BIAFO INDUSTRIES LIMITED

Manufacturer of Tovex® Explosives and Blasting Accessories

CORPORATE PROFILE

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ISO 9001 & OHSAS 45001 CERTIFIED


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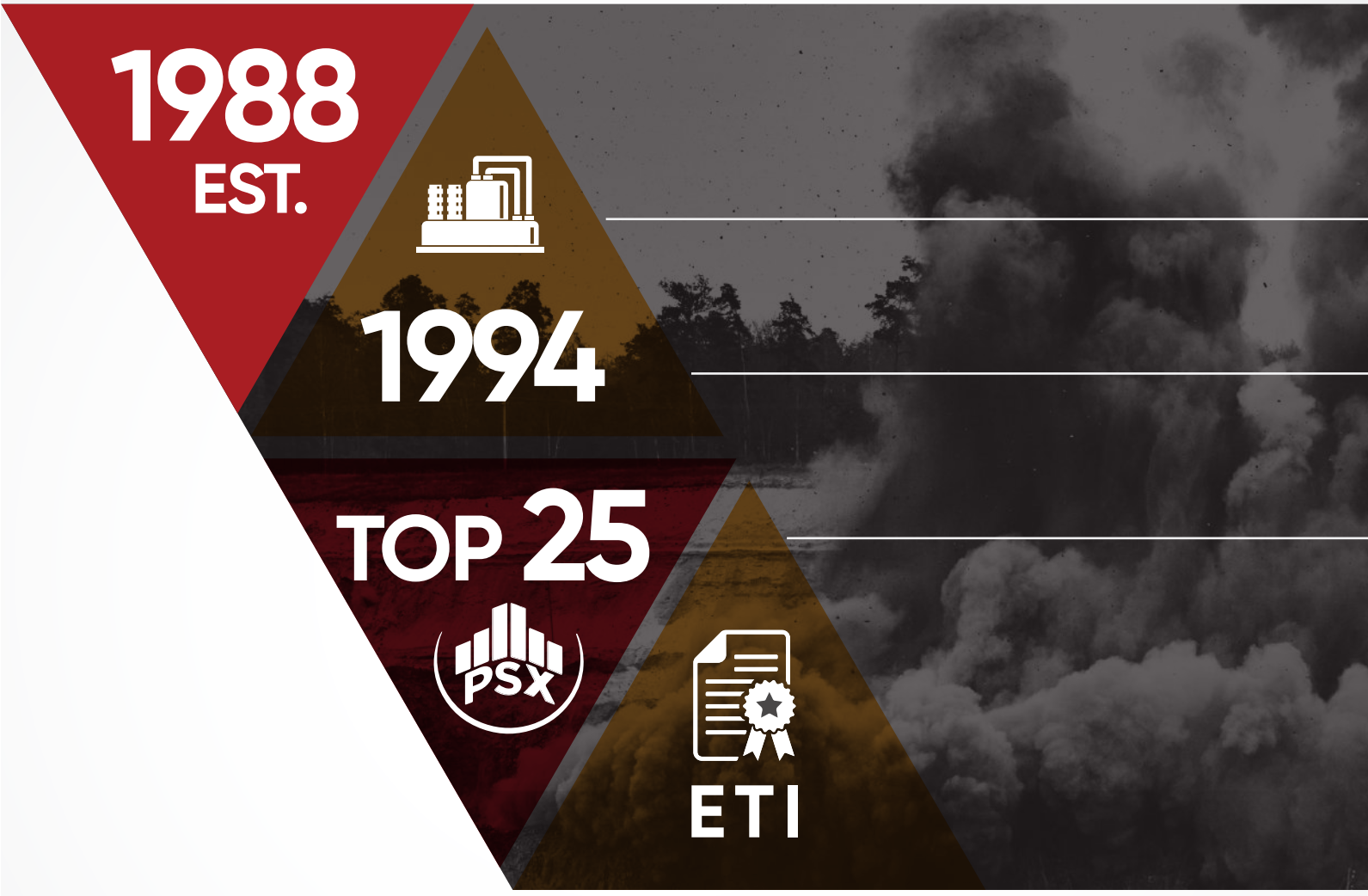
CORPORATE **PROFILE**



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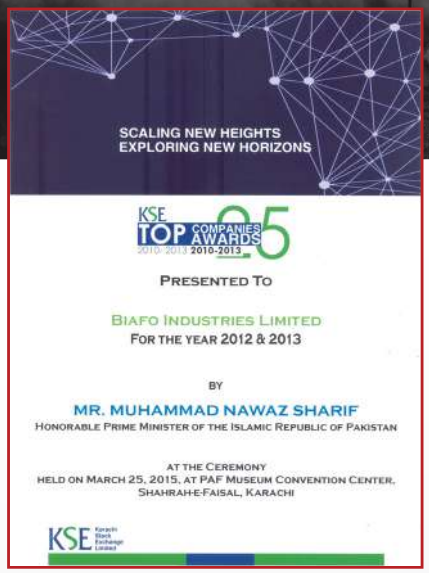
TRANSFORMING LANDSCAPES REALIZING DREAMS

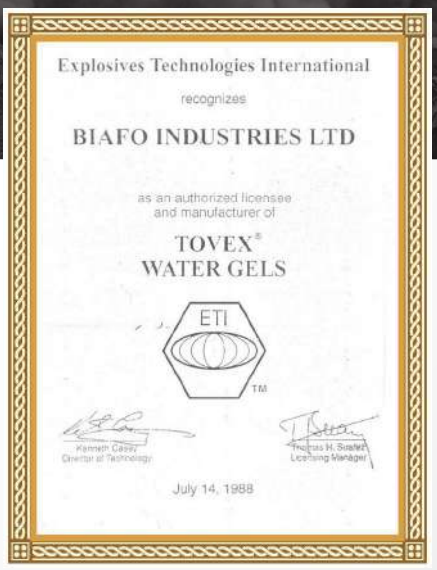
Biafo Industries Limited was incorporated in 1988 as a Public Limited Company. Listed on the Pakistan Stock Exchange, Biafo is market leader in the explosives manufacturing & engineered blasting industry of Pakistan. The Company has transcended expectation by delivering nothing short of the best. It has had the privilege of providing services to the Industry for over two decades.

Since 1994, our manufacturing facility has been based at Hattar, Khyber Pakhtunkhwa. A flourishing region for industries, Hattar Industrial Estate is home to a state of the art Biafo production facility. At this facility the company produces industrial standard Commercial Explosives and Blasting Accessories.

