*
2.	CARSID - BELGIUM	*BE-AZ-HT-OL-TE-Carsid*
3.	SULTAM – CHIMNEY - ISRAEL	*IL-AZ-HT-OL-Sultam*
4.	DERBY – TURBINE EXHAUST STACKS - UNITED KINGDOM	*UK-AZ-HT-OL-TE-Derby*
5.	EDEN GREENHOUSE DOME – UNITED KINGDOM	*UK-AG-HD-HT-TP-Eden*
6.	PORT ELISABETH ELECTRICITY DEPARTMENT - FUEL TANKS AND EXHAUST – SOUTH AFRICA	*ZA-AZ-HT-TA-Port.El.*

HU: Humidity and vapour

1.	CULVERTS - AUSTRALIA	*AU-HD-HU-IM-UN-Culverts*
2.	J.M. INDUSTRIAL – RACKS, METAL EQUIPMENT AND STRUCTURES IN BRICK MANUFACTURING FACTORIES - BELGIUM	*BE-AZ-CE-HU-OL-TE-JM Ind.*
3.	BASF – CHEMICAL COMPANY - BELGIUM	*BE-HU-PE-TA-TE-BASF*

4.	GREENHOUSE - FINLAND	*FI-HU-TP-Greenhouse*
5.	CULVERTS - UNITED KINGDOM	*UK-HD-HU-IM-UN-Culverts*

IM: Immersion

1.	CULVERTS - AUSTRALIA	*AU-HD-HU-IM-UN-Culverts*
2.	DE BRANDT – FENDER CONSTRUCTIONS - BELGIUM	*BE-BR-IM-OL-De Brandt*
3.	DIRECTION DEPARTEMENTALE DE L'EQUIPEMENT, VENDEE SEA BUOYS – FRANCE	*FR-HD-IM-MA-OL-TE-Sea Buoys*
4.	BANGOR PIER – IMMERSED PILES - IRELAND	*IE-IM-MA-Bangor*
5.	KILLYBEGS FISHING PIER - IMMERSED PIER LEGS - IRELAND	*IE-IM-MA-TE-Killybegs pier*
6.	SLUICE GATES WEST BENGAL – INDIA	*IN-IM-Sluice gates West Bengal*
7.	TRASH RACKS POWER PLANT – SOUTH KOREA	*KR-EL-IM-MA-TC-Trash rack*
8.	SEA BUOYS - SENEGAL	*SN-IM-MA-Sea Buoy*
9.	CULVERTS - UNITED KINGDOM	*UK-HD-HU-IM-UN-Culverts*

LT: Low temperatures

1.	ALCOA LTD - AUSTRALIA	*AU-EL-HD-LT-PY-Alcoa*
2.	SLAUGHTERHOUSE CHARLEROI - BELGIUM	*BE-CR-FO-LT-OL-TE-Abattoir Charleroi*
3.	BONNETS OF SRC BUNDLES - BELGIUM	*BE-LT-TE-SPX Cooling Technologies*
4.	METRO – MINSK – BELARUS	*BY-AM-LT-TC-Metro*

MA: Marine environments and offshore

1.	BLANKENBERGE - PARAVENT – BELGIUM	*BE-CO-CR-MA-OL-Paravent*
2.	BLOMMAERT - SHIP HATCHES - BELGIUM	*BE-MA-SH-BlommaertHatches*
3.	DECLOEDT – DREDGING COMPANY - BELGIUM	*BE-OL-MA-TE-Decloedt*
4.	DRILLING PLATFORM - BRAZIL	*BR-MA-PE-Polvo*
5.	USNS ZEUS CABLESHIP - USA	*CA-AR-MA-HD-SH-USNS Zeus Cableship*
6.	BC FERRY TERMINALS - CANADA	*CA-BR-MA-OL-TE-BC Ferry*
7.	PACIFIC GRAIN ELEVATOR - CANADA	*CA-CN-MA-Pacific Grain Elevator*
8.	CITY OF BURNABY – A SLOPE - CANADA	*CA-MA-TE-CityOfBurnaby*
9.	NATIONAL GRAND THEATRE BEIJING - CHINA	*CN-AM-MA-Theatre Beijing*
10.	YUEHAI PASSAGE TRAIN FERRY PIER TERMINAL - CHINA	*CN-AZ-MA-RW-YuehaiTrainFerry*
11.	EL SALAAM BRIDGE - EGYPT	*EG-BR-MA-PI-TE-Salaam*
12.	DIRECTION DEPARTEMENTALE DE L'EQUIPEMENT, VENDEE SEA BUOYS – FRANCE	*FR-HD-IM-MA-OL-TE-Sea Buoys*
13.	TRANSOCEAN SEDCO FOREX – OFFSHORE DRILLING COMPANY INDONESIA	*ID-MA-PE-TransSedcoForex*
14.	BANGOR PIER – IMMERSED PILES - IRELAND	*IE-IM-MA-Bangor*
15.	KILLYBEGS FISHING PIER - IMMERSED PIER LEGS - IRELAND	*IE-IM-MA-TE-Killybegs pier*
16.	TRASH RACKS POWER PLANT – SOUTH KOREA	*KR-EL-IM-MA-TC-Trash rack*
17.	SHELL TANK - MOROCCO	*MA-MA-PE-TA-Shell*
18.	NATIONAL ELECTRICITY COMPANY - MOROCCO	*MA-MA-PI-ONE*
19.	SHELL - PETROCHEMICAL COMPANY - NETHERLANDS	*NL-MA-PE-TE-Shell*
20.	KALVOYA BRIDGE - NORWAY	*NO-BR-MA-OL-TE-Kalvoya*
21.	ST. PAUL – JETTY – REUNION	*RE-BR-MA-St. Paul*
22.	SEA BUOYS - SENEGAL	*SN-IM-MA-Sea Buoy*
23.	STATIONARY DOCK - SENEGAL	*SN-MA-Dry Dock*
24.	OFFICE TOGOLAIS DES PHOSPHATES PHOSPHATE MINE OFFSHORE CHARGING CRANES - TOGO	*TG-CN-MA-OL-PE-Off.Togolais*
25.	YACHT WATER TANKS - UNITED KINGDOM	*UK-MA-OL-Adela*
26.	OFFSHORE COMPANIES – UNITED KINGDOM	*UK-MA-Offshore*

27.	SHIPS – UNITED KINGDOM	*UK-MA-SH-Ships*
28.	VECTOR INTERNATIONAL – OFFSHORE NUTS AND BOLTS – UNITED KINGDOM	*UK-MA-NB-PE-TE-Vector*

NB: Nuts and bolts

1.	VECTOR INTERNATIONAL – OFFSHORE NUTS AND BOLTS – UNITED KINGDOM	*UK-MA-NB-PE-TE-Vector*

OL: Applications ≥ 10 years

1.	DIRK – AGRICULTURAL MACHINERY– BELGIUM	*BE-AG-OL-TE-Martens*
2.	GENT KIOSK - BELGIUM	*BE-AM-CO-OL-GentKiosk*
3.	NATO – NATO PUMP STATIONS - BELGIUM	*BE-AR-OL-PI-TE-NATO*
4.	BELGIAN ARMY - NAVY SHIPS AND ANTENNA - BELGIUM	*BE-AR-OL-PY-SH-Belgian Army*
5.	CARSID - BELGIUM	*BE-AZ-HT-OL-TE-Carsid*
6.	FLOREAC – COAL FUNNEL - BELGIUM	*BE-AZ-HT-OL-Floreac*
7.	EUROPEAN TECHNICAL ASSOCIATION FOR PROTECTIVE COATINGS - BELGIUM	*BE-BR-OL-TE-Etapc*
8.	DE BRANDT - BELGIUM	*BE-BR-IM-OL-DeBrandt*
9.	MELLE BRIDGE - BELGIUM	*BE-BR-OL-TC-Melle Bridge*
10.	WEGENFONDS BRIDGE - BELGIUM	*BE-BR-OL-Wegenfonds*
11.	HOLCIM GRANULATS - CEMENT FACTORY - BELGIUM	*BE-CE-OL-TE-Holcim*
12.	J.M. INDUSTRIAL - BELGIUM	*BE-AZ-CE-HU-OL- TE-JM-Ind*
13.	DE GIEY - BELGIUM	*BE-CI-CR-OL-De Giey*
14.	KLEIN KASTEELKEN – CAST IRON FENCE - BELGIUM	*BE-CI-CR-OL-TC-Klein Kast.*
15.	ANTWERP PORT CRANES - BELGIUM	*BE-CN-OL-AntwerpPortCranes*
16.	HARBOUR OF GENK - BELGIUM	*BE-CN-OL-TE-KHG*
17.	BACOB BANK DENDERMONDE - BELGIUM	*BE-CO-OL-Bacob*
18.	CNO - A COOLING TOWER - BELGIUM	*BE-CO-OL-CNO*
19.	BLANKENBERGE PARAVENT – BELGIUM	*BE-CO-CR-MA-OL-Paravent*
20.	SE INDUSTRIES - BELGIUM	*BE-CO-OL-SE Industries-*
21.	SLAUGHTERHOUSE CHARLEROI - BELGIUM	*BE-CR-FO-LT-OL-TE-AbattoirCharleroi*
22.	HERAS - A FENCE - BELGIUM	*BE-CR-OL-Heras*
23.	INTERCOMMUNALE E3 - METAL CONSTRUCTIONS - BELGIUM	*BE-CR-OL-TE-Intercomm*
24.	KEIZER BRIDGE GHENT - BELGIUM	*BE-BR-CR-OL-Keizer Bridge*
25.	ZEEBRUGGE UNDERGROUND CROSSING - BELGIUM	*BE-CR-OL-Zeebrugge*
26.	TRACTEBEL – POWER STATION - BELGIUM	*BE-CO-EL-OL-TE-Tractebel*
27.	SLAUGHTERHOUSES - BELGIUM	*BE-FO-OL-Goossens*
28.	CATTLE FEED COMPANY - BELGIUM	*BE-FO-HD-OL-TA-TE-Quartes*
29.	DECLOEDT – DREDGING COMPANY - BELGIUM	*BE-MA-OL-TE-Decloedt*
30.	TOTAL PETROCHEMICAL FELUY - PIPELINES - BELGIUM	*BE-OL-PE-PI-TE-Fina*
31.	WOLF OIL CORPORATION - BELGIUM	*BE-OL-PE-TA-Wolf oil*
32.	ASSOCIATION COMPANY OF PRODUCTION OF ELECTRICITY - S.P.E.- BELGIUM	*BE-OL-PI-TE-SPE*
33.	KLUIZEN WATER PURIFICATION STATION - BELGIUM	*BE-OL-PI-TC-Kluizen*
34.	PIT COAL MINE - BELGIUM	*BE-OL-PI-UN-Kemp.Steenk*
35.	STORA ENSO PAPER MILL - BELGIUM	*BE-OL-PP-TE-Stora Enso*
36.	PUBLIC FOUNTAIN IN GHENT - BELGIUM	*BE-OL-PW-TC-TE-Gent fount.*
37.	ELECTRABEL - BELGIUM	*BE-OL-PY-Electrabel*
38.	DE LIJN – PYLONS - BELGIUM	*BE-HD-OL-PY-RW-De Lijn*
39.	CITA – RAILWAY WAGON - BELGIUM	*BE-OL-RW-TE-CITA*
40.	DREDGING COMPANIES DECLOEDT - BELGIUM	*BE-OL-SH-TE-Dredging*

