INFORMATION

Warning and Disclaimer

The information and recommendations in this document are provided for reference purposes only and should not be construed as advice to cover every application of the product or variation of conditions under which the product may be used. The recommendations herein are based on the manufacturer's experience, research, and testing, but no warranties are made, expressed or implied with respect to merchantability or fitness for any purpose. Also, the specifications contained herein are all nominal, which represent our current production.

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Introduction

This manual is written to provide information to allow new users of NxbursT to start using it safely and confidently.

This manual provides general instructions for NxbursT usage and handling. Only those people who have had NxbursT training should be directly involved when charging and firing NxbursT.

NxbursT operation

High Explosive

High Explosive when fired detonates. This means it burns with a flame that travels at supersonic speeds and this produces a destructive shockwave. This shockwave is largely uncontrolled and violent event. It produces large amounts of flyrock, noxious gasses and dust. It produces high vibration and noise levels.

NxbursT

When NxbursT is fired it deflagrates. This means it burns with a subsonic flame speed. This does not produce a shockwave but produces a pressure wave. The pressure wave is a controlled event. This produces minimal flyrock, low vibration levels, negligible amounts of noxious gasses and negligible amounts of dust.

Detonation vs. Deflagration

Deflagration

Deflagrations are thermally initiated reactions propagating at subsonic speeds that proceed radially outwards in all directions through the energetic material, away from the ignition source. The maximum pressure developed by deflagration is dependent on the materials involved and the strength (failure pressure) of the vessel or structure confining the materials.

Detonation

The supersonic reaction speed of detonation develops a shock wave in the explosive, which triggers the propagating reaction. The propagation of the shock wave is accompanied by a chemical reaction that furnishes energy to sustain the shock wave advance in a stable manner, followed by the formation of the final gaseous products and their associated pressures at some time later.

How NxbursT works

NxbursT technology is based on a non-detonating chemical compound enclosed in a cartridge, which reacts very quickly when ignited to produce high volumes of harmless gas, mainly consisting of nitrogen, carbon dioxide and steam.

When the cartridge is sealed in a drill hole, the gas generated by the ignition of the propellant enters into the micro-fractures created from the percussive drilling process and into the natural fractures and planes of weakness of the rock to produce a tensile breaking of the rock or concrete often called splitting.

Once a hole is drilled in the rock or concrete, the required cartridge is inserted in the hole. When the cartridge is fully inserted in the rock the hole is then stemmed with dirt or crusher dust and tamped to provide a solid seal that will contain the gas when ignited (Other forms of stemming are in development). The pressure created by the gas exceeds the tensile strength of the rock, causing the rock to fracture.