Leaping forward to meet industrial benchmarks, Biafo Industries Limited is an authorized licensee of Explosive Technology International (ETI), using the Du Pont Technology and producing Tovex® Water Gel Explosives. Biafo has been involved in a strategic partnership with Hanwha Group of South Korea to acquire technology and produce high quality accessories.

As a recognition of its stability and progress, the Company has been selected amongst Top 25 Companies of Pakistan Stock Exchange for the Years 2012, 2013, 2014, 2015 and 2018. Apart from this our credibility is solidified by our internationally accredited certifications; ISO 9001 & OHSAS 450001.





VISION

To be a world class manufacturer of commercial and industrial explosives providing consistent high quality of product to meet the increasing requirement of potential customers in the country and to establish an international market by exporting to countries in the region. To expand the company into other associated/industrial chemical products.

MISSION

To increase the market shares of the company to an appropriate level by marketing product which meet the expectations of customers both within country and outside. To ensure that the recent improvement in the market share is maintained and rapidly convert the company into profitable organization. To achieve improved financial results by continued ethical business practice and improved international quality products and service to customers at a competitive price. To provide a decent return in the coming years.

HISTORY OF EXPLOSIVES

Everything evolves with time, such has been the case with technology in commercial explosives. Tovex has been an important breakthrough in explosives since the invention of dynamite by Alfred Nobel more than a century ago. Dynamite has served the industry well but hazards associated with the use, manufacturing, transportation, storage and toxic nature has been the cause of serious concern.

After intensive studies and research, in 1974 DuPont, the largest manufacturer of Nitro Glycerin based dynamite in the United States of America introduced Tovex Water Gel, and in 1976 they decided to withdraw from the dynamite business in favour of Tovex.

EVOLUTION OF TOVEX

Tovex Water Gel is substantially and demonstratively, safer. It is designed to perform equal to, if not better than dynamite in all sectors of the industry i.e. construction, mining, quarrying, seismic, tunneling etc. Tovex compositions manufactured by Biafo are cap sensitive and are equipped with all of its basic features for entire customer satisfaction.

FRIENDLY FEATURES

- Wide range of bore hole densities
- Improved flexibility in loading
- Water-resistant
- No Nitro Glycerin and noxious fumes
- Reduced handling, transportation and storage hazards
- High bubble energy (Under water explosion)
- Reduced sound levels and better vibration control

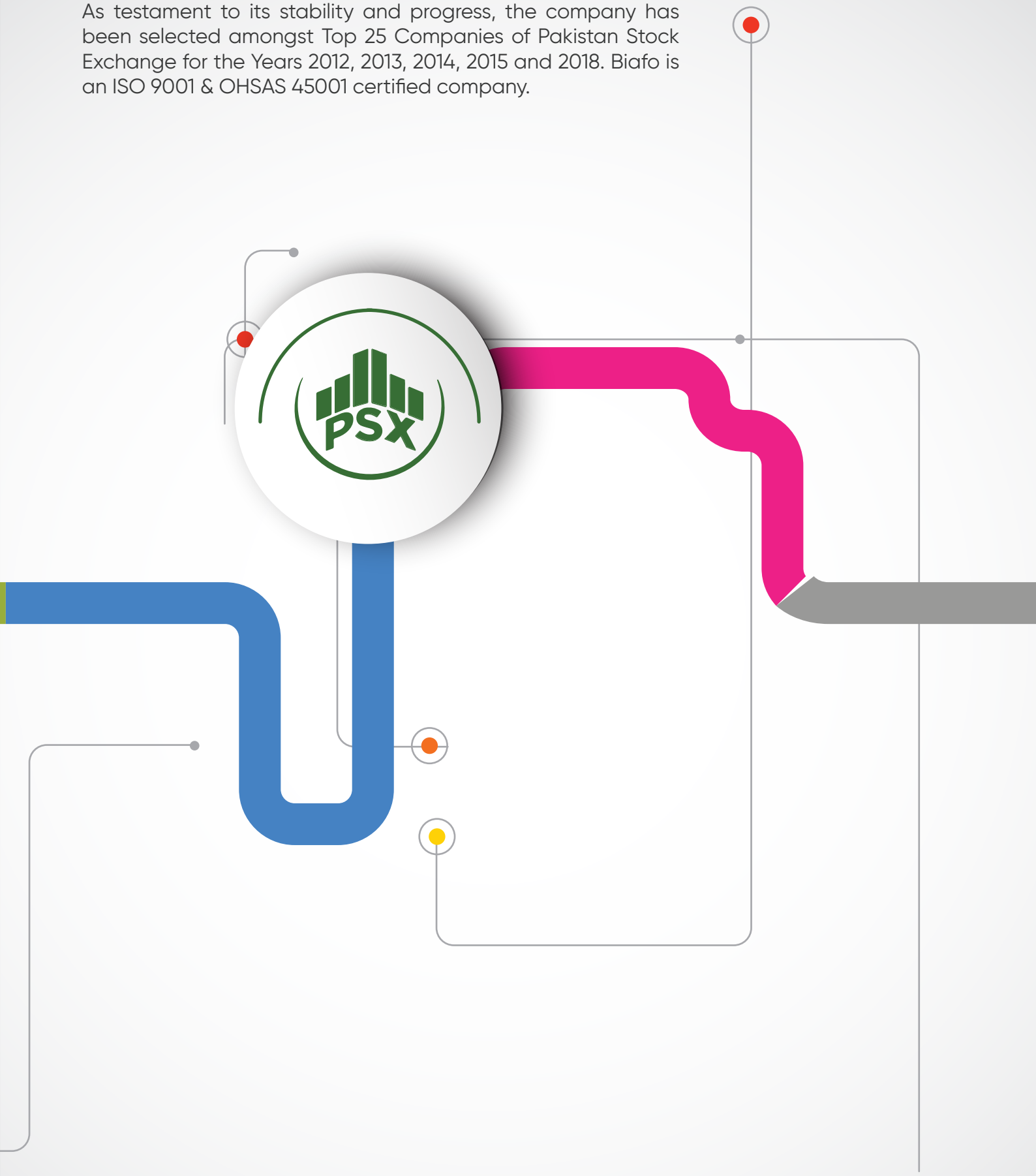
ABOUT BIAFO

Biafo Industries Limited incorporated in 1988 as a Public Limited Company Listed on the Pakistan Stock Exchange is market leader in the explosives manufacturing industry of Pakistan. Biafo has been manufacturing explosives, blasting accessories & providing engineered blasting services for over three decades.