41.	NARAI – SAILING SHIP - BELGIUM	*BE-OL-SH-TE-Narai*
42.	DE GRAEVE SHIPYARDS - BELGIUM	*BE-OL-SH-TC-TE-De Graeve*
43.	MERCATOR – SAILING SHIP - BELGIUM	*BE-OL-SH-TC-Mercator*
44.	WESTHINDER – LIGHTSHIP - BELGIUM	*BE-OL-SH-TC-Westhinder*
45.	RAILWAY OFFICE - BENIN	*BJ-BR-OL-RW-Chemins Fer*
46.	CONFEDERATION BRIDGE - CANADA	*CA-BR-OL-Confederation*
47.	BC FERRY TERMINALS - CANADA	*CA-BR-MA-OL-TE-BC Ferry*
48.	OVERLANDER BRIDGE - CANADA	*CA-BR-OL-TE-Overlander*
49.	BLANICE RIVER BRIDGE - CZECH REPUBLIC	*CZ-BR-OL-Blanice*
50.	KRASIKOV TRANSFORMER STATION - CZECH REPUBLIC	*CZ-EL-OL-PY-Krasikov*
51.	TEMELIN NUCLEAR POWER PLANT - CZECH REPUBLIC	*CZ-EL-OL-Temelin*
52.	DÜSSELDORF AIRPORT - GERMANY	*DE-AP-CO-HD-OL-TE-Düss.Airport*
53.	SCHWENK – CEMENT FACTORY - GERMANY	*DE-CE-OL-TE-Schwenk*
54.	ZDF TELEVISION BROADCASTING STATION - GERMANY	*DE-CO-OL-ZDF*
55.	DÜSSELDORF HIGHWAY - CRASH BARRIERS - GERMANY	*DE-CR-OL-TE-Düss. Highway*
56.	RWE - AG – ELECTRICITY COMPANY - GERMANY	*DE-EL-OL-TE-RWE*
57.	STROM UND HAUFENBAU HAMBURG HARBOUR COMPAGNY - GERMANY	*DE-OL-PE-TA-TE-Strom*
58.	LE MANS CENTRE OF SPORTS AND CULTURE STEEL CONSTRUCTION - FRANCE	*FR-CO-OL-Le Mans*
59.	RENAULT - CAR MANUFACTURING COMPANY - FRANCE	*FR-CO-OL-TE-TR-Renault*
60.	DIRECTION DEPARTEMENTALE DE L'EQUIPEMENT - FRANCE	*FR-HD-IM-MA-OL-TE-Sea Buoys*
61.	SOCIETE NATIONALE DE CHEMINS DE FER - FRANCE	*FR-OL-RW-TE-SNCF*
62.	SULTAM – CHIMEY - ISRAEL	*IL-AZ-HT-OL-Sultam*
63.	ABADAN & SHIRAZ REFINERIES - IRAN	*IR-OL-PE-TE-Abadan Shiraz*
64.	MINISTRY OF PUBLIC WORKS - KUWAIT	*KW-CO-OL-TE-Ministry of Public Works*
65.	MINISTRY OF ELECTRICITY AND WATER - KUWAIT	*KW-EL-OL-TE-Ministry of Electricity and Water*
66.	KALVOYA BRIDGE - NORWAY	*NO-BR-MA-OL-TE-Kalvoya*
67.	RYSTRAUM MOTOR SHIP - NORWAY	*NO-OL-SH-TE-Rystraum*
68.	REDE ELECTICA NACIONAL - PORTUGAL	*PT-EL-OL-PY-TE-REN*
69.	ENERGOPROJECT – TRANSMISSION TOWERS - QATAR	*QA-EL-OL-PY-TE-Energo*
70.	ELECTRICA - NATIONAL ELECTRICITY SUPPLIER - ROMANIA	*RO-EL-OL-TE-Electrica*
71.	SNCFR - ROMANIAN RAILWAYS - ROMANIA	*RO-OL-RW-TE-SNCFR*
72.	LAND TRANSPORT AUTHORITY GUARD RAIL PANELS - SINGAPORE	*SG-CR-OL-Land Transp. Auth.*
73.	PHOSPHATE MINE OFFSHORE CHARGING CRANES - TOGO	*TG-CN-MA-OL-PE-Off. Togolais*
74.	POWER COMPANY – POWER PYLONS - TAIWAN	*TW-EL-HD-OL-PY-TE-TPC*
75.	DERBY – TURBINE EXHAUST STACKS - UNITED KINGDOM	*UK-AZ-HT-OL-TE-Derby*
76.	NEWARK MARINA BRIDGE - UNITED KINGDOM	*UK-BR-OL-Newark Mar.*
77.	YACHT WATER TANKS - UNITED KINGDOM	*UK-MA-OL-Adela*
78.	LONDON UNDERGROUND - UNITED KINGDOM	*UK-OL-RW-TE-UN-London Underground*
79.	US ARMY - UNITED STATES OF AMERICA	*US-AR-OL-TE-TR-US Army*
80.	LAFARGE - SOUTH AFRICA	*ZA-CE-OL-Lafarge*
81.	DURAPIPE STEEL PRODUCTION - SOUTH AFRICA	*ZA-DI-OL-Durapipe steel production*

PE: Chemical, Petrochemicals

1.	FLUXYS - BELGIAN LARGEST GAS SUPPLIER - BELGIUM	*BE-PE-TE-Fluxys*
2.	BASF – CHEMICAL COMPANY - BELGIUM	*BE-HU-PE-TA-TE-BASF*
3.	FINA CHEMICALS - PIPELINES - BELGIUM	*BE-OL-PE-PI-TE-Fina*
4.	WOLF OIL CORPORATION - BELGIUM	*BE-OL-PE-TA-Wolf oil*

5.	VAN BROEKHOVENS - DIESEL STORAGE TANKS – BELGIUM	*BE-PE-TA-TE-Van Broekhoven*
6.	DRILLING PLATFORM - BRAZIL	*BR-MA-PE-Polvo*
7.	KOBRIN OIL PUMPING STATION - BELARUS	*BY-PE-TA-TC-Kobrin*
8.	SHANGHAI DOVECHEM BOMTA TERMINAL - CHINA	*CN-PE-TA-Bomta*
9.	SHANGHAI PRAXAIR YIDIAN - GAS PROCESSING COMPANY - CHINA	*CN-PE-Praxair*
10.	STROM UND HAUFENBAU HAMBURG HARBOUR COMPAGNY - GERMANY	*DE-OL-PE-TA-TE-Strom*
11.	ABU QIR FERTILIZERS - EGYPT	*EG-PE-AbuQirFert.*
12.	TRANSOCEAN SEDCO FOREX – OFFSHORE DRILLING COMPANY INDONESIA	*ID-MA-PE-TransSedcoForex*
13.	ABADAN & SHIRAZ REFINERIES - IRAN	*IR-OL-PE-TE-Abadan Shiraz*
14.	NATIONAL IRANIAN GAS COMPANY - REBARS - IRAN	*IR-PE-RE-NIGC*
15.	KUWAIT OIL COMPANY - KUWAIT	*KW-PE-TE-KOC*
16.	PETROCHEMICAL COMPANY - NETHERLANDS	*NL-MA-PE-TE-Shell*
17.	SHELL TANK - MOROCCO	*MA-MA-PE-TA-Shell*
18.	OFFICE TOGOLAIS DES PHOSPHATES PHOSPHATE MINE OFFSHORE CHARGING CRANES - TOGO	*TG-CN-MA-OL-PE-Off.Togolais*
19.	VECTOR INTERNATIONAL – OFFSHORE NUTS AND BOLTS – UNITED KINGDOM	*UK-MA-NB-PE-TE-Vector*
20.	CLAMPS CCS – UNITED KINGDOM	*UK-PE-PI-Clamps CCS*
21.	OIL STORAGE TANK - EXXON MOBILE - UNITED KINGDOM	*UK-PE-TA-Exxon Mobile*

PI: Pipelines

1.	NATO – NATO PUMP STATIONS - BELGIUM	*BE-AR-OL-PI-NATO*
2.	FINA CHEMICALS - PIPELINES - BELGIUM	*BE-OL-PE-PI-TE-Fina*
3.	KLUIZEN WATER PURIFICATION STATION – BELGIUM	*BE-OL-PI-TC-Kluizen*
4.	KEMPENSE STEENKOOLMIJNEN – PIT COAL MINE - BELGIUM	*BE-OL-PI-TE-UN-Kemp.Steenk.*
5.	ASSOCIATION COMPANY OF PRODUCTION OF ELECTRICITY S.P.E – BELGIUM	*BE-OL-PI-TE-SPE*
6.	EL SALAAM BRIDGE - EGYPT	*EG-BR-MA-PI-TE-Salaam*
7.	GASCO COMPANY UNDERGROUND PIPELINES - EGYPT	*EG-PI-UN-Gasco*
8.	METRONCO – PIPELINES - GHANA	*GH-PI-Metronco*
9.	SEOUL AIR CONDITIONING – SOUTH KOREA	*KR-AL-PI-Seoul Air Conditioning*
10.	NATIONAL ELECTRICITY COMPANY - MOROCCO	*MA-MA-PI-ONE*
11.	GAS PIPELINES - POLAND	*PL-PI Wtoctawek*
12.	TEMVAR BRASOV BRIDGE – ROMANIA	*RO-BR-PI-Temvar Brasov Bridge*
13.	MOSVODOKANAL – WATER SUPPLIER - RUSSIA	*RU-PI-Mosvodo*
14.	CLAMPS CCS – UNITED KINGDOM	*UK-PE-PI-Clamps CCS*

PP: Pulp and paper mills

1.	STORA ENSO PAPER MILL – BELGIUM	*BE-OL-PP-TE-Stora Enso*
2.	PULP AND PAPER INDUSTRY - CANADA	*CA-PP-Pulp and Paper Industry*

PW: Potable water

1.	GHENT - PUBLIC FOUNTAIN – BELGIUM	*BE-OL-PW-TC-TE-Gent fount.*
2.	RUBLEVO WATER INTAKE PLANT - RUSSIA	*RU-PW-RE-Rublevo*
3.	FURMANITE – A REFERENCE LETTER - UNITED KINGDOM	*UK-PW-TE-Furmanite*
4.	BRAITHWAITE TANK – UNITED KINGDOM	*UK-PW-TA-Braithwaite tank*

PY: Pylons, light poles, towers and wind mills

1.	ENERGEX - PYLONS - AUSTRALIA	*AU-PY-Energex*
2.	ALCOA LTD - AUSTRALIA	*AU-EL-HD-LT-PY-Alcoa*

3.	TRANSEND NETWORKS - AUSTRALIA	*AU-EL-PY-TE-Transend Networks*
4.	TRANSGRID NETWORKS – NEW SOUTH WALES	*AU-EL-PY-Transgrid Networks*
5.	BAKCELL COMMUNICATION TOWER - AZERBAIJAN	*AZ-PY-TE-Bakcell Communication Tower*
6.	BELGIAN ARMY - NAVY SHIPS AND ANTENNA - BELGIUM	*BE-AR-OL-PY-SH-Belgian Army*
7.	ELECTRABEL – ELECTRICITY COMPANY - BELGIUM	*BE-OL-PY-Electrabel*
8.	MULLEM WIND MILL – BELGIUM	*BE-PY-Mullem Mill*
9.	DE LIJN – PYLONS – BELGIUM	*BE-HD-OL-PY-RW-De Lijn*
10.	FURNAS – ELECTRICITIY PYLONS - BRAZIL	*BR-EL-PY-TE-Furnas*
11.	MOBIMETAL – TELECOMMUNICATION PYLONS - CONGO	*CD-PY-TE-Mobimetal*
12.	CHONGQING BROADCASTING COMPANY - CHINA	*CN-HD-PY-Chong Broad*
13.	GUANGZHOU TV TOWER - CHINA	*CN-PY-Guangzhou TV tower*
14.	KRASIKOV TRANSFORMER STATION - CZECH REPUBLIC	*CZ-EL-OL-PY-Krasikov*
15.	SLAVETICE TRANSFORMER STATION – CZECH REPUBLIC	*CZ-EL-PY-Slavitice*
16.	KECHABIA - ALGERIA	*DZ-PY-Kecahbia*
17.	OHENE DJAN SPORT STADIUM LIGHT POLES - GHANA	*GH-AM-HD-PY-OheneDjanStadium*
18.	PLN HIGH TENSION PYLONS – INDONESIA	*ID-EL-HD-PY-PLN High Tension Pylons*
19.	LIGHT POLES OF THE ANFA AVENUE - MOROCCO	*MA-PY-Anfa*
20.	TENAGA NASIONAL BERHAD - PYLONS - MALAYSIA	*MY-HD-PY-Tenaga Nasional Berhad*
21.	PHCN - POWER HOLDING COMPANY OF NIGERIA - NIGERIA	*NG-HD-PY-PHCN*
22.	NATIONAL GRID CORPORATION PHILIPPINES – PHILIPPINES	*PH-EL-HD-PY-National Grid Corporation Philippines*
23.	SANTA RITA BALFOUR BEATTY – PHILIPPINES	*PH-EL-HD-PY-Santa Rita Balfour Beatty*
24.	REDE ELECTICA NACIONAL POWER STATIONS AND SUPPLY LINES - PORTUGAL	*PT-EL-PY-TE-REN*
25.	ENERGOPROJECT – TRANSMISSION TOWERS - QATAR	*QA-EL-OL-PY-TE-Energo*
26.	ARAD POWER STATION - ROMANIA	*RO-EL-PY-Arad*
27.	MUNTENIA – PYLONS - ROMANIA	*RO-PY-TE-Muntenia*
28.	PSA LIGHTING MASTS	*SG-PY-PSA Lighting Masts*
29.	GLOW ENERGY PUBLIC COMPANY MONOPOLES - THAILAND	*TH-EL-HD-PY-Glow Energy Public Company Monopoles*
30.	LIGHT POLES – DON MUANG TOLL WAY – THAILAND	*TH-HD-PY-Don Muang Toll*
31.	FORMOSA PLASTICS COMPANY TRANSMISSION TOWERS - TAIWAN	*TW-EL-HD-PY-TE-Formosa*
32.	POWER COMPANY – POWER PYLONS - TAIWAN	*TW-EL-HD-OL-PY-TE-TPC*
33.	TAIWAN POWER COMPANY - ZEPHYROS WIND MILLS - TAIWAN	*TW-PY-ZC-Zephyros*
34.	KIEV ENERGO POWER PLANT - UKRAINE	*UA-EL-HD-PY-Kiev Energo*
35.	KIEV ROAD ADMINISTRATION - UKRAINE	*UA-PY-Kiev Road Administration*
36.	NEXRAD TOWER – UNITED STATES OF AMERICA	*US-AR-PY-Nexrad Tower*
37.	LIGHT POLES, TERMINAL CUENCA DEL PLATA, PORT OF MONTEVIDEO, URUGUAY	*UY-HD-PY-Katoennatie Light Pole*
38.	HAI PHONG TOWER - PYLONS - VIETNAM	*VN-PY-Hai Phong Tower*