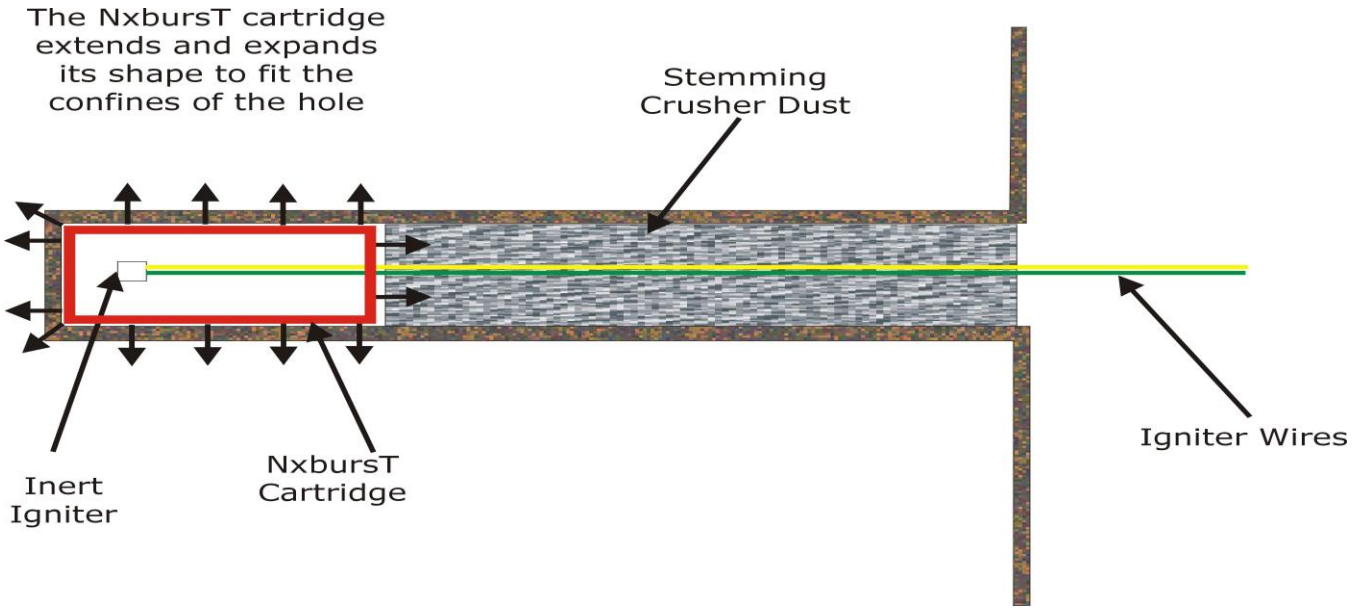

Fig. 1 NxbursT™ Cartridge confined in a drill hole.

Fig.2 NxbursT™ Cartridges

Cartridge Construction

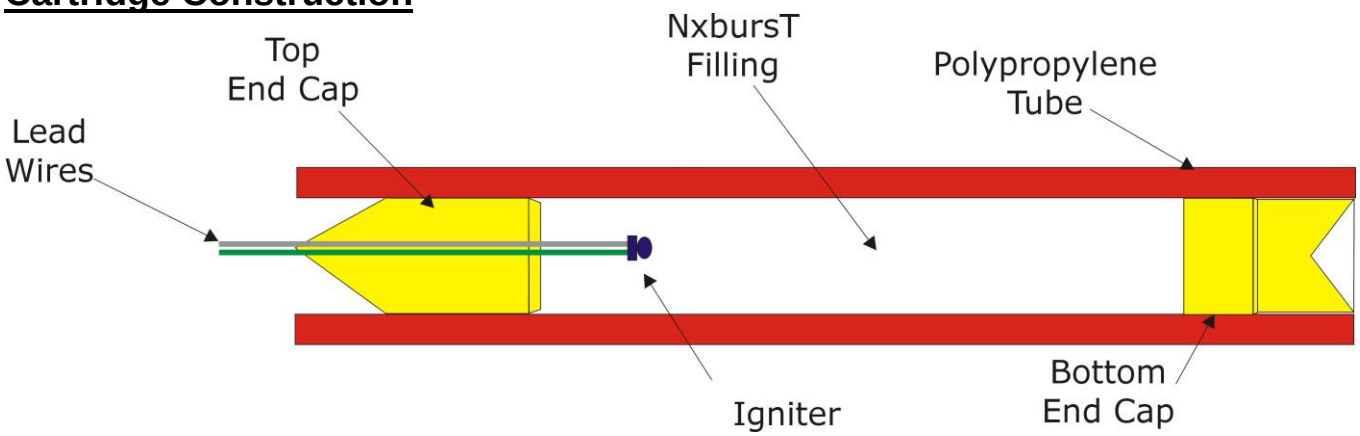

Fig. 3 Sectional view of the cartridge

Cartridge Components

- **Lead wires** – They are coated with polyethylene to increase the abrasion resistance of the wires to protect the core during the process of stemming.
- **The tube** – the tube is made of polypropylene and has various wall thicknesses for the different sizes.
- **Top end cap**- the top end cap is made of a tough plastic to resist shearing during the build up of pressure. The top cap has a specific wedge design to enable it to wedge into the stemming aggregate during pressure build up.
- **Nex - Igniter** –these igniters have specific electrical characteristics to prevent accidental ignition through electro static discharge. The igniter is contained within the cartridge.
- **NxbursT™ Filling** - the mixture is specifically formulated to prevent the emission of noxious fumes.
- **The bottom end cap**- the cap is made of a material designed to fracture under pressure to release the gas at the bottom of the cartridge. It has a specific conical shape which results in concentration of the pressure in the corners of the drill hole.