Since 1994, Hattar Industrial Estate has been home to a state of the art Biafo production facility. At this facility the Company produces international standard Commercial Explosives and Blasting Accessories.

Leaping forward to meet industrial benchmarks, Biafo Industries Limited is an authorized licensee of Explosive Technology International (ETI), using the Du Pont Technology and producing Tovex® Water Gel Explosives. Biafo has been involved in a strategic partnership with Hanwha Group of South Korea to acquire technology and produce high quality accessories.

As testament to its stability and progress, the company has been selected amongst Top 25 Companies of Pakistan Stock Exchange for the Years 2012, 2013, 2014, 2015 and 2018. Biafo is an ISO 9001 & OHSAS 45001 certified company.



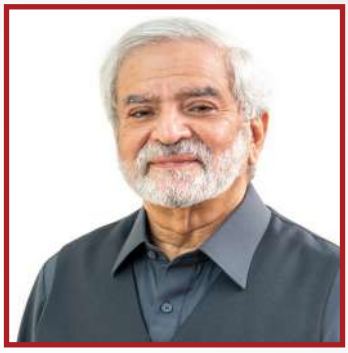
OUR PRODUCTS & SERVICES

Tovex® has several advantages over traditional dynamite, including lower toxicity and safer manufacture, transport, and storage. It has thus almost entirely replaced dynamite.
Tovex® is used by 80% of international oil companies for seismic exploration, performs equal to or better than dynamite, and it's much safer and environment/user friendly.

Powder explosives or low density explosives are unique because of their explosives properties as well as their premier requirement. Biafo industries manufactures as well as provides professional services for the application of the product. Our state of the art production facilities is fully capable of meeting the demand for powdered explosives while our engineering team is well skilled in adopting innovative methods in application.

Accessories are the initiating devices for any blasting operation. Better results can only be achieved when the initiating devices used to detonate the explosive charge are carefully chosen and properly utilized. Biafo produces and provides professional services for the application of such accessories to national and international clients.

EHSAN MANI
CHAIRMAN



Mr. Ehsan is a fellow of the Institute of Chartered Accountants (England & Wales) having qualified in 1970. He was, until September 2015, the senior independent director of one of the largest affordable housing companies in the UK (assets in excess of gbp3 billion), where he was also the Chair of the Audit & Risk Committee and a member of the Strategic Finance Committee. He served as a director of two banks in the United Kingdom for over 25 years; chairing the Audit & Risk Committees of both the banks. He has also served on the Prime Minister of Pakistan's Inspection Commission as a co-opted member in 1990-1992 to review and report on WAPDA and PIA.

He is a past Chairman & President of the International Cricket Council 2003-06. He chaired the ICC Finance Committee (1996-2002). He represented PCB at the ICC between 1989 and 1996. He is on the Board of Governors of Shaukat Khanum Memorial Trust, where he also chairs the Audit & Finance Committee. He is the Chairman of the Finance Committee of Lady Reading Hospital Peshawar and is a trustee of a number of other charities in Pakistan and the United Kingdom; including the Sir Feroze Khan and Lady Viqar-un-Nisa Noon Foundation set up to provide financial assistance to Pakistani students admitted to Oxford and Cambridge Universities. He is a trustee of the Sanjan Nagar Educational Trust in Lahore which provides high quality education to under privileged children. He is Chairman of the Galiyat Development Authority and Ansar Management Company Limited. He is serving on the Board of Biafo Industries Limited since 2016.

ANWAR MOIN
CHIEF EXECUTIVE OFFICER

Mr. Anwar Moin has joined Biafo Industries Limited as Chief Executive Officer effective 1st February 2019. He is a Graduate in Economics (1969) with a Post – Graduate Diploma in Business Management. He has over 40 years of very versatile experience in the Petroleum Industry, both upstream and downstream. During his career he has laid special emphasis on Corporate Petroleum Management, Economic Analysis, Petroleum Finance, Joint Venture Management and Oil Field Production and Operations. His specialization has been in Oil and Gas Asset Procurement, development and port folio building. He has strong presentation and communication skills and has worked with multi-disciplinary teams as project leader.

During the course of his long career in the Oil Industry, he has also served as Vice Chairman of Pakistan Petroleum Exploration and Production Companies Association (PPEPCA) and also a member of its board for over four years. He was also a member of the task force dominated by PPEPCA for negotiating and concluding the 1994, 1997 and 2012 Petroleum Policies of the Government of Pakistan. He has Represented his Companies in Oil Field Operations in Sudan, Libya and Mauritania. Mr. Anwar Moin has remained Chief Executive Officer of Tullow Oil (Pakistan) Limited, Orient Petroleum Limited, Ocean Pakistan Limited and Canadian Resources (Pakistan) Limited. Mr. Anwar Moin is a certified Director as required under code of Corporate Governance.

PROD


EXPLOSIVES
TOVEX®
BIAFO INDUSTRIES LIMITED
ISO 9001:2015 & OHSAS 18001:2007 CERTIFIED


SUPER BREAKER-100


SEISMIC EXPLOSIVES
CLASS 3 DIVISION 1
BIAFO INDUSTRIES LIMITED


EXPLOSIVES
TOVEX®
BI-BULK
EXPLOSIVE
CLASS 2
NET WT 25 KG
BIAFO IND LTD.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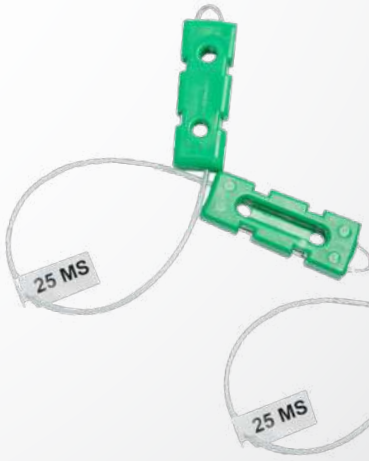
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BIAFO CORD
BIAFO CORD
SAFETY FUSE
SAFETY FUSE

CORPORATE **PROFILE**

EXPLOSIVES

Commercial explosives are proportionate mixtures and phases of chemical compounds in solid and liquid form. Detonation transforms the compounds into other products, gases, shock wave and high temperature. This action is exothermic, producing heat that further expands the gases and causes them to exert enormous pressure in a blast hole in addition to produce a shock wave. The combination of these two effects (borehole pressure and detonation wave) breaks the rock surrounding a blast hole.