RE: Rebars

1.	TRANSFO ZWEVEGEM - BELGIUM	*BE-RE-Transfo*
2.	HANGZHOU BAY BRIDGE - CHINA	*CN-BR-RE-Hangzou Bay*
3.	CONTRACTOR – TURBINES - CHINA	*CN-RE-RW-CWTW*
4.	NATIONAL IRANIAN GAS COMPANY - REBARS - IRAN	*IR-PE-RE-NIGC*
5.	REBAR SPRAYING INSTALLATION TEHRAN HARA - IRAN	*IR-AS-RE-AutomSprayLine*
6.	CHABAHAR PORT – REBARS - IRAN	*IR-RE-TE-Chabahar*
7.	OMRAN SAHEL INSTITUTE – REBARS - IRAN	*IR-RE-TE-OmranSahelInst.*
8.	PERLITE CONSTRUCTION - SULFUR EXPORT WHARF - IRAN	*IR-RE-TE-PerliteConstr*

9.	RAHE SAHEL INSTITUTE – REBARS - IRAN	*IR-RE-TE-RaheSahelInst.*
10.	PARS OIL & GAS CO. – REBARS - IRAN	*IR-RE-TE-Pars Oil & Gas Co.*
11.	RUBLEVO WATER INTAKE PLANT - RUSSIA	*RU-PW-RE-Rublevo*
12.	BUILDING WITH REBARS - RUSSIA	*RU-RE-Building*

RW: Railway

1.	QUEENSLAND RAILWAY BRIDGES - AUSTRALIA	*AU-BR-RW-QR Railway Bridges*
2.	DE LIJN – PYLONS – BELGIUM	*BE-HD-OL-PY-RW-De Lijn*
3.	CITA – RAILWAY WAGON - BELGIUM	*BE-OL-RW-TE-Cita*
4.	RAILWAY OFFICE - BENIN	*BJ-BR-OL-RW-Chemins Fer*
5.	DORBRAS RAILWAY COMPANY - BRAZIL	*BR-RW-TE-Dorbras*
6.	YUEHAI PASSAGE TRAIN FERRY PIER TERMINAL - CHINA	*CN-AZ-MA-RW-YuehaiTrainFerry*
7.	CONTRACTOR – TURBINES - CHINA	*CN-RE-RW-CWTW*
8.	MAGLEV TRANSRAPIP RAILWAY - CHINA	*CN-RW-Maglev*
9.	SOCIETE NATIONALE DE CHEMINS DE FER - FRANCE	*FR-OL-RW-TE-SNCF*
10.	SNCFR - ROMANIAN RAILWAYS - ROMANIA	*RO-RW-OL-TE-SNCFR*
11.	TELEGONDOLA – ROMANIA	*RO-RW-TE-Telegondola*
12.	TRAIN CARRIAGE TRANSRAIL - SENEGAL	*SN-RW-TA-Train Wagon*
13.	LONDON UNDERGROUND – UNITED KINGDOM	*UK-OL-RW-TE-UN-London Underground*
14.	LONDON UNDERGROUND – UNITED KINGDOM	*UK-OL-RW-TE-Underground*

SH: Ships

1.	BELGIAN ARMY - NAVY SHIPS AND ANTENNA - BELGIUM	*BE-AR-OL-PY-SH-Belgian Army*
2.	BLOMMAERT SHIP HATCHES - BELGIUM	*BE-MA-SH-BlommaertHatches*
3.	BONNE INDUSTRIAL - SHIPS - BELGIUM	*BE-SH-TC-Bonne Industrial*
4.	COBBAERT SHIP - BELGIUM	*BE-SH-Cobbaert*
5.	DE GRAEVE SHIPYARDS - BELGIUM	*BE-OL-SH-TC-TE-De Graeve*
6.	DREDGING COMPANIES DECLOEDT, JAN DE NUL & DREDGING INTERNATIONAL - BELGIUM	*BE-OL-SH-TE-Dredging*
7.	DUPON BOAT - BELGIUM	*BE-SH-Dupon*
8.	FULTON MARINE - BELGIUM	*BE-SH-Fulton*
9.	MERCATOR – SAILING SHIP - BELGIUM	*BE-OL-SH-TC-Mercator*
10.	NARAI – SAILING SHIP - BELGIUM	*BE-OL-SH-TE-Narai*
11.	WALTZING MATHILDE SHIP - BELGIUM	*BE-SH-Waltzing*
12.	WESTHINDER – LIGHTSHIP - BELGIUM	*BE-OL-SH-TC-Westhinder*
13.	SHIP - BELGIUM	*BE-SH-TE-West-Vl.*
14.	USNS ZEUS CABLESHIP - USA	*CA-AR-MA-HD-SH-USNS Zeus Cableship*
15.	EXXON MOBIL PLATFORM - MALAYSIA	*MY-SH-ExxonMobil*
16.	RYSTRAUM MOTOR SHIP - NORWAY	*NO-OL-SH-TE-Rystraum*
17.	COAL TRANSPORT SHIP - TAIWAN	*TW-SH-TC-Coal Tr Ship*
18.	SHIPS – UNITED KIGDOM	*UK-MA-SH-Ships*
19.	ITCHEN MARINE – UNITED KINGDOM	*UK-SH-Itchen*

TA: Tanks, containers and silos

1.	DOSSCHE – CATTLE FEED TANKS - BELGIUM	*BE-FO-TA-Dossche*
2.	QUARTES CATTLE FEED COMPANY - BELGIUM	*BE-FO-HD-OL-TA-TE-Quartes*
3.	BASF – CHEMICAL COMPANY - BELGIUM	*BE-HU-PE-TA-TE-BASF*
4.	VAN BROEKHOVENS - DIESEL STORAGE TANKS – BELGIUM	*BE-PE-TA-TE-Van Broekhoven*
5.	DUMON AGRO - CONTAINER - BELGIUM	*BE-TA-Dumon*

6.	GENT PUBLIC WORKS – SALT FUNNELS - BELGIUM	*BE-TA-Gent Pub.*
7.	COCA COLA - BELGIUM	*BE-TA-Coca Cola*
8.	SILOS DE COCK – BELGIUM	*BE-HD-TA-De Cock*
9.	SILO'S DUBO DEUREN – ERPE-MERE	*BE-HD-TA-Silo's Dubo Deuren*
10.	SNACK FOODS VEURNE - BELGIUM	*BE-TA-SnackFoods*
11.	PAESEN - CONCRETE MILL - BELGIUM	*BE-CE-TA-Paesen*
12.	WOLF OIL CORPORATION - BELGIUM	*BE-OL-PE-TA-Wolf oil*
13.	MAKRO – A TANK - BELGIUM	*BE-TA-Makro*
14.	SILOS VANDENBERGHE - BELGIUM	*BE-TA-Vandenberghe*
15.	KOBRIN OIL PUMPING STATION - BELARUS	*BY-PE-TA-TC-Kobrin*
16.	SHANGHAI DOVECHEM BOMTA TERMINAL - CHINA	*CN-TA-PE-Bomta*
17.	STROM UND HAUFENBAU HAMBURG HARBOUR COMPAGNY - GERMANY	*DE-OL-PE-TA-TE-Strom*
18.	GRILLO WERKE AG GAS CYLINDERS GERMANY	*DE-TA-Grillo Werke AG*
19.	WATER STORAGE TANKS ROURKELA – INDIA	*IN-TA-Water Storage Tanks*
20.	GRAIN SILOS NADOR CEREALES – MOROCCO	*MA-AG-HD-TA-Grain Silos Nador Cereales*
21.	HYDRO-TANK - MAROC	*MA-TA-Hydro-tank*
22.	SHELL TANK - MOROCCO	*MA-MA-PE-TA-Shell*
23.	TANK - MOROCCO	*MA-TA-Kettle construct*
24.	STORAGE TANKS - NORWAY	*NO-TA-Storage tanks*
25.	TANKS – NEW PLYMOUTH – NEW ZEALAND	*NZ-TA-New Plymouth*
26.	CONTAINERS AND METAL GIRDERS - POLAND	*PL-CO-TA-ZREMB*
27.	TRAIN CARRIAGE TRANSRAIL - SENEGAL	*SN-RW-TA-Train Wagon*
28.	MAERSK CONTAINERS - TAÏWAN	*TW-TA-TE-Maersk*
29.	OIL STORAGE TANK - EXXON MOBILE - UNITED KINGDOM	*UK-PE-TA-Exxon Mobile*
30.	BRAITHWAITE TANK – UNITED KINGDOM	*UK-PW-TA-Braithwaite tank*
31.	PORT ELISABETH ELECTRICITY DEPARTMENT - FUEL TANKS AND EXHAUST – SOUTH AFRICA	*ZA-AZ-HT-TA-Port.EL*

TC: Topcoats

1.	REYNELLA BRIDGE - AUSTRALIA	*AU-BR-TC-Reynella Bridge*
2.	MELLE BRIDGE - BELGIUM	*BE-BR-OL-TC-Melle Bridge*
3.	DULLE GRIET - CANNON – BELGIUM	*BE-CI-TC-Dulle Griet*
4.	KLEIN KASTEELKEN – CAST IRON FENCE - BELGIUM	*BE-CI-CR-OL-TC-Klein Kast.*
5.	NO-PARKING POSTS BRUSSELS	*BE-CR-TC-Amsterdammertjes Stad Brussel*
6.	WATER PURIFICATION STATION – BELGIUM	*BE-OL-PI-TC-Kluizen*
7.	PUBLIC FOUNTAIN IN GHENT – BELGIUM	*BE-OL-PW-TC-TE-Gent fount.*
8.	BONNE INDUSTRIAL - SHIPS - BELGIUM	*BE-SH-TC-Bonne Industrial*
9.	DE GRAEVE SHIPYARDS - BELGIUM	*BE-OL-SH-TC-TE-De Graeve*
10.	MERCATOR – SAILING SHIP - BELGIUM	*BE-OL-SH-TC-Mercator*
11.	WESTHINDER – LIGHTSHIP - BELGIUM	*BE-OL-SH-TC-Westhinder*
12.	TEATRO MUNICIPAL - BRAZIL	*BR-CI-CO-TC-Teatro*
13.	METRO – MINSK – BELARUS	*BY-AM-LT-TC-Metro*
14.	KOBRIN OIL PUMPING STATION - BELARUS	*BY-PE-TA-TC-Kobrin*
15.	TRASH RACKS POWER PLANT – SOUTH KOREA	*KR-EL-IM-MA-TC-Trash rack*
16.	POWER PLANTS - TAIWAN	*TW-EL-TC-ZC-Power Plants*
17.	COAL TRANSPORT SHIP - TAIWAN	*TW-SH-TC-Coal Tr Ship*