There is a modified version of the 34mm cartridges that is useable to 15m under water.

The reason why NxbursT cartridges do not explode, is that the velocity of deflagration or burning of the propellant is almost directly proportional to the degree of confinement of the chemical reaction. Thus, in an unconfined environment such as the product's original packaging, the propellant if ignited will only burn at a very low velocity, which is incapable of causing an explosion.

Environmental Impacts

Airblast overpressure

Airblast overpressure is simply the pressure produced by blasting over and above that of atmospheric pressure.

The NxbursT™ method of breaking ensures that expansion gases are contained in the drill hole by effective stemming, which results in low overpressure levels. Overpressure levels produced by NxbursT™ are low when compared to conventional explosives and are of a shorter duration and less damaging frequency. This gives NxbursT™ a major advantage over explosives in environmentally sensitive areas.

Noise

Noise is the part of the airblast overpressure wave which falls within the audible frequency region of the human ear. The high frequency portion of the air pressure wave is audible and is responsible for the noise that accompanies a blast. The lower frequency portion is not audible but can excite structures, such as windows, which in turn respond and produce secondary noise such as rattles.

Noise levels produced by NxbursT™ depend largely on the type and nature of the rock being broken, charge weight, burden, depth of the hole and the effectiveness of the stemming used. A well-stemmed NxbursT™ cartridge in granite will generally produce a noise level in the range 80 to 85 dBa at 50 metres from the hole. Noise levels can be attenuated by the use of conveyor belting, or other matting, to cover the holes being fired.

Ground Vibration

Ground borne vibrations from blasting can cause damage to buildings and infrastructure which are in the vicinity of the blast. The degree of vibration-induced damage caused by blasting is dependent on the magnitude, frequency and duration of the vibration. Generally, low frequency, long duration vibrations are more damaging than higher frequency, short duration vibrations.

The vibration waves produced by NxbursT™ are mostly of a higher frequency, and of short duration and are therefore the least harmful to sensitive structures. In addition, the magnitude of the vibration levels produced by NxbursT™ is particularly low when compared to explosives over the same distance from the shot hole.

When a NxbursT™ cartridge is fired, the very fast change from solid to gaseous matter is accompanied by a very sharp increase in the blast hole pressure and temperature. This is accompanied by a pressure wave that radiates from the drill hole.

The primary factors known to influence the level of ground vibration from the NxbursT cartridges include:

- The weight of propellant per cartridge
- The distance between the drill holes and the point of measurement

- The local geological conditions, and the influence of geology and topography on vibration attenuation.

Vibration Limits for Structures

The degree of vibration-induced damage caused by blasting is dependent on the magnitude, frequency and duration of the vibration. Generally, low frequency, long duration vibrations are more damaging than higher frequency, short duration vibrations.

Frequencies above 40 Hz

- PPV less than 50 mm/s - safe zone
- PPV greater than 50 mm/s - damage zone

Frequencies below 40 Hz

- PPV Less than13 mm/s - safe zone (old wooden house)
- PPV Greater than 19.5 mm/s - safe zone (modern house)

Safe Vibration limit threshold

As a result of the reduced charge weights used for rock breaking and its favourable vibration signature, the vibrations generated by NxbursT are well within most imposed restrictions for rock breaking close to sensitive structures. As can be seen from Figure 4, safe vibration levels for rock breaking, as defined in the USBM guidelines, can be achieved by NxbursT™ within 5 metres of a sensitive structure