Tovex ® Water Gel Explosives were developed by Du Pont in1974. These products are gelled and chemically cross-linked saturated aqueous solution containing suspended solids and consisting of oxidizers, fuels, crystal modifiers and sensitized with MMAN (Mono-Methylamine Nitrate). Performance of Tovex ® Water Gel Explosives has been proven to be outstanding for various types of rocks and products have gained wide acceptance by users.

Advantages of Tovex® Water Gel Explosives over dynamite are;

- Far safe to handle and store in magazines as compared to dynamites.
- Better in controlling bore-hole density, powder factor.
- Better vibration and sound boom control.
- Minimum risk of sympathetic detonation, which is maximum in dynamites.
- Much reduced smoke and toxic fumes, also user friendly in mines and all underground applications.
- Excellent intended performance, with cost effective blasting.
- Much flexibility in selection over a wide range of products.
- No detonation by 0.30 Cal. Bullet impact.
- Very safe in case of fire with no explosion, just burn if un-heaped.

Biafo has wide range of Water Gel Explosives;

1. Super Blaster
2. Blaster
3. Super Breaker
4. Breaker-S
5. Seismic Explosive
6. Pre Splitter
7. Coal Miner

SUPER BLASTER

Tovex® Super Blaster is a standard # 8 cap sensitive explosive designed for underground and surface blasting applications. Super Blaster provides excellent performance where high strength performance product is required. Tovex ® Super Blaster is being produced in standard diameters ranging from 25 mm to 90 mm having standard length between 200 mm to 1000 mm. Length of the cartridges is flexible and customizable depending upon the requirement of the customer.

TECHNICAL SPECIFICATION	
Density	1.30 g/cc
Energy	4.60 MJ/kg
Gas Volume	850 Liter/kg
Velocity of Detonation	+5000 m/sec unconfined
Fume Class	Class 1 Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures.
Net weight per box	25 kg

BLASTER

Tovex® Blaster is a standard # 8 cap sensitive explosive designed for underground and surface application. Blaster provides excellent performance where medium to high strength explosive is required for optimum performance. Blaster is being produced in standard diameters ranging from 25 mm to 90 mm having standard length between 200 mm to 1000 mm. Cartridge length is flexible and customizable depending upon the customer need.

TECHNICAL SPECIFICATION	
Density	1.25 g/c.c
Energy	4.10 MJ/kg
Gas Volume	830 Liter/kg
Velocity of Detonation (VOD)	+4500 m/sec (unconfined)
Fume Class	Class 1, Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures
Net weight per box	25 kg

SUPER BREAKER

Tovex® Super Breaker is a standard # 8 cap sensitive explosive designed for underground, surface and mining applications. Super Breaker provides excellent performance where medium strength blasting is required for better output. It is being produced in standard diameters ranging from 25 mm to 90 mm and length range of 200 mm to 500 mm. It is also produced in a special diameter of 200 mm having length of 1000 mm, which is flexible depending upon customer requirement. This is very special product that generates large volume of gases, especially designed for mining projects. Upon customer requirement chub having weight of 15 kg can also be produced with unmatchable consistency.

TECHNICAL SPECIFICATION	
Density	1.15 g/cc
Energy	4.00 MJ/kg
Gas Volume	868 Liter/kg
Velocity of Detonation	+3500 m/sec (unconfined)
Fume Class	Class 1 Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures.
Net weight per box	25 kg. (25mm to 90mm diameter chubs) 30 kg. (200mm diameter chubs)

BREAKER-S

Tovex® Breaker-S is a standard # 8 cap sensitive explosive designed for underground and surface application. Breaker provides excellent performance where medium strength explosive is required for optimum performance. Breaker is being produced in standard diameter ranging from 25 mm to 90 mm having standard length between 200 mm to 1000 mm. Cartridge length is flexible and customizable depending upon the customer need.

TECHNICAL SPECIFICATION	
Density	1.12 g / c.c
Energy	4.00 MJ / kg
Gas Volume	850 Liter / kg
Velocity of Detonation	+3500 m / sec (unconfined)
Fume Class	Class 1 Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures.
Net weight per box	25 kg.

SEISMIC EXPLOSIVE

Tovex® Seismic is a water gel explosive especially designed for Seismic Exploration. It is standard # 8 cap sensitive product and need to be initiated with especially designed Biafo Seismic Detonator. It has following advantages;

- Tovex® Seismic Explosive is proven to be consistently high performing with far less risk in handling as compared to dynamite.
- Much safer in use, been totally non-toxic fume generator.
- It ensures no headaches while working with Biafo seismic product.
- Shot hole results reveal its better performance to achieve desired results for seismic prospects.
- It is hermetically produced particularly well suited for application as a longer time sleep charge.
- Excellent resistance to water and thus does not desensitize under high hydrostatic pressures in the bore holes.
- The shells are exceptionally of high quality material and can be screwed together to form a string as per desired length.

TECHNICAL SPECIFICATION	
Density	1.30 g/cc
Energy	4.7 MJ/kg
Gas Volume	700 Liter/Kg
Velocity of Detonation	+5500 m/sec (unconfined)
Fume Class	Class 1 Acceptable for Oil & Gas exploration
Explosive Classification	Class 3, Division 1, UN No. 0241, Group 1.1D
Water Resistance	Excellent (in packing)
Sleep Time	30 days (04 week) is given sleep charge time in the field (bore hole) pertaining to 100 psi Hydrostatic Pressure.
Shelf Life	One year from the date of manufacture while properly stored at ambient standard storage conditions
Packing & Net weight	Hard Shell: (Packed in HDP Plastic Shell, Hermitically sealed 1/2kg, 1kg and 2kg). 1 kg shell : Diameter 58 mm, Length 340 mm, Per box 25 kg 2kg shell : Diameter 63 mm, Length 570mm, Per box 20 kg Note:- String formation is possible with 01 kg shell to make string of odd number shells. Soft Shell: 25 kg (Packed in polythene tube) Diameter 26mm, 28mm and 32mm, Weight 250 gm to 1 kg (As per customer requirement)

PRE SPLITTER

Tovex® Pre Splitter is a standard # 8 cap sensitive Non-Aluminized, smaller diameter explosive which after intrinsic work has especially been designed for smooth and very well controlled facing (wall formation) applications. Its unique feature is its control over work for optimum desired results. Pre Splitter is readily available in diameter range of 25 mm to 32 mm. It can uniquely be produced in the continuous length of 500 mm to 5000 mm (in coil form).