TE: Testimonials

1.	TRANSEND NETWORKS - AUSTRALIA	*AU-EL-PY-TE-Transend Networks*

2.	BAKCELL COMMUNICATION TOWER - AZERBAIJAN	*AZ-PY-TE-Bakcell Communication Tower*
3.	QUARTES CATTLE FEED COMPANY - BELGIUM	*BE-FO-HD-OL-TA-TE-Quartes*
4.	DREDGING COMPANIES DECLOEDT – BELGIUM	*BE-OL-SH-TE-Dredging*
5.	DE GRAEVE SHIPYARDS – BELGIUM	*BE-OL-SH-TC-TE-De Graeve*
6.	INTERCOMMUNALE E3 – METAL CONSTRUCTIONS - BELGIUM	*BE-CR-OL-TE-Intercomm*
7.	EUROPEAN TECHNICAL ASSOCIATION FOR PROTECTIVE COATINGS – BELGIUM	*BE-BR-OL-TE-Etapc*
8.	PIT COAL MINE – BELGIUM	*BE-OL-PI-TE-UN-Kemp.Steenk*
9.	SLAUGHTERHOUSE CHARLEROI – BELGIUM	*BE-CR-FO-HD-LT-OL-TE-AbattoirCharleroi*
10.	ASSOCIATION COMPANY OF PRODUCTION OF ELECTRICITY – S.P.E. – BELGIUM	*BE-OL-PI-TE-SPE*
11.	TOTAL PETROCHEMICAL FELUY – PIPELINES – BELGIUM	*BE-OL-PE-PI-TE-Fina*
12.	NARAI – SAILING SHIP – BELGIUM	*BE-OL-SH-TE-Narai*
13.	NATO – NATO PUMP STATIONS – BELGIUM	*BE-AR-OL-PI-TE-NATO*
14.	HOLCIM GRANULATS - CEMENT FACTORY – BELGIUM	*BE-CE-OL-TE-Holcim*
15.	DECLOEDT – DREDGING COMPANY – BELGIUM	*BE-OL-MA-TE-Decloedt*
16.	HARBOUR OF GENK – BELGIUM	*BE-CN-OL-TE-KHG*
17.	STORA ENSO PAPER MILL – BELGIUM	*BE-OL-PP-TE-Stora Enso*
18.	CITY – RAILWAY WAGON – BELGIUM	*BE-OL-RW-TE-CITA*
19.	J.M. INDUSTRIAL – BELGIUM	*BE-AZ-CE-HU-OL-TE-JM-Ind*
20.	CARSID – BELGIUM	*BE-AZ-HT-OL-TE-Carsid*
21.	MARTENS DIRK – AGRICULTURAL MACHINERY	*BE-AG-OL-TE-Martens*
22.	PUBLIC FOUNTAIN IN GHENT – BELGIUM	*BE-OL-PW-TC-TE-Gent fount.*
23.	TRACTEBEL – POWER STATION – BELGIUM	*BE-CO-EL-OL-TE-Tractebel*
24.	VERDEGEM CATTLE FEED COMPANY – BELGIUM	*BE-FO-TE-Verdegem*
25.	FLUXYS (BELGIAN LARGEST GAS SUPPLIER) – BELGIUM	*BE-PE-TE-Fluxys*
26.	BASF – CHEMICAL COMPANY – BELGIUM	*BE-PE-HU-TA-TE-BASF*
27.	VAN BROEKHOVENS – DIESEL STORAGE TANKS – BELGIUM	*BE-PE-TA-TE-VanBroekh*
28.	SPX COOLING TECHNOLOGIES – BONNETS OF SRC BUNDLES – BELGIUM	*BE-LT-TE-SPX Cooling Technologies*
29.	WEST-VLAANDEREN SCHEEPSWERF – BELGIUM	*BE-SH-TE-West-VL*
30.	FURNAS – ELECTRICITIY PYLONS - BRAZIL	*BR-EL-PY-TE-Furnas*
31.	DORBRAS RAILWAY COMPANY – BRAZIL	*BR-RW-TE-Dorbras*
32.	TECHNICAL FAIR – BULGARIA	*BG-CO-TE-TechnFair*
33.	BC FERRY TERMINALS – CANADA	*CA-BR-MA-OL-TE-BC Ferry*
34.	OVERLANDER BRIDGE – CANADA	*CA-BR-OL-TE-Overlander*
35.	MINISTRY OF TRANSPORT - QUEBEC	*CA-HD-TE-Ministry of transport*
36.	CITY OF BURNABY – CANADA	*CA-MA-TE-CityofBurnaby*
37.	WALT DISNEY – HONG KONG – CHINA	*CN-AM-TE-Walt Disney HK*
38.	MOBIMETAL – TELECOMMUNICATION PYLONS - CONGO	*CD-PY-TE-Mobimetal*
39.	EL SALAAM BRIDGE - EGYPT	*EG-BR-MA-PI-TE-Salaam*
40.	SOCIETE NATIONALE DE CHEMINS DE FER - FRANCE	*FR-OL-RW-TE-SNCF*
41.	RENAULT - CAR MANUFACTURING COMPANY - FRANCE	*FR-CO-OL-TE-TR-Renault*
42.	DIRECTION DEPARTEMENTALE DE L'EQUIPEMENT - FRANCE	*FR-HD-IM-MA-OL-TE-Sea Buoys*
43.	ZINGA ANTICORROSION DISTRIBUTOR - FRANCE	*FR-HD-TE-Guerin*
44.	DÜSSELDORF HIGHWAY - CRASH BARRIERS - GERMANY	*DE-CR-OL-TE-Düss.Highway*
45.	STROM UND HAUFENBAU HAMBURG HARBOUR COMPAGNY - GERMANY	*DE-OL-PE-TA-TE-Strom*
46.	DÜSSELDORF AIRPORT - GERMANY	*DE-AP-CO-HD-OL-TE-Düss.Airport*
47.	RWE - AG – ELECTRICITY COMPANY - GERMANY	*DE-EL-OL-TE-RWE*

48.	SCHWENK – CEMENT FACTORY - GERMANY	*DE-CE-OL-TE-Schwenk*
49.	ABADAN & SHIRAZ REFINERIES - IRAN	*IR-OL-PE-TE-Abadan Shiraz*
50.	OMRAN SAHEL INSTITUTE – REBARS - IRAN	*IR-RE-TE-OmranSahelInst*
51.	PARS OIL & GAS CO. – REBARS - IRAN	*IR-RE-PE-TE-Pars Oil & Gas*
52.	PERLITE CONSTRUCTION SULFUR EXPORT WHARF - IRAN	*IR-RE-TE-PerliteConstr*
53.	RAHE SAHEL INSTITUTE – REBARS - IRAN	*IR-RE-TE-RaheSahelInst.*
54.	CHABAHAR PORT – REBARS - IRAN	*IR-RE-TE-Chabahar*
55.	KILLYBEGS FISHING PIER IMMERSED PIER LEGS - IRELAND	*IE-IM-MA-TE-Killybegs pier*
56.	MINISTRY OF PUBLIC WORKS - KUWAIT	*KW-CO-OL-TE-Ministry of Public Works*
57.	MINISTRY OF ELECTRICITY AND WATER - KUWAIT	*KW-EL-OL-TE-Ministry of Electricity and Water*
58.	KUWAIT OIL COMPANY - KUWAIT	*KW-PE-TE-KOC*
59.	RYSTRAUM MOTOR SHIP - NORWAY	*NO-OL-SH-TE-Rystraum*
60.	KALVOYA BRIDGE - NORWAY	*NO-BR-MA-OL-TE-Kalvoya*
61.	REDE ELECTICA NACIONAL - PORTUGAL	*PT-EL-OL-PY-TE-REN*
62.	ENERGOPROJECT – TRANSMISSION TOWERS - QATAR	*QA-EL-OL-PY-TE-Energo*
63.	ELECTRICA - NATIONAL ELECTRICITY SUPPLIER - ROMANIA	*RO-EL-OL-TE-Electrica*
64.	SNCFR - ROMANIAN RAILWAYS - ROMANIA	*RO-OL-RW-TE-SNCFR*
65.	SERVSPEC - ROMANIA	*RO-TE-Servspec*
66.	MUNTENIA – PYLONS - ROMANIA	*RO-PY-TE-Muntenia*
67.	TELEGONDOLA - ROMANIA	*RO-RW-TE-Telegondola*
68.	EXXARO KUMBA GROOTGELUK COALMINE – SOUTH AFRICA	*ZA-CO-TE-UN-Kumba Mine*
69.	FORMOSA PLASTICS COMPANY TRANSMISSION TOWERS - TAIWAN	*TW-EL-HD-PY-TE-Formosa*
70.	MAERSK CONTAINERS - TAIWAN	*TW-TA-TE-Maersk*
71.	SHELL PETROCHEMICAL COMPANY - THE NETHERLANDS	*NL-MA-PE-TE-Shell*
72.	LONDON UNDERGROUND – UNITED KINGDOM	*UK-OL-RW-TE-UN-London Underground*
73.	DERBY – TURBINE EXHAUST STACKS – UNITED KINGDOM	*UK-AZ-HT-OL-TE-Derby*
74.	VECTOR INTERNATIONAL – UNITED KINGDOM	*UK-MA-NB-PE-TE-Vector*
75.	FURMANITE – UNITED KINGDOM	*UK-PW-TE-Furmanite*
76.	LONDON UNDERGROUND – UNITED KINGDOM	*UK-OL-RW-TE-UN-London Underground*
77.	US ARMY -UNITED STATES OF AMERICA	*US-AR-HD-OL-TE-TR-US Army*
78.	MISSISSIPPI DEPARTMENT OF TRANSPORTATION BILOXI BRIDGE – UNITED STATES OF AMERICA	*US-AR-BR-TE-MDOT*

TP: Tropical environments

1.	TROPICAL ISLAND DOME - GERMANY	*DE-TP-Trop Islands*
2.	GREENHOUSE - FINLAND	*FI-HU-TP-Greenhouse*
3.	KENSINGTON PALACE SUNKEN GARDENS – UNITED KINGDOM	*UK-AG-AM-CI-TP-Kensington Palace Sunken Gardens*
4.	EDEN GREENHOUSE DOME – UNITED KINGDOM	*UK-AG-HD-HT-TP-Eden*

TR: Trucks and trailers

1.	DANZAS –TRUCK - BELGIUM	*BE-TR-Danzas*
2.	ICC - TRUCK CHASSIS - BELGIUM	*BE-TR-ICC*
3.	LAMBREGT - TRUCK CHASSIS - BELGIUM	*BE-TR-Lambregt*
4.	RENAULT - CAR MANUFACTURING COMPANY - FRANCE	*FR-CO-OL-TE-TR-Renault*
5.	CARTS TO CONVEY STONES - MOROCCO	*MA-TR-Transit trailer*
6.	CHASSIS – UNITED KINGDOM	*UK-TR-Chassis*
7.	US ARMY – UNITED STATES OF AMERICA	*US-AR-HD-OL-TE-TR-US Army*

UN: Underground

1.	CULVERTS - AUSTRALIA	*AU-HD-HU-IM-UN-Culverts*
2.	KEMPENSE STEENKOOLMIJNEN – PIT COAL MINE - BELGIUM	*BE –OL-PI-TE-UN-Kemp.Steenk.*
3.	GASCO COMPANY UNDERGROUND PIPELINES - EGYPT	*EG-PI-UN-Gasco*
4.	LONDON UNDERGROUND – UNITED KINGDOM	*UK-OL-RW-TE-UN-London Underground*
5.	CULVERTS - UNITED KINGDOM	*UK-HD-HU-IM-UN-Culverts*
6.	EXXARO KUMBA GROOTGELUK COALMINE – SOUTH AFRICA	*ZA-CO-TE-UN-Kumba Mine*

WE: Welding

ZC: Zingaceram

1.	POWER PLANTS - TAIWAN	*TW-EL-TC-ZC-Power Plants*
2.	TAIWAN POWER COMPANY - ZEPHYROS WIND MILLS - TAIWAN	*TW-PY-ZC-Zephyros*

SYSTEM RECOMMENDATIONS FOR REBARS

Rebars or reinforcement bars are embedded in fresh concrete after they have been protected by the Zinga anti-corrosion system.

The Zinga surface is rough enough to provide a good adhesion to the concrete. Zinga passed the pull-out test according to the standard RILEM/CEB/FIP Rec. RC6-1978.

Zinga is flexible and will not be damaged when the rebars are bent or handled roughly. If severe damage does occur, galvanic protection will start and moreover Zinga can be easily touched-up thanks to its reloading properties.

In comparison with all other methods of protection that have been tried out on reinforcement bars, a thin layer of Zinga provides the best protection at a very low and cost effective price.

Surface preparation and application method

- **General guidelines**

Please refer to the Zinga data sheet and the technical specifications for zinganisation.

- **Specific remarks**

A **layer thickness** of 60 µm is advised.

Rebars are hard to manipulate and are therefore difficult to grit-blast. If the surface is prepared by phosphating, then the adhesion of Zinga will not be adequate.

That is why **we recommend burning and blasting in an automatic installation** instead of manual grit-blasting or phosphating. With an automatic blasting installation (type wheelabrator or similar) you should be able to blast rebars with diameters between 8 and 40 mm.

After the blasting is done you can choose between a dipping process or a **spraying** process to apply the Zinga.

The **drying time** of Zinga before the contact with the concrete can be very short. As soon as the Zinga is touch-dry, the concrete can already be cast. From the moment that the fresh concrete encapsulates the zinganised rebar, zinc salts are formed on the surface of the Zinga coating. These zinc salts will seal off the Zinga layer completely, thus providing an additional barrier protection.

Context

- **Problems?**

→ High concentration of corroded rebars
→ Marine environment and pollution
→ Bad quality concrete

►**Prevention: protected rebars!**

- **An ultimate solution?**

→ Stainless steel (inox)
→ Passivation
→ Increasing performances of concrete
→ pH concrete: 12 -> 8
- normal carbon rebar: pH < 9
-> 100% corrosion
- stainless steel rebar: pH < 2.5
-> pitting

70% of all concrete "diseases" are related to corroded rebars!

- **Prevention of corrosion**

→ High performance concrete
→ Corrosion inhibitor to the concrete
→ Coatings on concrete surface
→ Pure cathodic protection by impressed current
→ Corrosion resistant steel bars: coating and others

- **Failures of traditionally protected rebars**

→ Protecting rebars by above anti-corrosion systems will remain safe and sound for +/- 30 years
→ Whereas the life expectancy of the structures are more than double!
→ Corrosion prevention of rebars by means of tradional anti-corrosion system such as HDG, FBE, CRS, other hard coatings of polymer, … prove to be ineffective in the long run. Some systems even suffer from adhesion problems as well.