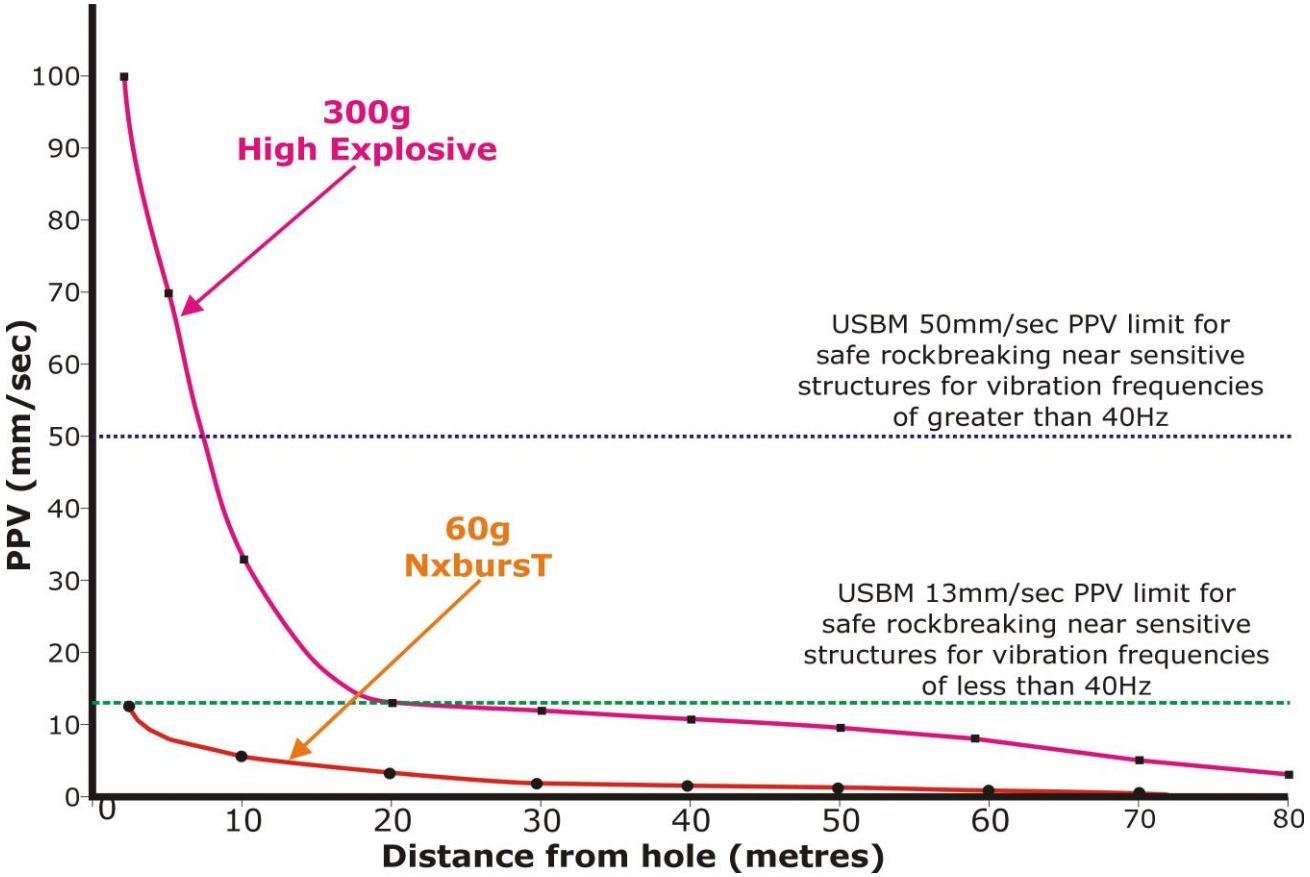

Fig. 4 Comparative vibration results

Noxious Fumes

The NxbursT cartridge is oxygen balanced so that sufficient oxygen is available for the chemical reaction to achieve optimal oxidation to produce gases consisting of carbon dioxide, nitrogen and steam and thus avoiding the production of noxious gases such as carbon monoxide and nitrous fumes.

In addition, the quantity of fill in a NxbursT cartridge is less than the comparable quantity of explosive that is historically used to break the same amount of rock by a factor of six. A single 180 gram NxbursT™ cartridge can be used in a 1.2 metre deep hole, to break a 500mm burden in most rock types, this compares to a 1.1kg charge of ANFO that is commonly used for the same application. The reduced quantities of NxbursT required to break the rock, compared to high explosive means that considerably less fumes are produced.