TECHNICAL SPECIFICATION	
Density	1.00 g/cc
Energy	2.8 MJ/kg
Gas Volume	827 Liter/Kg
Velocity of Detonation	+3300 m/sec (unconfined)
Fume Class	Class 1 Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at standard storage conditions
Net weight per box	25 kg.

COAL MINER

Tovex® Coal Miner is a multipurpose small diameter permissible Water Gel Explosive. Salient features of this explosive are;

- Specially designed for tough loading and shooting conditions in underground Coal and Rock mining applications.
- Tovex Coal Miner being permissible explosive offers excellent fumes and smoke control (to the lowest possible level) for better working environment.
- Very good proportionate outcome of quantity to yield.
- It is available in standard diameter range of 25 mm to 32 mm with variable lengths as per customer requirement.

TECHNICAL SPECIFICATION	
Density	1.14 g/cc
Energy	2.85 MJ/kg
Gas Volume	844 Liter/Kg
Velocity of Detonation	+3900 m/sec (unconfined)
Fume Class	Class 1 Acceptable for underground use
Explosive Classification	Class 3, Division 1, UN No 0241 Group 1.1D
Water Resistance	Excellent (in packing)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures
Net weight per box	25 kg.

MANUFACTURER OF TOVEX® EXPLOSIVES AND BLASTING ACCESSORIES

POWDER EXPLOSIVES

Powder Explosives or low density explosives are unique in nature by virtue of their explosive properties, specific application as well as their booster and/or primer requirement. Ammonium nitrate is the major essential ingredient in almost every commercial explosive and most of the time its predominant use is in the form of AN-PP (Ammonium Nitrate – Porous Prills). A small porous pellet is absorbed with fuel oil. This mixture is commonly referred as ANFO. ANFO is packed in a water resistant package for use in wet boreholes.

Biafo offers complete low density Blasting Agents which are:

1. Bi Bulk
2. Bio Prill (ANFO)

BI BULK

Bi Bulk is a non-cap sensitive blasting agent and intimate blend of ammonium nitrate prills, fuel oil, aluminum and other supporting ingredients. Presence of Aluminum in this product produces heaves more effect, thus higher volume of gaseous expansion it generated which results in better rock fragmentation and movement. Bi-Bulk is used for column charge to carryout open cut blasting work.

TECHNICAL SPECIFICATION	
Density	0.85 g/cc
Energy	4.2 MJ/kg
Gas Volume	900 Liter/kg
Velocity of Detonation	+ 3000 m/sec (unconfined)
Fume Class	Class 1, not recommended for underground (tunnel) use
Explosive Classification	Class 2, UN No 0082 Group 1.1D
Water Resistance	Poor
Primary Requirement	Since it is Non-Cap sensitive, so require Booster/Primer (powerful shock) for initiation, use recommended grades or water gel for this purpose (Blaster / Super Blaster)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures taking necessary precautions
Net weight per box	25 Kg poly-propylene bag with polythene liner. Also available on order in polythene tubes of dia. 50mm to 90 mm and length 500 mm in 25 kg corrugated cartons.

BIO PRILL (ANFO)

Bio Prill (ANFO) is a non-cap sensitive blasting agent an intimate mixture of duly proportionate Fuel and Oxidizer, which is blend of granulated ammonium nitrate prills, fuel oil. It is uniformly mixed, absorbed and is free flowing. Bio Prill is intended for use as column charge to carry out open cut blasting work.

TECHNICAL SPECIFICATION	
Density	0.815 g/cc
Energy	3.8 MJ/kg
Gas Volume	950 Liter/kg
Velocity of Detonation	+2500 m/sec (unconfined)
Fume Class	Class 1, not recommended for underground (tunnel) use
Explosive Classification	Class 2, UN No 0082 Group 1.1D
Water Resistance	Poor (Totally non water resistant if exposed)
Primary Requirement	Since it is Non-Cap sensitive, so require Booster/Primer (powerful shock) for initiation, use recommended grades water gel for this purpose (Blaster / Super Blaster)
Shelf Life	One year from the date of manufacture while properly stored at ambient temperatures taking necessary precautions
Net weight per box	25 Kg poly-propylene bag with polythene liner inside. Also available on customer order in polythene tubes of dia. 50 mm to 90 mm and length 500 mm in net packing of 25 kg corrugated cartons.

BLASTING ACCESSORIES

Quality and assured performance of the Blasting Accessories is key to successful main explosive charge initiation and its optimum performance. In parallel to the evolution of explosives, different types of blasting accessories that supplement, support and are in compliance to the standard modern electric and non-electric initiation systems are being produced at Biafo Industries Limited.

Biafo offers these state of the art Accessories as per customer's need and is proud to declare these as "Symbol of Quality". Our success story to produce a wide range of accessories listed below is beyond number counts. We are producing both instantaneous and delay series, that intrinsically has many features such as;

- It generates shock waves that initiates the commercial explosives, which by virtue of safe handling are more insensitive than conventional dynamites.
- Delay detonator series have excellent control over delay initiation time (complete range of MS and HS period for improved and desired results like optimum fragmentation.
- Punctual Priming (either at the top or base of the blast hole) and / or Axial Priming.
- Accurate performance, reliability and flexibility in breakage operations, while ensuring and maintaining a higher degree of Safety for personnel and installations.

Following products are being manufactured;

1. Plain Detonators (Aluminum Blasting caps)
2. Electric Detonator Instantaneous
3. Seismic Electric Detonators
4. Delay Electric Detonator
5. Non-Electric Delay Detonator - Binel
6. Two Way Delay Relays
7. Biafo Cord (Detonating Cord)
8. Safety Fuse (Miners fuse)
9. Binel Thermotube

PLAIN DETONATOR

Plain Detonator or blasting cap is a small sensitive primary explosive device generally used to detonate a larger, more powerful and less sensitive secondary explosive. Plain Detonator is used for mining and construction purposes. It can reliably initiate all cap sensitive explosives and detonating cord. This type of detonator is used with safety fuse under relatively dry conditions, preferably where a single or multiple charges are to be fired. Plain detonator is made of Aluminum Tube, lead azide, lead styphanate (1°) and PETN (2°).