The solution to the several problems: zinganisation protects better than HDG, MS and CRS. (cf. report)

SOLUTION: ZINGANISED REBARS

- **Surface preparation**

→ Degreasing
→ Grit-blasting to cleanliness degree SA 2,5 and roughness degree Rz 50 à 70 µm
→ Dedusting

- **Application method**

Zinga is easy to apply by:
→ Brush
→ Roll
→ Dipping
→ spraying

➔ A thin layer of Zinga (DFT 30 – 40 µm) provides the best protection at a very low and cost effective price.

➔ Zinga is flexible and will not be damaged when the rebars are bended or handled roughly. If damage does occur, Zinga can be easily touched-up.

➔ The drying time of Zinga before the contact with the concrete is very short. As soon as the Zinga is touch-dry, the concrete can be cast!

➔ From the moment that the fresh concrete encapsulates the zinganised rebar, zinc salts are formed on the surface of the Zinga coating.

➔ These zinc salts will seal off the Zinga layer completely, thus providing an additional barrier protection.

- **Advantages of Zinga on rebars**

Zinga offers an active cathodic protection to the rebars.
Zinga provides an additional barrier protection to the rebars, due to the zinc salts on the surface.
Zinga is flexible and will not be damaged when the rebars are bended or handled roughly.
Zinga has a quick drying time
Zinga can be applied in humid circumstances.
Welding is possible on top of Zinga
Zinga can be used on new rebars as well as for the repair of old rebars.
Zinga can be touched up easily, a new layer will reliquify the old layer.
Zinga offers a good adhesion to concrete.
Zinga offers a longer protection than the traditional systems

ZINGAMETALL STRATEGY

- **Zingametall & rebars**

a) Develop & manufacture & distribute our film galvanising system Zinga
b) Obtain certificates and comparative performance tests
c) Distribute complementary & compatible range of topcoats
d) Support our distribution & sales channels from a marketing & commercial perspective.
e) Encourage new developments & applications

- **Specific**

f) Supportive role (coating technology)
g) Assisting in developing a distributor network of Zinganised rebars:
   - ➔ Seminars
   - ➔ Exhibitions
   - ➔ Specific marketing

- **Target groups**

h) Construction – buildings
i) Public works – bridges – pipelines
j) Harbours – anchor points – tunnels
k) Energy plants – cooling towers
l) Maintenance
m) Decorative structures
n) …

- **Commercialising:**

o) By introduction, acceptance and prescription of the zinganised rebars by the different responsibles:

   - ➔ Engineering offices
   - ➔ Architects
   - ➔ Technology associations
   - ➔ Contractors
   - ➔ ….

REBAR RELATED TESTING

Product related testing	Zinga on concrete *(BE-9b.203-EN)*	B- RUG **(Belgium)**
	Zinga on rebars *(BE-8.143-EN)*	B- RUG *(Belgium)*
	Zinga on rebar in concrete *(BE-4.65-EN)*	B-RUG *(Belgium)*
	Bend test on ZINGA *(BE-399-EN)*	B-B Holding
	Adhesion to rebars *(BE-353-EN)*	B-B Holding
	Zinga on bended rebars *(IR-14.5-EN)*	IRAN
	Zinga on different steel type *(CN-12.3-EN)*	CHINA
	Zinga mechanical testing *(EG-12.1-EN) - (MA-15.2-FR) - (UK-23.4-EN) - (BE-9b.200-EN)*	Different lab
Production related testing	Zinga oven-drying *(BE-9c.242-EN)*	Belgium - ZM
	Zinga re-use in circulating *(IR-14.4-EN)*	IRAN

Effectiveness related testing	Corrosion rate and galvanic protection *(IN-13a.2-EN)*	INDIA
	Corrosion rate, corrosion resistance and stress corrosion *(IN-13a.3-EN)*	INDIA
Other test reports	Various testing *(RU-17b.5-RU) - (ZA-19.13-EN)*	RU, SA,..

PRODUCT RELATED TESTING

a) Zinga on concrete (after 28 day)

B- RUG report - **BE-9b.203-EN** *(date 16/11/2004)*

RESULT:

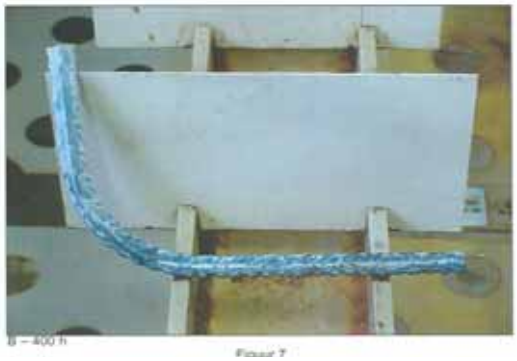
Metallic pathway between rebar and outside Zinga coating

b) Zinga on U-bended rebar (400 hrs salt-sprays)

B- RUG report - **BE-8.143-EN** *(date 28/04/2003)*

DFT: 66 µm and 95 µm

U-bended rebar with Zinga and touch-up with Zingaspray



RESULT:

No traces of red rust

c) Zinga on rebar in concrete (500hrs salt-spray)

B-RUG report - **BE-4.65-EN** *(date 25/08/1999)*

Bond strength testing of zinganised rebar in reinforced concrete.

RESULT:

Compressed strength concrete:		30,5 N/mm^2
Pull out test:	Non coated rebar:	18,9 N/mm^2
	Zinga coated rebar:	17,0 N/mm^2

Adhesion to concrete of Zinganised rebar is not negatively affected by the Zinganisation.

d) Bend test on ZINGA

B-RUG report - **BE-399-EN** *(date 27/05/2009)*

Crack resistance to bending.

RESULT:

No cracks when bended over 20mm diameter and 60µm DFT.

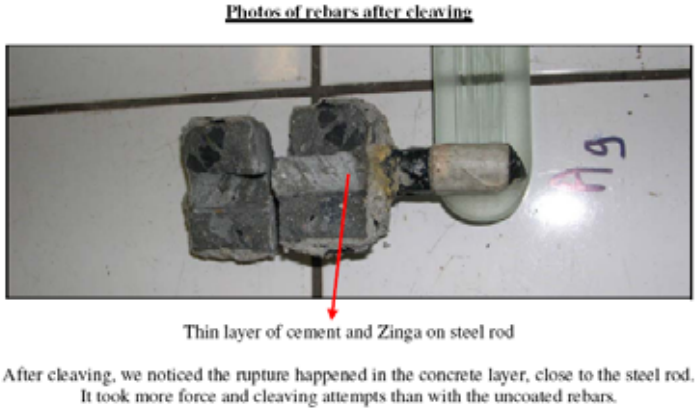
e) Adhesion to rebars

B-RUG report - **BE-353-EN** *(date 16/04/2008)*

Adhesion of ZINGA coated rebars to concrete.

RESULT:

Better adhesion of the rebar to concrete when it is coated with ZINGA.



f) Zinga on bended rebar (500 hrs saltspray)

IRAN Amirkabir University - **IR-14.5-EN** *(date 16/03/2007)*

RESULT:

Visual assessment – Scratches
Salt-spray test (ASTM B 117):
Uncoated rebar: heavily corroded
Zinga coated rebar: white rust, no red rust
Throwing power and barrier effect helps to protect the rebar.

g) Zinga on different steel types. CN – CNC Steel

Quality and Test Center - **CN-12.3-EN** *(date 18/01/2005)*

Steel Q235B and Q345B

RESULT:

Anti-slip coefficient not influenced

h) Zinga mechanical testing

Bending test on piping

Egypt - **EG-12.1.EN** *(date 24/04/2001)*

RESULT:

No peeling or cracking on 60µm DFT ZINGA

Bending (cylindrical) and impact testing

Morroco - **MA-15.2-FR** *(date 12/08/2004)*
DFT 112 µm DFT ZINGA

RESULT:

Bending 6 mm, NF T 30-40
Impact 0,5 m/1Kg, NF T 30-039

Bending test (Cylindrical) and impact testing

UK Stangers - **UK-23.4-EN** *(date 09/03/1992)*

DFT 85 µm Bending test result 12 mm (micro-crazing)
DFT 75 µm Impact test result: Direct OK, indirect OK.

Bending test Conical mandrel and direct Impact test

Belgium –SGS - **BE-9b.200-EN** *(date 21/10/2004)*

RESULT:

DFT 60 µm
Bending test result 9 mm, ISO 6860
Direct Impact 3,5 Nm, ASTM D 2794
DFT 50 µm
Bending test result 7 mm, ISO 6860
Direct Impact 4,5 Nm, ASTM D 2794

PRODUCTION RELATED TESTING

a) Zinga test for oven-drying

Belgium ZM testing - **BE-9c.242-EN** *(date 06/09/2005)*

Zinga applied on rebar with diameter 10 – 18 and 22 mm.
Influence of radiation (heating by), power increase and thinning on drying.

RESULT:
Zinga resin not damaged by radiation. Increase in power increases drying without increase of substrate temp.
Extremely thinned Zinga increases substrate temp and decreases drying

b) Zinga re-use in circulating

IRAN Tehran Hara Co. Zinga distributor - **IR-14.4-EN** *(date 01/01/2007)*

Influence of the recycling of Zinga in automatic spraying line on the quality of the applied Zinga.

RESULT:
After 5 times being recycled we found no quality difference between the final applied and the initially applied Zinga coating.

EFFECTIVENESS RELATED TESTING

a) Corrosion rate and galvanic protection

INDIA – Steel Authority of India Ltd - **IN-13a.2-EN** *(date 16/06/2006)*
Comparative testing Zinga, HDG, FBEC and Uncoated 90 day testing with 3,5 and 5% NaCl

Result	Zinga	HDG	FBEC	Uncoated
Corrosion rate in µm/Year 3,5% NaCl, ASTM G 71-81 (2003)	6 *1*	26 *3*	11 *2*	88 *4*
Corrosion rate in µm/year 5% NaCl, ASTM B 117	16 *1*	274 *3*	41 *2*	506 *4*
Galvanic protection 3,5% NaCl	OK *1*	Ok *1*	NOK *2*	NOK *2*

➔ Zinga > FBEC > HDG > Uncoated

Zinga and HDG are giving cathodic protection but Zinga exhibit superior corrosion resistance than the other products.

b) Corrosion rate, corrosion resistance and stress corrosion

INDIA Jadavpur University - **IN-13a.3-EN** *(date 16/06/06)*

Comparative testing Zinga, HDG, FBEC, Stainless steel and Mild steel

RESULT:
- Corrosion resistance Zinga better than the others tested.
- Zinga 2 times higher corrosion resistance than HDG.
- FBEC requires over 500 hours to assess effect of salt fog testing.
- Stress corrosion: Lowest Zinga, 2,5 x better than HDG and 1,75 x than Mild steel.

in NACE solution: Zinga **>** HDG **>** FBEC **>** Stainless steel **>** Mild steel

OTHER TESTING

a) **National Research and Scientific Laboratory for Modified Concrete**
RU-17b.5-RU *(date 28/06/2002)*
DFT 21 µm

RESULT:
- Impact resistance: 50 cm/1 Kg.
- Reduction of Bond strength after HP washing
  - Plain rebar (5)3,9%
  - Normal rebar (1-4)1,7%
- Reduction after 28 days of concrete curing
  - Plain rebar (5)4,0 %
  - Normal rebar (1-4)4,0%

b) **Roediger Agencies co**
South Africa - **ZA-19.13-EN** *(date 16/11/2005)*

Bending test (Conical mandrel)
Impact resistance test (direct and indirect testing)
Adhesion test

RESULT:
- Zinga is extremely pliable with no cracking
- Zinga withstands the impact test with success
- Zinga passed the adhesion test


Figure 1. Results of Conical Mandrel bend test.


Figure 2. Results of cross-hatch adhesion test.

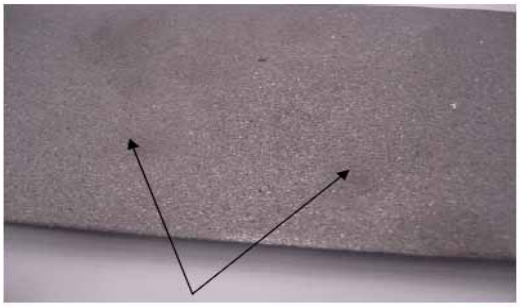


Figure 3. Results of ball impact test from the top.

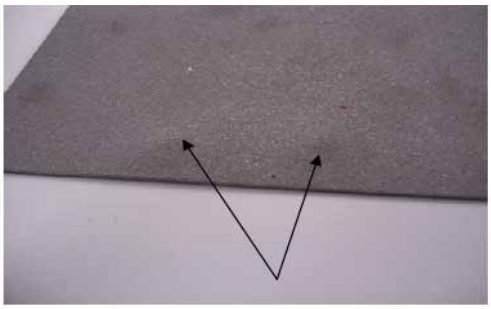


Figure 4. Results of ball impact test from the bottom.