Flyrock

Normally, blasting, using conventional explosives will require the rock breaking site to be evacuated for a distance of 500m which means disruption of the production operations and delays to operating equipment.

In contrast, a NxbursT cartridge produces an optimal pressurisation of the hole for a given burden and type of rock. By controlling the characteristics of the pressure pulse, the velocity and distance travelled by the dislodged rock can be limited.

Controlled gas release from the NxbursT cartridge, at a relatively low pressure, results in a minimal quantity of low velocity flyrock, which is generally contained within 10 metres of the rock breaking site

Rock breaking Methodology

It is important to know the rock structure that you are working on. Study the rock before commencing with the work. A solid hard rock will break differently from a soft sandstone rock or a well-weathered rock.

Hard rock boulders

Hard rock boulders are often the easiest to break. Because of the hardness they are brittle and will normally break into multiple smaller pieces depending on the size of charge that was used.
Hard rocks are also more prone to fly rock. Fly rock can be controlled by the charge size and by placing blasting mats on the rock before firing.

Guidelines for a successful break

- Study the natural cracks in the rock before drilling the hole.
- Drill the holes perpendicular to natural cracks in the rock (or as close as possible) see Figure 7.

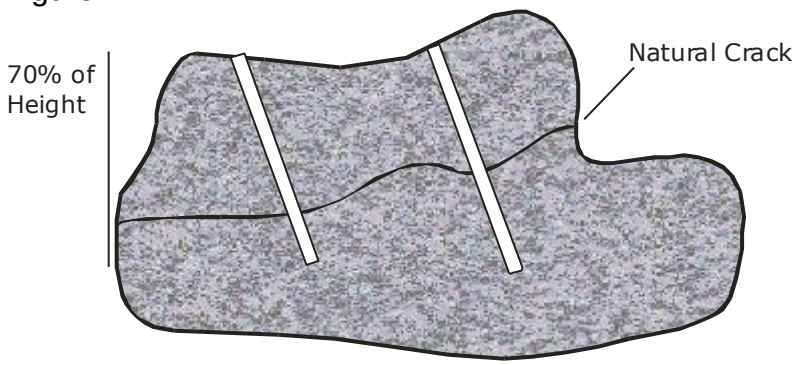

Fig 7

- Drill the hole to a depth of 70% (2/3) of the size of the rock
- Determine the optimum amount of cartridges for the specific rock type from the tables.
- Balance the number of holes with the required rubble size and the cost.
- It is better to break the rock in to as small as possible pieces with the first shot than to come back and re drill the rock and re blast it.
- A good estimation for the size of the cartridge is 40 gram per ton or cubic meter of rock.
- This can be done by one 40 gram or two 20 gram cartridges, depending on the size of the break required.
- It is important to stem the hole properly.
- If more than 2 holes must be drilled, drill the holes staggered. This will prevent the rock to split in one line. The aim is to drill and blast only once.
- For a small fragmentation keep the burden (distance from the side of the rock) between 350 and 500 mm and the spacing (between holes) 700 mm (figure 8). This is a general pattern and must be adapted to suit the situation.