TECHNICAL SPECIFICATION	
Tube length	46mm
Designated Initiating Power	No. 8
Tube Material	Aluminum Alloy
Composition	PETN, AS-Compo
Packing	80 in cardboard and 10,000 Pieces in corrugated box.
Maximum Energy	1272 Calories
Abel Heat Test	Stable at temperature of +70 °C
Environmental Conditions	Stable at temperature range of -50 °C to +70 °C
Explosive Classification	Class 6, Division 3 UN No. 0455 Group 1.4S

ELECTRIC DETONATOR – INSTANTANEOUS

Instantaneous Electric Detonator detonates without delay on application of the required electric firing current. The wires passes through a molded PVC plug which is then duly crimped into the open end of detonator tube. All electric detonators are shunt on the free ends of the leg wires to help protect against unwanted current flowing through the bridge circuit, as a mandatory safety precaution. Our product generally fulfills all the international safety and technical aspects by virtue of its type and application.

TECHNICAL SPECIFICATION	
Plain Detonator	No. 8
Length of Leg wire	3.5 and 5 Meter (as per customer requirement)
Wire Resistance	Wire: 0.05~ 0.06 Ohms per meter (Single ply) Squib : 1.0 ~ 1.3 Ohms
Safe Current	0.55 amps
Firing Current	1.00 amps
Packing	25 Pieces in a cardboard box and 250 Pieces in a corrugated carton
Abel Heat Test	Stable at temperature of +70 C^{o}
Environmental Conditions	Stable at temperature range of -50 C^{o} to +70 C^{o}
Explosive Classification	Class 6, Division 3, UN No 0456 Group 1.4S

SEISMIC ELECTRIC DETONATOR

Seismic Electric Detonator is a special fast functioning high strength and result oriented instantaneous Blasting Cap that detonates in less than one millisecond after required current flows through its bridge wire. It has been designed especially to meet the rigid requirements and severe environmental conditions associated with geophysical exploration. It is intended primarily for single shot firing but can also be used effectively in pattern firing applications.

Leg wires of the Seismic Detonator are drawn from pure copper and tinned for further protection before coating with plastic insulation. The leg wires are insulated with a sheath of antistatic plastic. This is very robust and absolutely watertight. The wire insulation is resistant to abrasion, both under dry and wet conditions.

TECHNICAL SPECIFICATION	
Plain Detonator	No. 8
Length of Leg wire	4.5, 15, 20, 25 and 30 Meter (As per customer requirement)
Wire Resistance	0.05 ~ 0.06 ohms / Meter (Single ply wire PVC coated)
Maximum No Fire energy	7 milli-watts/ ohm
Maximum Operating Energy	15 milli-watts/ ohm
Water Resistance	Excellent at 100 psi
Packing	25 Pcs in a card board box and 250 Pcs in a corrugated carton • 4.5 meter: 25 pieces in a card board box and 10 card board boxes in a corrugated carton • 15, 20, 25 and 30 meter: 10 pieces in a card board box and 10 card board boxes in a corrugated carton
Heat Test	Stable at temperature of +70 ℃
Environmental Conditions	Stable at temperature range of -50 ℃ to +70 ℃
Explosive Classification	Class 6, Division 3, UN No. 0456 Group 1.4S

DELAY ELECTRIC DETONATOR

High Precision Electric Delay Detonators are used in wide variety of applications. These are available in various standard wire lengths and in two different delay series (Milli Second and Half Second). The detonators can be deployed easily and have several features that is simply blast connections, field checks and initiation. Biafo's electrical detonators features equal timing accuracy for improved fragmentation and vibration.

- Milli Second detonators have standard delay numbers ranging from period # 1 to 20 (25ms to 500ms) with nominal time intervals of 25ms between successive delay numbers.
- Half Second detonators have standard delay numbers ranging from period # 1 to 10 (500ms to 5000ms) with nominal time intervals of 500ms between successive delay numbers.

TECHNICAL SPECIFICATION	
Plain Detonator	No. 8
Length of Leg wire	3.5 & 5 Meter (as per customer requirement)
Wire Resistance	0.05 ~ 0.06 ohms/ Meter (Single ply wire PVC coated)
Maximum No Fire energy	7 milli-watts/ ohm
Maximum Operating Energy	15 milli-watts/ ohm
Packing	25 Pcs in a card board box and 250 Pcs in a corrugated carton
Heat Test	Stable at temperature of +70 ℃
Environmental Conditions	Stable at temperature range of -50 ℃ to +70 ℃
Explosive Classification	Class 6, Division 3, UN No 0456 Group 1.4S

NON-ELECTRIC DELAY DETONATOR (BINEL)

Non-Electric Delay Detonators are manufactured in the name of Binel in two different delay series (Milli Second and Half Second). Binels are widely used in open cut, underground mines, tunnels, drifts, shaft sinking and in quarries where multi-shot rounds are required. Similarly these detonators are utilized in civil engineering and demolition applications. Biafo's non-electric detonators features consistent timing accuracy for improved fragmentation and vibration.

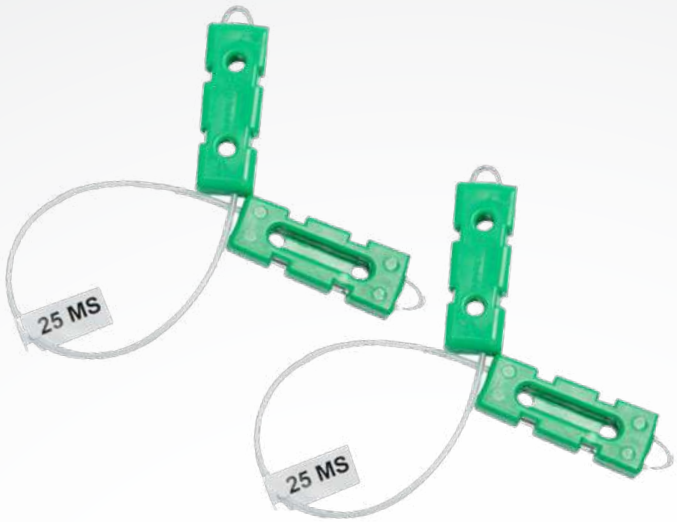
- Milli Second detonators have standard delay numbers ranging from 1 to 20 (25ms to 500ms) with nominal time intervals of 25ms between successive delay numbers.
- Half Second detonators have standard delay numbers ranging from 1 to 10 (500ms to 5000ms) with nominal time intervals of 500ms between successive delay numbers.