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HANGZHOU BAY BRIDGE - CHINA

The Hangzhou Bay Bridge is located in the bay of Hangzhou and connects the harbours of Shanghai and Ningbo. In May 2005, ZINGA was applied on the rebars used for this project.

A supplementary extension to the project (emergency platform) prescribes ZINGA on the entire construction.

System:
ZINGA 1 x 60 µm

Brush application with ZINGA

Rebars treated with ZINGA

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CHONGQING WATER TURBINE WORKS COMPANY – CONTRACTOR OF THE CHONGQING MONORAIL - CHINA

System :

Rebars :
ZINGA 1 x 40 µm

Other structures :
ZINGA 2 x 50 µm

The company Chongqing Water Turbine Works (CWTW) is one of the main contractors for the construction of the Chongqing Monorail.
The CWTW has applied ZINGA with satisfactory results on the rebars of the beam supports, directing splitter tracks and connecting plates.
These pictures were taken on 16/04/02.

www.zinga.be

REBAR SPRAYING INSTALLATION TEHRAN HARA - IRAN

Since the beginning of 2005 the company Tehran Hara has been engineering the newly built rebar spraying installation. The rebar coating company is called GCE and is a 100% family business.

The plant covers a shop area of 2000 m² and is built on a plot of land with a total surface of 25000 m² (180m x 139m).
The installation itself measures 72m x 10m and is max. 10m high.
Another similar installation will be built here in the future with the purpose of coating other profiles (L, U and I Beams) with the Zinga system. They still have space for another expansion at the same location.

Another plant will be built in the Jebel Ali Free Zone – Dubai – UAE, from there they will be able to export to any Middle-East country within a few days.

The actual rebar installation can produce 50 000 tons of rebars per year.
In a 2nd phase, the production will be increased to 150 000 tons per year and after expansion to a 3rd phase up to 450 000 tons per year.

Technical details of the spraying process

1. Incoming uncoated rebars are stocked above the feeding line, up to a quantity of 50 tons.
2. All rebars are manually handled onto an automatic side conveyor.
   Up to 16 rebars per charge.
3. The side loader is automatically transferred to the treatment line.
   The 16 rebars are lifted and positioned in the treatment line.
4. The rebars are then heated. The heat will loose the mill scale from the underlying steel.
   The surface temperature of the rebars mounts up to 60°C.
5. The rebars automatically enter the wheel blast machine. Automatic (electrically driven) wheel blasters are grit-blasting the rebars to cleanliness degree SA 2,5 and roughness degree 30 to 40 µm Rz. The surface temperature of the rebars is still too high after blasting.
6. The rebars are then pushed through brushes in order to remove the dust and grit, this is followed by dedusting with clean air.
7. The rebars automatically enter the temperature equalising area. In order to avoid temperature stresses in the steel, the inner and outer temperature of the rebars is equalised.
8. The rebars pass through an automatic spray booth in which two reciprocators are spraying the Zinga.
9. The rebars pass through a drying oven.
10. The rebars are transferred automatically to the end station for unloading.
11. The rebars are automatically unloaded and are manually bound together, so that they are ready for transport.

System:

ZINGA 1 x 50 µm

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www.zinga.be

NATIONAL IRANIAN GAS COMPANY
REBARS - IRAN

In December 2001 the ‘National Iranian Gas Company’ has used Zinga for the protection on rebars to reinforce the concrete walls of large containers, during the construction of a sulphur Jetty project constructed by Perlite company, in the special industry zone in Assaluyeh. It was a very large project and it did take about 5 years to complete.
For the application of Zinga they used a specially designed spraying machine for rebars.

System :

ZINGA 1 x 40 µm

www.zinga.be

System :

ZINGA 1 x 40 µm

www.zinga.be

CHABAHAR PORT – REBARS - IRAN

These pictures show the application of Zinga on rebars to reinforce concrete in the Chabahar Port in Iran.




System :

ZINGA 1 x 40 µm

PAYMAN HOJEDK CONSTRUCTION CO

پیمان هجدک شرکت فنی و مهندسی

بسمه تعالی

مدیریت عامل محترم شرکت تهران حرا

با سلام ، بدینوسیله اعلام می داره که این شرکت جهت اجرای پروژه های مختلف در استان های جنوبی کشور ، خصوصا" منطقه چابهار به منظور عملیات گالوانیزاسیون سازه های فلزی از طریق حفاظت کاتدی از پوشش زینگا ساخت کشور بلژیک استفاده نموده و مراتب رضایت خود و مشاورین و کارفرمایان محترم طرح را به آگاهی می رساند .

ضمنا" پوشش زینگا مناسب ترین پوشش برای ترمیم سطوح ممبوبگالوانیز گرم به لحاظ مقاومت در برابر خوردگی و زنگزدگی و عوامل نامساعد جوی میباشد .

تهران - خیابان استاد نجات اللهی - پلاک ۵۵ - طبقه دوم - شماره ۲ کد پستی: ۱۵۹۹۹۱۴۶۳۱

تلفن: ۸۸۰۸۴۵۱ نمابر: ۸۸۰۶۳۹۲

Free translation of the reference letter

PAYMAN HOJEDK Co.

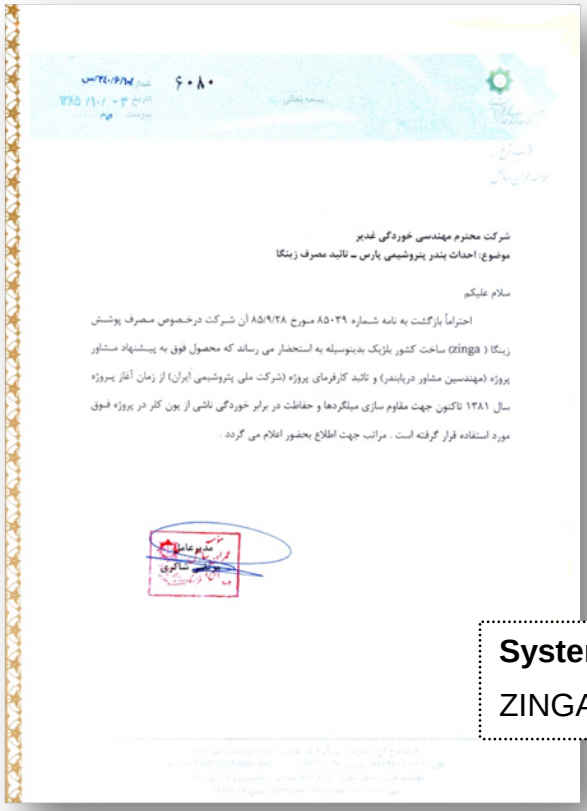
To: General Manager of TEHRAN HARA Co.
(Distributor of Zinga in Iran)

Hereby we inform you that this company used ZINGA coating product for the execution of different projects in South Iran, especially in CHABAHAR. “This product is meant for galvanisation and cathodic protection of metallic framed structures. Moreover, ZINGA is also the best cover for reconstruction of damaged hot-dip galvanised surfaces in order to avoid corrosion.”

www.zinga.be

OMRAN SAHEL INSTITUTE – REBARS - IRAN

This is a testimonial letter from the company Omran Sahel Institute, issued in 2006.
They have been using Zinga since 2002 for repair of rebars and armatures.



شرکت محترم مهندسی خوردگی غدیر
موضوع: احداث بندر پتروشیمی پارس ـ تائید مصرف زینگا

سلام علیکم

احتراماً بازگشت به نامه شماره ۸۵۰۳۹ مورخ ۸۵/۹/۲۸ آن شرکت درخصوص مصرف پوشش زینگا (zinga) ساخت کشور بلژیک بدینوسیله به استحضار می رساند که محصول فوق به پیشنهاد مشاور پروژه (مهندسین مشاور دریابندر) و تائید کارفرمای پروژه (شرکت ملی پتروشیمی ایران) از زمان آغاز پروژه سال ۱۳۸۱ تاکنون جهت مقاوم سازی میلگردها و حفاظت در برابر خوردگی ناشی از یون کلر در پروژه فوق مورد استفاده قرار گرفته است . مراتب جهت اطلاع بحضور اعلام می گردد .

System :

ZINGA 2 x 60 µm

translation by the company Tehran Hara (Zinga Distributor in Iran)

OMRAN SAHEL INSTITUTE

To: GHADIR CORROSION ENGINEERING Co.
Subject: Ingeneration of Pars Petrochemical Harbour- Confirmation of ZINGA using

Due to number letter 85039 on 28/09/2006 which was related to consuming of “ZINGA” coating which is made in Belgium, hereby informs that the mentioned product is being used since starting of the project at 2002 for supporting the rebar and armatures and also corrosion protection that came from chloride yon. It is good to mention that consuming of this product suggested by consultant of the project (Darya Bandar consulting engineers) and confirmation of employer of the project (Iran National Petrochemical Co).

General Manager
Morteza Shakeri

PARS OIL & GAS CO. – REBARS - IRAN

This is a testimonial letter from the company Pars Oil & Gas co., issued in 2006. Where in is confirmed that Zinga will be used for the anti-corrosion protection of rebars on the wharf instead of epoxy.

شرکت نفت و گاز پارس

بسمه تعالی

تاریخ : ۷۹/۹/۱۴
شماره : ن ک ۱/۵۰۱/ ۴۷۷
پیوست : ـــ

مشارکت پرلیت / تهران برکلی
جناب آقای مهندس معدلی

موضوع : پوشش گالوانیزاسیون آرماتور کیسونهای اسکله
قرارداد شماره م ت ن - ۰۲۹-۷۶-۵۲۰

با سلام،

احتراماً، پیرو نامه شماره ن ک/۱/۵۰۱/۴۴۱ مورخ ۷۹/۸/۷ با توجه به اینکه استفاده از پوشش گالوانیزه زینگا از نظر مشخصات فنی و کیفیت مورد تائید می باشد لذا با عنایت به مقطوع بودن پیمان چنانچه استفاده از پوشش فوق الذکر بار مالی اضافی نداشته باشد می توان از این پوشش بجای اپوکسی استفاده نمود .

من ا... التوفیق

اسماعیل گله داری

۷۹/۹/۱۴

System :

ZINGA 1 x 40 µm

translation by PARS OIL & GAS Co.

PARTICIPATION of PERLITE/TEHRAN BERKLEY
Considerable for Mr. MOADDELI

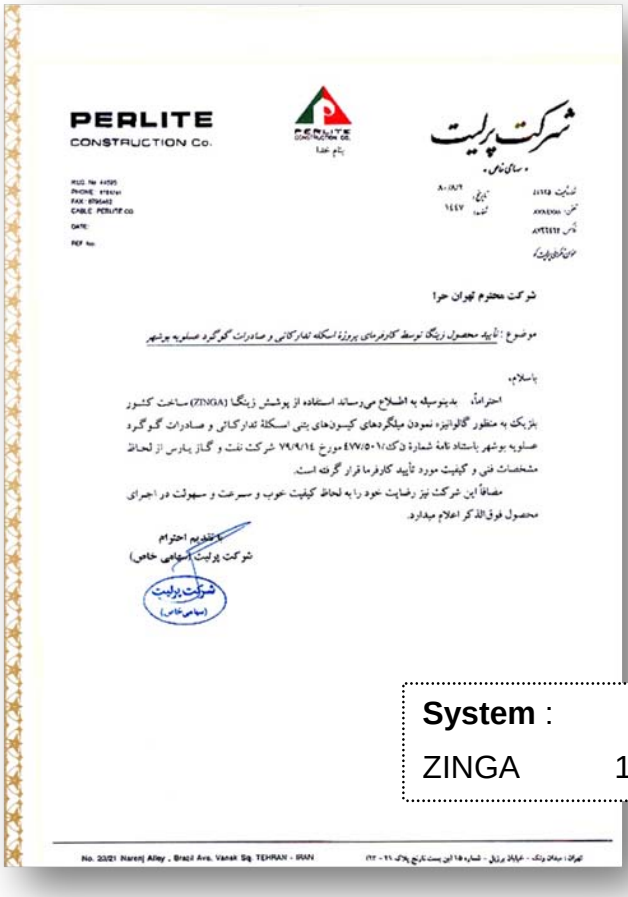
Subject: galvanization coating of <u>wharf's rebars</u>
Contract no: 029-76-520-MTN

Hereby, according to letter number NK/501/441 on 07/08/2000, informs that uses of the "ZINGA" galvanized coating is confirmed from technical characteristics and the quality. So, by considering that this contract is not interrupted and consuming of this coating has no financial burden, we can use this product instead of epoxy.

Esmaeel Galleh Dari
Agent of employer

PERLITE CONSTRUCTION
SULFUR EXPORT WHARF - IRAN

This is a testimonial letter from the company Perlite Construction Co., issued in 2006.
They have used Zinga on rebars and other structures on a wharf for sulfur (=brimstone) export.



PERLITE
CONSTRUCTION Co.