The non-electric delay detonators, whose lengths and delay times vary are well suited for use in surface and underground blasting. These are factory-assembled units with the following main components:

- Shock tube/thermotube to transmit a signal to the delay Blasting Cap. Shock tube/thermotube is a 3mm outer diameter plastic tube, coated inside with a thin layer of High Explosive/Aluminum dust, which reliably transmits a low energy signal/ pressure wave up-to 1150±100 m/s from one point to another to initiate the detonator. The core of the tube works on the principle of Deflagration. By virtue of the nature and unique application of shock tube/thermotube, the low energy signal will propagate through most sharp bends, knots and kinks that may occur in the shock tube (some time in field via application). The outer surface of the tube remains intact during and after functioning. The distinguishable tough outer layer gives excellent abrasive, oil resistance and tensile properties.

TECHNICAL SPECIFICATION	
Plain Detonator	No. 8
Length of Shock tube/Thermotube	3~30 meter (according to requirement of customer)
Packing	Aluminium foil packing for initial packing and corrugated box for final packing. Quantity depends upon length of shock tube / thermotube as per customer requirement.
Heat Test	Stable at temperature of +70 °C
Environmental Conditions	Stable at temperature range of -50 °C to +70 °C
Explosive Classification	Class 6, Division 3, UN No. 0455 Group 1.4S

TWO WAY DELAY RELAYS



Two Way Delay Relays are especially designed to provide accurate delay timing between the individual rows of blast holes using detonating cord as primary initiation system. These can be used for developing various delay patterns as deemed fit.

Delay Relay consists of a 50cm shock tube/thermotube , two delay detonators and color coded plastic blocks. The detonators are attached to each end of the shock tube/thermotube and are inserted into plastic connector blocks. The connector blocks are specially designed for fast and easy detonating cord connections. There are 4 different delays available from 25ms to 100ms.

Advantages of two way delay relays are ;
- 800 mg PETN base charge ensures reliable initiation of 10g detonating cord
- Delay tag is attached that shows/lists delay time.
- Easy and Safe Bidirectional use

TECHNICAL SPECIFICATION	
Plain Detonator	No. 8
Packing	10 Pcs in Aluminum foil packets for initial packets and 250 Pcs in a corrugated carton for final packets.
Heat Test	Stable at temperature of +70 ℃
Environmental Conditions	Stable at temperature range of -50 ℃ to +70 ℃
Explosive Classification	Class 6, Division 3, UN No. 0455 Group 1.4S

BIAFO CORD

Biafo Cord is a flexible cord containing a uniform and compact core of high explosive Pentra Erythritol-Tetra Nitrate (PETN), which is covered in Poly Propylene Tape and further intact with combination of various yarns and finally with PVC/ LDPE coating. This process protects Biafo cord from extreme temperatures, water, oil or other chemicals. It provides essential feature such as tensile strength, flexibility and other handling characteristics. It can be initiated by use of a plain or an electric detonator.

TECHNICAL SPECIFICATION

Requirements	Spec. Values	Test Values
Base Charge	PETN	PETN
Charge Weight	10 ~ 12 gm / meter	10 ~ 12 gm/meter.
Inner Construction	Textile	Textile
Finish Layer	LDPE (Low Density Polythyene) or PVC (Polyvinyl chloride) coating	LDPE OR PVC coating
Diameter	5.2mm Maximum	5.2mm
Breaking Strength	55 Kg.f. Minimum	100 kg.f.
Detonating Velocity	6000 m/s. Minimum	7000 m/s
Explosive Classification	Class 6, Division 2, UN No. 0289, Group 1.4D	---
Flame Sensitivity	The detonating cord shall not detonate.	Pass
Impact Sensitivity	The detonating cord shall not detonate through the ends of the sample	Pass
Waterproofness	The detonating cord shall withstand immersion in water for not less than 72 hours and should function satisfactorily	Pass
Flexibility	The plastic coating shall not crack	Pass

SAFETY FUSE

Safety Fuse is a flexible cord containing a core of Explosive Black Powder which is covered with combination of various yarns and finally with LDPE coating. This process protects Safety Fuse from extreme temperature, water, oil or other chemicals and provides essential feature of tensile strength, flexibility and other handling characteristics. It can be initiated with hot object or open flame.

TECHNICAL SPECIFICATION

Requirements	Spec. Values	Test Values
Base Charge	Black Powder	Black Powder
Charge Weight	5.5 gm/meter Minimum	6.0 gm/meter
Inner Construction	Textile	Textile
Finish Layer	LDPE(Low density Polythyene) coating	LDPE coating
Diameter	5.5mm Maximum	5.2mm
Breaking Strength	55 Kg.f. Minimum	100 kg.f.
Burning Rate	90 – 120 sec/m	110 sec/m
Explosive Classification	Class 6, Division 1, UN No. 0105, Group 1.4S	Pass
Flame Sensitivity	Yes, for the open & exposed end	Pass
Flash Over	Will pick the flame at 50 mm distance	60 mm
Impact Sensitivity	Pass	Pass
Waterproofness	Shall be ignited and burn after immersing in water 1m in depth for 2 hours.	Pass

BINEL THERMOTUBE

Binel Thermotube is manufactured using state-of-the-art technology, which does not use conventional explosive as reactive material. Unlike conventional shock tubes that produce shock wave, Binel Thermotube generates high temperature spark emission.

Application

Binel Thermotube is designed for the production of non-electric igniters and for use in underground and open-pit mines to extend the blast line using non-electric detonators. The tube cannot be used in potentially explosive atmospheres of coal dust and/or methane. BINEL THERMOTUBE recommended application and usage are:

1. Used in conjunction with non-electric initiators;
2. Recommended Initiation: Detonator Cap No.8 / Initiating Equipment.
3. Tube sealing requires ultrasound technology.

TECHNICAL SPECIFICATIONS	
Outside Tube Diameter [mm]:	3.00 mm [ffl0.15mm]
Internal Tube Diameter [mm]:	1.20 mm [ffl0.10 mm]
Pyrotechnic Contents	>1%
Priming:	For secure Binel Thermotube priming, it is advisable to use a suitable priming device or other authorized priming means.
Propagation speed [m/s]:	1200 ffl 50 m/s
Thermal Stability at 75ºC:	48 h
Breaking Strength at 20ºC:	>150 N at 20ºC min
Percebtage Elongation:	>150%

Packaging

Binel Thermotube is wound on spools, packaged in boxes, placed on pallets and stretch wrapped. On request, tube spools for the manufacture of detonators can be placed directly on pallets and stretch wrapped.

Binel Thermotube is delivered on spools containing 3,000 meters (± 0.5%)

Storage Conditions

Storage temperature: from -30°C to 50°C.
The warranty period is 36 months from the date of manufacture.

Usage Conditions

Application temperature: from -30°C to 50°C.

Transport Information

International Classification: Not classified as dangerous product.

OUR SERVICES

Specialist technical services team having expertise in the field of controlled blasting aim to share knowledge and experience in finding solutions to customer's problems and train them to achieve optimum results.

Our blasting services department is involved in all mega projects of Pakistan. Key function of our blasting services is to deliver solution to meet needs across the surface, underground mining, tunnels, road constructions, control blasting in residential and developed commercial areas, junk explosive disposal, vibration monitoring with latest equipment etc.

Biafo has been widely recognized for our Training, which provides the industry with a comprehensive level of expertise for fulfilling the core requirements of the customers and ensuring that personnel have the required knowledge for the efficient and safe application of explosives technology. Our range of training courses and assessment procedures are available to every user of commercial explosives throughout the country, and conducted by experts who are actively involved in the explosives field on a day-to-day basis.


Lowari
Tunnel
Road Approx: 9km
Ghazi Brotha
Hydro Project
54km Canal
Kohat
Tunnel
Road
Approx: 2km
Tarbella
Dam
4th
Extension

Our Co
Majo

Neelum Jhelum
Hydro Project
969 MW

Motorways

KKH
ansion
ikot-
unjrab

Mangla
Dam
Raising

Attabad
Lake
5 Diversion
Tunnels

ntribution in
or Projects

SAINDAK COPPER & GOLD MINE PROJECT

DUDDAR LEAD & ZINC PROJECT

GHAZI BRO

GOMAL ZAM HYDRO PROJECT (FWO / SINOHYDRO)

LOWARI TUNNEL

ATTABAD TUNNEL

GAZI BROTHA DAM

THA 54 KM CANAL

NEELUM JHELUM HYDROPOWER PROJECT

PATRIND DAM

SUKKI KINARI HYDROPOWER PROJECT

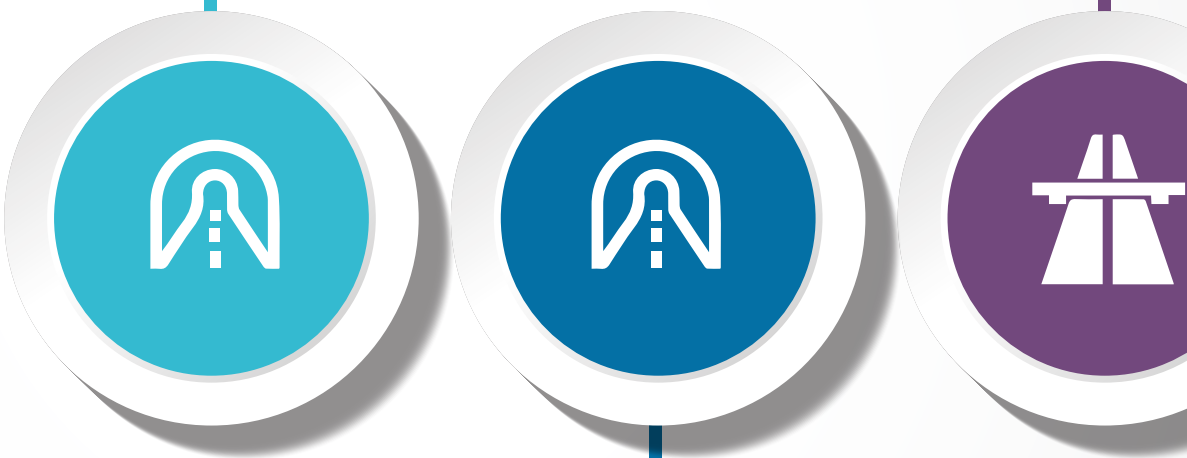
GOMAL ZAM DAM

KAROT DAM

PROJECTS COMPLETED OR UNDER EXECUTION USING TOVEX® WATER GEL EXPLOSIVES

TUNNELS

Kohat Tunnel in KPK
Lowari Tunnel
Lakhpass Tunnel near Quetta Balochistan
Malakand Tunnels for Hydroelectricity Projects
Neelum Jhelum Hydro Power Project Tunnel
Tarbela 4th Extension
5 Diversion tunnels at Attabad



TUNNEL WIDENING AND HALF TUNNELING

Mughal Kot-Zhob Road Half Tunneling Project
Tunnel widening in South Waziristan

HIGHWAYS MOTORWAYS

Karakoram Highways
Highways in Azad Kashmir, Northern Areas and Chitral
Lahore-Islamabad Motorway, LHR-Multan
Islamabd –Peshawar Motorway, Multan-Sukkur
Kohat to Karak Indus Highway
Hazara Motorway, Havelian-Thakot

CEMENT FACTORIES QUARRY SITES

All Cement factories are using Tovex® Water Gel Explosives on large scale for extraction of Lime Stone.

TRENCHING PROJECTS

Parco Pipe Trenching Project from Karachi to Sher Shah
White Oil Pipe Line Trenching Project from Karachi to Sher Shah

MINING

Tovex® Water Gel Explosives are being extensively used about 200 ton/ month at Pakistan's largest Copper & Gold mining Project at Saindak, Balochistan.

STONE CRUSHING INDUSTRIES

Small diameter Tovex® Water Gel explosives are being used in stone crushing industries

OIL AND GAS EXPLORATION

Due to the excellent Performance of Seismic Explosives, all International and Local companies prefer to use Tovex® Water Gel Explosives in their Seismic Operations.

CAUTIOUS BLASTING PROJECTS

Large scale excavation using cautious blasting techniques are being used at Bahria Golf City Project in Islamabad.

Sher Shah Bridge Demolition in Karachi
Dam Demolition at Hunza river at Attabad lake along KKH

MASSIVE OPEN CUT EXCAVATION

About 7 million cubic meter of rock was excavated for channel at Ghazi Barotha Project

BIAFO INDUSTRIES LIMITED

Manufacturer of Tovex® Explosives and Blasting Accessories

Groundbreaking Performance
Through Pragmatic Innovation

1st Floor, Biafo House, Plot No. 23, St No. 38-40, I&T Centre, G-10/4, Islamabad - Pakistan.

+ 92 51 2353450-53, 2353455-57 + 92 51 2353458 management@biafo.com