شرکت پرلیت
(سهامی خاص)

شرکت محترم تهران حرا

موضوع: تأیید محصول زینگا توسط کارفرمای پروژه اسکله تجارگاتی و صادرات گوگرد عسلویه بوشهر

با سلام،

احتراماً، بدینوسیله به اطلاع می‌رساند استفاده از پوشش زینگا (ZINGA) ساخت کشور بلژیک به منظور گالوانیزه نمودن میلگردهای کیسون‌های بتنی اسکلهٔ تجارگاتی و صادرات گوگرد عسلویه بوشهر باستناد نامهٔ شمارهٔ ن/ک/۷۷/۵۰۱ مورخ ۷۹/۹/۱۴ شرکت نفت و گاز پارس از لحاظ مشخصات فنی و کیفیت مورد تأیید کارفرما قرار گرفته است.

مضافاً این شرکت نیز رضایت خود را به لحاظ کیفیت خوب و سرعت و سهولت در اجرای محصول فوق‌الذکر اعلام میدارد.

با تقدیم احترام
شرکت پرلیت (سهامی خاص)

شرکت پرلیت (سهامی خاص)

No. 23/21 Narenj Alley , Brazil Ave. Vanak Sq. TEHRAN - IRAN

System :

ZINGA 1 x 40 µm

translation by the company PERLITE CONSTRUCTION

TO: TEHRAN HARA Co.

Subject: Confirmation for “ZINGA” coating by employer of preparation wharf and export of Brimstone of ASALOOYE BOSHEHR

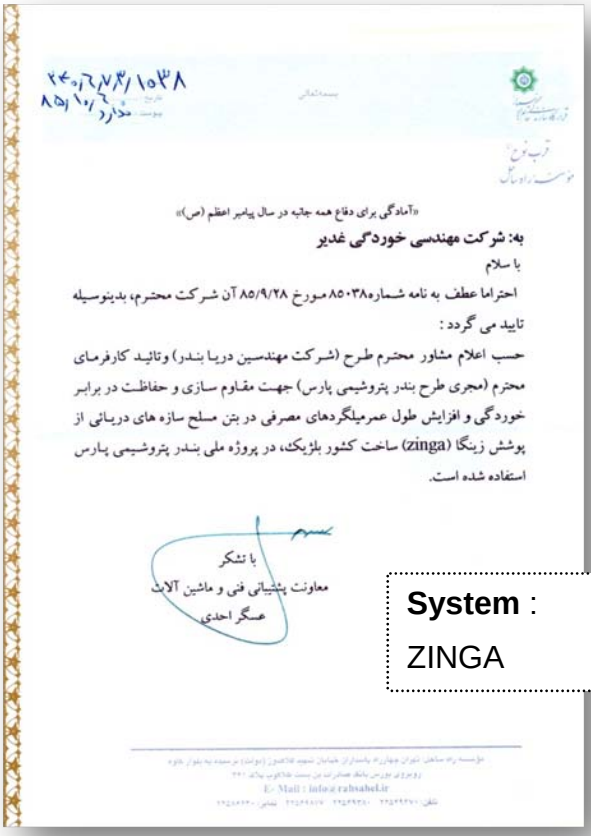
Hereby, wants to inform you uses of “ZINGA” coating (made in Belgium) which used in Galvanization of concreted rebar of preparation wharf and export Brimstone of ASALOOYE, is confirmed by Pars Gas & Oil Co., from the technical and quality characteristics.

In addition, this company wants to announce you its appreciation because of good quality, good service and fast working for applying this product.

Best Regards
PERLIT CONSTRUCTION Co. LTD.

RAHE SAHEL INSTITUTE – REBARS - IRAN

This is a testimonial letter from the Rahe Sahel Institute, issued in 2006.
Confirming that Zinga is used for the anti-corrosion protection of rebars used by the Pars Petrochemical Harbour.



«آمادگی برای دفاع همه جانبه در سال پیامبر اعظم (ص)»

به: شرکت مهندسی خوردگی غدیر

با سلام

احتراما عطف به نامه شماره۸۵۰۳۸ مورخ ۸۵/۹/۲۸ آن شرکت محترم، بدینوسیله تایید می گردد :

حسب اعلام مشاور محترم طرح (شرکت مهندسین دریا بندر) وتائید کارفرمای محترم (مجری طرح بندر پتروشیمی پارس) جهت مقاوم سازی و حفاظت در برابر خوردگی و افزایش طول عمرمیلگردهای مصرفی در بتن مسلح سازه های دریائی از پوشش زینگا (zinga) ساخت کشور بلژیک، در پروژه ملی بندر پتروشیمی پارس استفاده شده است.

با تشکر
معاونت پشتیبانی فنی و ماشین آلات
عسگر احدی

E- Mail : info@rahsahel.ir

System :

ZINGA 1 x 40 µm

translation by RAHE SAHEL INSTITUTE

TO: GHADIR Corrosion Engineering Co.

Due to your sent letter number 85038 on 28/09/2006, the confirmation is as the appendix:

According to announcement of consultant of the project (Darya Bandar Engineering Co.) and also confirmation of employer (executive of Petrochemical harbor of Pars Project) for making longer service life for rebar which used in reinforced concrete of sea projects, uses of the “ZINGA” coating (made in Belgium) is confirmed in national project of Pars Petrochemical Harbor.

Thankfully
Technical Protection & Machinery Assistance

www.zinga.be

RUBLEVO WATER INTAKE PLANT - RUSSIA

In 2003 ZINGA was applied on all the steel structures (both new constructions and repaired old objects) and also on the reinforcing bars in the concrete of the Rublevo Water intake Plant near Moscow.

System:

ZINGA 2 x 60 µm

www.zinga.be

BUILDING WITH REBARS - RUSSIA

System :

ZINGA 1 x 40 µm

In March 2002 ZINGA was applied on rebars to reinforce the walls of a large building in Russia.

These pictures were taken during the ZINGA application in the work shop and during the construction of the building.

ZINGA

ZM-RE-PRO-04-A (01/08/06)

The film galvanising system Zinga is a one pack coating that contains 96% zinc in the dry film and provides cathodic protection to ferrous metals. It can be used as a unique system as an alternative to hot-dip galvanisation or metallisation, as primer in a duplex system or as a recharging system for hot-dip galvanisation or metallisation. It can be applied by brushing, rolling or spraying on a clean and rough substrate in a wide range of atmospheric circumstances. Zinga is also available as an aerosol and is sold as Zingaspray.

Physical data and technical information

- **Wet product**

Components	- zinc powder - aromatic hydrocarbons - binder
Density	2,67 Kg/dm³ (± 0,06 Kg/dm³)
Solid content	- 80% by weight (± 2%) - 58% by volume (± 2%) according to ASTM D2697
Type of thinner	Zingasolv
Flash point	≥ 40°C to < 60°C
VOC	474 g/L (EPA method 24) (= 178g/Kg)

- **Dry film**

Colour	matt metallic grey (colour darkens after contact with humidity)
Zinc content	96% (±1%) by weight, with a purity of 99,995% Zinga gives full cathodic protection and conforms to the standard ISO 3549 in regard to its zinc purity of 99,995 % and to the standard ASTM A780 in regard of its use as repair coating for hot-dip galvanisation.
Special characteristics	- atmospheric temperature resistance - minimum : -40°C - maximum : 120°C with peaks up to 150°C - pH resistance in immersion: from 5,5 pH to 9,5 pH - pH resistance in atmospheric circumstances: from 5,5 pH to 12,5 pH - excellent UV resistance
Non-toxicity	A dry layer of Zinga is not toxic and can be used in contact with potable water, according to the standard BS 6920.

- **Packing**

500 ml	aerosol
1/4 Kg	available as sample (on request)
1 Kg	available, packed in undividable boxes of 12 x 1 Kg
2 Kg	available, packed in undividable boxes of 6 x 2 Kg
5 Kg	available
10 Kg	available
25 Kg	available

- **Conservation**

Storage	store in a cool and dry place
Shelf life	unlimited In case of long time storage it is recommended to shake the unopened tin in an automatic shaker at least once every 3 years.

Application data

- **System recommendations**

Unique system	- Zinga is used as a stand-alone system, applied in 2 or 3 layers to obtain a total maximum DFT* of 120 to 180 µm. - This system is strongly recommended because of the easy maintenance. In time the layer will become thinner as the Zinga sacrifices itself due to the cathodic protection. A new layer of Zinga can be directly applied once the surface has been properly cleaned and it will re-liquidise and recharge the previous Zinga layer. The DFT of Zinga that should be applied depends upon the remaining Zinga layer. - The system Zinga 2 x 60 µm DFT conforms to the standards: NORSOK M-501 syst. 7 ISO 12944-6: 2 x 60µm DFT ZINGA: C4-High, C5M-Medium and C5I-Medium 2 x 90µm DFT ZINGA: C5M-High and C5I-High
Duplex system	- In a duplex system, Zinga should be applied in **one single application**, preferably by spraying, to obtain a maximum DFT of 60 to 80 µm. - The surface of the Zinga should be free of zinc salts and other contaminations prior to application of a topcoat. - Zinga can be topcoated with a wide range of compatible sealers and topcoats. To avoid pinholes when topcoated, use the **mist coat & full coat technique** (meaning a standard diluted coat of 25 to 30µm DFT followed by a full coat of the same product).
Stripe-coat	It is recommended to apply a stripe-coat of Zinga by brush on all sharp edges, nuts and bolts and weld areas before the application of the first full layer of Zinga.
Recharging system	Zinga can be applied on top of a hot-dip galvanising layer, a metallisation layer or an old Zinga layer in order to renew or enhance the cathodic protection. The DFT of Zinga that should be applied depends upon the existing galvanising layer.

*DFT & WFT : dry film thickness and wet film thickness ; to be measured **above the peaks** of the roughness profile

- **Coverage and consumption**

Theoretical consumption	- for 60 µm DFT : 0,28 Kg/m² or 0,10 L/m² - for 120 µm DFT : 0,55 Kg/m² or 0,21 L/m²
Theoretical coverage	- for 60 µm DFT : 3,62 m²/Kg or 9,67 m²/L - for 120 µm DFT : 1,81 m²/Kg or 4,83 m²/L
Practical coverage	depends upon the roughness profile of the substrate and the application method

- **Environmental conditions during application**

Ambient temperature	- minimum -15°C - maximum 40°C
Relative humidity	- maximum 95%
Surface temperature	- minimum 3°C above the dew point - no visual presence of water or ice - maximum 60°C
Product temperature	During application the temperature of the Zinga liquid must remain between 15 and 25°C. A lower or higher temperature of the product will influence the smoothness of the film when drying.

- **Drying process and overcoating**

Drying process	Zinga dries by evaporation of the solvent. The drying process is influenced by the total WFT, the number of coats applied, the ambient air and surface temperatures and the air circulation.
Drying time	for 40 µm DFT at 20°C in a well-ventilated environment: - touch-dry: after 10 min. - dry to handle: after 1 hour - fully cured: after 48 hours - ready for immersion: after 2 hours
Overcoating	- with a new layer of Zinga : - brush : 2 hours after touch dry - spray gun : 1 hour after touch dry - with a compatible paint : after 6 to 24 hours depending on the drying conditions
Reliquidisation	Each new layer of Zinga reliquidises the former Zinga layer so that both layers form one homogeneous layer.

Instructions for use

- **Surface preparation**

Cleanliness	- The most common method to obtain a clean (and at the same time rough) surface for the application of Zinga is: The metal substrate should first be **degreased**, preferably by **steam-cleaning** at 140 bar at 80°C. After that it should be **grit-blasted** or **slurry-blasted** to cleanliness degree SA 2,5 according to the standard ISO 8501-1 or to the cleanliness degree described in the standards SSPC-SP10 and NACE nr 2. This means that the surface must be free from rust, grease, oil, paint, salt, dirt, mill scale and other contaminants. Once the grit-blasting is completed the surface should be **de-dusted** with non contaminated compressed air according to the standard ISO 8502-3 (class 2) or in case of slurry-blasting the surface should be **dried** with non-contaminated compressed air. - Another method to obtain a clean surface is **UHP water-jetting** to cleanliness degree WJ2 according to the standards NACE nr 5 and SSPC-SP12 level SC1. But keep in mind that this method does **not** create surface roughness. - This high degree of cleanliness is not needed when Zinga is applied on a hot-dip galvanisation or a metallisation layer, or when it is applied on top of an existing Zinga layer. Please consult with the Zingametall representative. - For substrates that will not be immersed Zinga can be applied on mild flash rust (FWJ-2) occurring in the allowed time limit. For applications that will be immersed Zinga can only be applied on an SA 2,5 prepared surface with contaminants to NACE No5/SSPC SP-12 level SC1 unless otherwise agreed with the Zingametall representative. - On small areas or on non-critical applications Zinga can be applied on a surface that is manually prepared to degree St 3 according to ISO 8501-1. Please consult with the Zingametall representative.
Roughness	- Zinga should be applied on a metal substrate that has roughness degree Rz 50 to 70 µm (for total DFT < 280 µm) or Rz 60 to 80 µm (for total DFT > 280 µm) according to the standard ISO 8503-2. This can be obtained by **grit-blasting** (with sharp particles) but not by shot-blasting (with spherical particles). Make sure that the surface is degreased **before** the grit-blasting. - This high degree of roughness is not needed when Zinga is applied on a hot-dip galvanisation or a metallisation layer, or when it is applied on top of an existing Zinga layer. Please consult with the Zingametall representative. - On small areas or on non-critical applications Zinga can be applied on a surface that is manually prepared e.g. with a needle gun or a grinding disk, in order to obtain an adequate roughness for Zinga. Please consult with the Zingametall representative.

Maximum time to application	Apply the Zinga as soon as possible on the prepared surface. - in dry circumstances : depending on the location - in case of water-cleaning or if the relative humidity is close to 80%: max. 4 hours waiting time If contamination occurs before coating, the surface must be cleaned again as described above. Flash rust can be removed by means of a wire brush.

- **Special instructions**

Stirring	- Zinga must be thoroughly stirred to achieve a homogeneous liquid before application. After a maximum of 20 min. re-mixing is necessary. - During the spraying application, the product must be stirred continuously.

Dilution	Zinga can be diluted with 0 to 5% (volume on volume) of Zingasolv when using airless spray equipment and 0 to 25% for air supported applications. The Zingasolv must be added whilst stirring.
Rinsing of tools and equipment	Before and after using the spraying equipment, it must be rinsed with Zingasolv. Brushes and rollers should also be cleaned with Zingasolv. Never use White Spirit.
Special demands for spraying equipment	- Pour the Zinga through a filter of 100 mesh (150 µm) into the drum. - For the spraying of Zinga, it is better to remove all filters from the pistol and from the drum to avoid blockage. - The spray gun must be equipped with reinforced needle springs.

- **Application by brush and roller**

Viscosity	Zinga is ready for use when applied by brush or roller. Do not dilute.
First layer	The first layer must never be applied by roller, only by brush, in order to fill the cavities of the roughness profile and to wet the surface.
Type of brush and roller	- short hair roller (mohair) - industrial round brush

- **Application by conventional spray-gun**

Dilution	0 to 25% (volume on volume)
Spray viscosity	25 to 35 sec. Ford cup nr. 4 at 20°C
Pressure at the nozzle	2 to 4 bar
Nozzle opening	2,2 to 2,5 mm
Remark	Make sure ZINGA is stirred frequently so the zinc in ZINGA cannot settle to the bottom.

- **Application by conventional spray-gun with pressure pot**

Dilution	0 to 25% (volume on volume)
Spray viscosity	25 to 35 sec. Ford cup nr. 4 at 20°C
Pressure at the nozzle	3 to 4 bar
Pot pressure	0,8 to 1,5 bar
Nozzle opening	1,8 to 2,2 mm

- **Application by airless spraying**

Dilution	0 to 5% (volume on volume)
Pressure at the nozzle	± 150 bar
Nozzle opening	± 0,023 inch

- **Other application methods**

Please consult with the Zingametall representative.

For more specific and detailed recommendations concerning the application of Zinga, please contact the Zingametall representative. For detailed information about the health and safety hazards and precautions for use, please refer to the Zinga **safety data sheet**.

Waiver*

* The information on this sheet is merely indicative and is given to the best of our knowledge based on practical experience and testing. The conditions or methods of handling, storage, use or disposal of the product cannot be controlled by us and are therefore outside our responsibility. For these and other reasons we retain no liability in case of loss, damage or costs that are caused by or that are linked in any way to the handling, storage, use or disposal of the product. Any claim concerning deficiencies must be made within 3 months upon reception of the goods quoting the relevant batch number. We retain the right to change the formula if properties of the raw material are changed. This data sheet replaces all former specimens.

ALU ZM

ZM-RE-PRO-04-A (01/08/06)

Alu ZM is a quick drying one pack coating based on aluminium flakes. It can be applied either without primer on an old, non-corroded hot-dip galvanisation or metallisation layer or as topcoat on top of Zinga. It can be applied by brushing or spraying in a wide range of atmospheric circumstances. Alu ZM is mainly applied for esthetical reasons as it gives a nice aluminium aspect and has a good chemical resistance which allows it to be used in industrial environments.

Physical data and technical information

- **Wet product**

Components	- aluminium powder - aromatic hydrocarbons - binder
Density	1,01 Kg/dm³ (± 0,05 Kg/dm³)
Solid content	- 35% (± 2%) by weight - 25% (± 2%) by volume
Type of thinner	Zingasolv (does not contain xylene or MEK)
Flash point	≥ 40°C to < 60°C

- **Dry film**

Colour	aluminium

- **Packing**

1 L	available, packed in undividable boxes of 6 x 1 L
2,5 L	available
15 L	available

- **Conservation**

Storage	store in a cool and dry place
Shelf life	unlimited In case of long time storage it is recommended to shake the unopened tin from time to time.

Application data

- **System recommendations**

As topcoat on Zinga	Alu ZM can be applied in 1 layer of 40 to 60 µm DFT as topcoat (by airspray or airless) on top of the anti-corrosion system Zinga on a metal substrate. Even though we always recommend maximum 60 µm DFT for Zinga in a duplex system, in combination with Alu ZM, the maximum layer thickness of Zinga is 120µm DFT in 1 layer applied by airless.
Stripe-coat	We recommend applying a stripe-coat of Alu ZM by brush on all sharp edges, nuts and bolts and welding areas before the application of the first full layer of Alu ZM.

- **Coverage and consumption**

Theoretical consumption	- for 40 µm DFT : 0,16 L/m² - for 80 µm DFT : 0,32 L/m²
Theoretical coverage	- for 40 µm DFT : 6,19 m²/L - for 80 µm DFT : 3,09 m²/L
Practical coverage	depends upon the application method

- **Environmental conditions during application**

Ambient temperature	- minimum -15°C - maximum 40°C
Relative humidity	- maximum 95%
Surface temperature	- minimum 3°C above the dew point - no visual presence of water or ice - maximum 60°C

- **Drying process and overcoating**

Drying process	Alu ZM dries by evaporation of the solvent. The drying process is influenced by the total WFT, the number of coats applied, the ambient air and surface temperatures and the air circulation.
Drying time	for 40 µm DFT at 20°C in a well-ventilated environment with at least 60% relative humidity : - touch-dry : after 25 min. - dry to handle : after 1,5 hour - fully cured : after 24 hours
Overcoating	- with a new layer of Alu ZM : 1 hour after touch dry - Any intermediate coat contamination that could disturb the adherence of the next coat should be removed by appropriate cleaning.
Reliquidisation	Each new layer of Alu ZM reliquidises the former Alu ZM layer so that both layers form one homogeneous layer.

Instructions for use

- **Surface preparation**

Cleanliness	- When Alu ZM is applied on top of Zinga, the surface should be free of zinc salts and other contaminations. That means that the Alu ZM must be applied within 24 hours after the application of the Zinga. In case the application of the Alu ZM can only be done after 24 hours, the Zinga surface should first be washed preferably by **steam-cleaning** at 140 bar at 80°C.
Roughness	When Alu ZM is applied on top of a new hot-dip galvanisation layer, the surface should be roughened by blasting with wet inert product, by using Scotch Brite or a nylon brush.
Maximum time to application	Apply the Alu ZM as soon as possible on the prepared surface. - in dry circumstances : max. 24 hours waiting time - if the relative humidity is close to 80% : max. 4 hours waiting time If contamination occurs before coating, the surface must be cleaned again as described above.

- **Special instructions**

Stirring	- Alu ZM must be thoroughly stirred to achieve a homogeneous liquid before application. After a maximum of 20 min. re-mixing is necessary. - During the spraying application, the product must be stirred continuously.
Dilution	Alu ZM can only be diluted with Zingasolv.
Rinsing of tools and equipment	Before and after using the spraying equipment, it must be rinsed with Zingasolv. Brushes should also be cleaned with Zingasolv. Never use White Spirit.

- **Application by brush**

Viscosity	Alu ZM is ready for use when applied by brush. Do not dilute.
Type of brush	- industrial round brush

- **Application by roller**

Viscosity	Alu ZM is ready for use when applied by roller. Do not dilute.
Type of brush	Industrial short haired roller (not foam based)

- **Application by conventional spray-gun**

Viscosity	10 to 20% Zingasolv (volume on volume)
Pressure at the nozzle	2 to 4 bar
Nozzle opening	1,4 to 1,8 mm

- **Application by conventional spray-gun with pressure pot**

Viscosity	10 to 20% Zingasolv (volume on volume)
Pressure at the nozzle	2 to 4 bar
Pot pressure	0,8 to 1,5 bar
Nozzle opening	1,4 to 1,8 mm

- **Application by airless spraying**

Dilution	0 to 5% (volume on volume)
Pressure at the nozzle	100 to 200 bar
Nozzle opening	0,017 to 0,021 inch

For more specific and detailed recommendations concerning the application of Alu ZM, please contact the Zingametall representative. For detailed information about the health and safety hazards and precautions for use, please refer to the Alu ZM **safety data sheet**.

Waiver*

* The information on this sheet is merely indicative and is given to the best of our knowledge based on practical experience and testing. The conditions or methods of handling, storage, use or disposal of the product cannot be controlled by us and are therefore outside our responsibility. For these and other reasons we retain no liability in case of loss, damage or costs that are caused by or that are linked in any way to the handling, storage, use or disposal of the product. Any claim concerning deficiencies must be made within 3 months upon reception of the goods quoting the relevant batch number. We retain the right to change the formula if properties of the raw material are changed. This data sheet replaces all former specimens.

ALUFER N

ZM-RE-PRO-04-A (01/08/06)

Alufer N is a moisture curing one pack polyurethane. Micaceous iron oxides create the special lamellar structure which create a very tight paint film
→ excellent water and corrosion resistance.
Alufer N can be applied as an intermediate and/or topcoat on Zinga.
Alufer N can be used for immersion in water, sea water and several chemicals.

Physical data and technical information

- **Wet product**

Components	- micaceous iron oxides - aluminium silicates - magnesium silicates
Binder	moisture curing aromatic polyisocyanate prepolymers.
Density	1,52 Kg/dm³ (± 0,05 Kg/dm³) at 20°C
Solid content	- 79% by weight (± 2%) - 66% by volume (± 2%)
Viscosity	105 KU (± 5 KU) at 20°C
VOC	300 g/L (= 198 g/Kg)

- **Dry film**

Colour	Grey
Gloss	Mat

- **Packing**

1 L	available (per box of 6 L)
4 L	available
20 L	available

- **Conservation**

Storage	2 years in the original, unopened package stored in a dry environment at temperatures between –20°C and +40°C.

Application data

- **Surface preparation**

When the waiting time between the successive coats is abnormally prolonged or in extremely polluted areas, the primed surface can become contaminated. All contamination that hampers the adhesion of the paint should be removed by appropriate means.
Surfaces contaminated with oil and grease should be washed down with solvent, alkaline solutions or emulsifier.
Salt deposits or other water-soluble contaminations should be removed with water and brush, water under high pressure or steam. Possible white zinc rust on zinc dust primers should be removed with water and rigid nylon brush.

- **Coverage and consumption**

Theoretical coverage	- for 80 µm DFT: 7,5 m²/L - for 100 µm DFT: 6,0 m²/L - for 150 µm DFT: 4,0 m²/L
Practical coverage	depends upon the roughness profile of the substrate and the application method

- **Environmental conditions during application**

Ambient temperature	- minimum 0°C - maximum 35°C
Relative humidity	- minimum 30% - maximum 98%
Surface temperature	- minimum 3°C above the dew point

- **Drying process and overcoating**

Drying time	for 80 µm DFT at relative humidity of 75%: - 10°C: dustdry: 2,5 hours tackfree: 4 hours dry: 6 hours - 20°C: dustdry: 1 hours tackfree: 2,5 hours dry: 4 hours - 30°C: dustdry: 40 minutes tackfree: 1,5 hours dry: 3 hours
Overcoating	for 80 µm DFT at relative humidity of 75%: 10°C: minimum: 24 hours maximum: 3 months 20°C: minimum: 6 hours maximum: 1 month 30°C: minimum: 4 hours maximum: 1 week Remark: At longer intervals a good cleaning is necessary to avoid intermediate coat contamination which could disturb the adherence of the next coat.

Instructions for use

- **Application by brush and roller**

Dilution	5 to 10% with Zingasolv

- **Application by conventional spray-gun**

Dilution	10 to 20% with Thinner 41
Pressure at the nozzle	3 to 5 bar
Nozzle opening	1,2 to 1,5 mm

- **Application by airless spraying**

Dilution	5 to 15% with Thinner 41
Pressure at the nozzle	100 to 300 bar
Nozzle opening	0,017 to 0,024 inch

- **Remarks**

Stripe coat	It is always recommended to treat corners, sharp edges, bolts and nuts before applying a uniform coat.
Dry layer thickness	Recommended: 60 to 100 µm Maximum: 120 to 160 µm
Cleaning	With Zingasolv

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