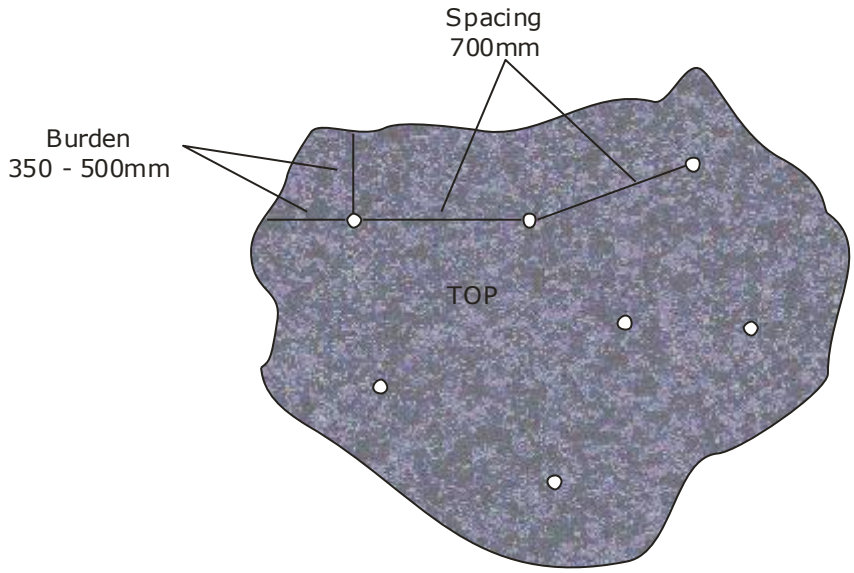

Fig. 8 Spacing

In situ rock

It is always difficult to judge the depth of in-situ rock. If you drill to deep the gas will simply blow out in the bottom of the hole.

Guidelines to break in situ rock:

- Never drill more than 1.2 m deep holes at a time. If the bottom of the hole blows out drill a new hole but only 600mm or less. Reload and blast.
- Drill the first row so that there is always a free face of max 500mm.
- It is advisable to have not less than 500mm stemming on top off a cartridge.
- Holes should be drilled at a 70 ° angle to facilitate a break point. See Figure 9.

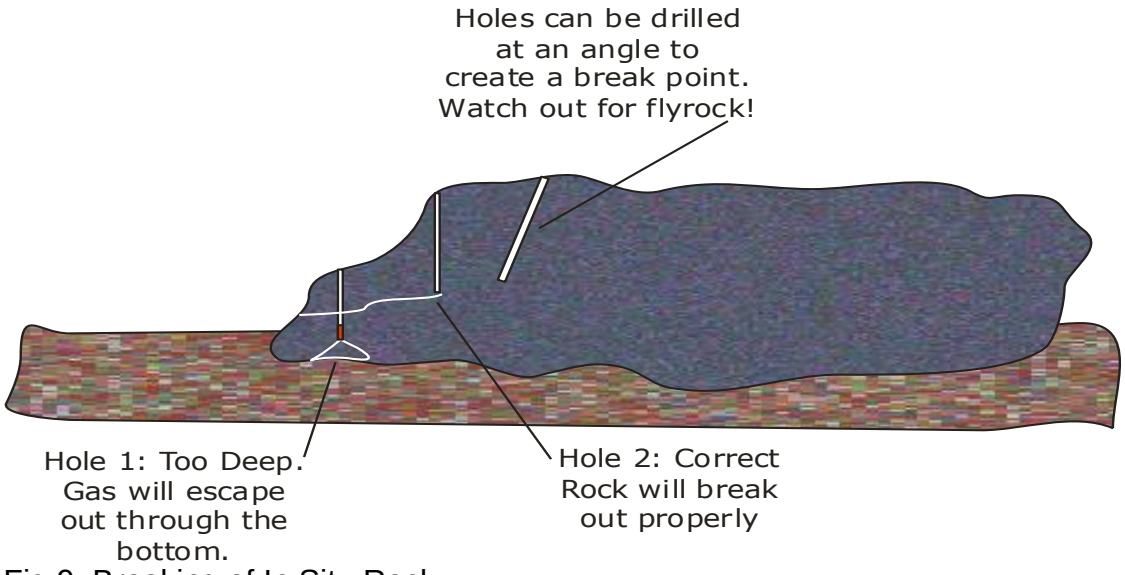

Fig 9. Breaking of In Situ Rock

Concrete

NxbursT™ cartridges work exceptionally well in the breaking of concrete. The low vibration and no shock waves makes this application an easy and safe way of breaking concrete.

- The standard staggered drill pattern is used for the concrete application. Depending on the size of the block that must be removed, a burden of 350 mm and a spacing of 350 to 500 mm is recommended for concrete.
- A 60 - 80gram cartridge will be sufficient for this application.
- Drill the hole to a depth of 70% (2/3) of the size of the concrete.
- Determine the optimum amount of cartridges for the concrete.
- Balance the number of holes with the required rubble size and the cost. It is better to break the concrete in to as small as possible pieces with the first shot than to come back and re drill the concrete and re blast it.
- It is important to stem the hole properly.
- If more than 2 holes must be drilled, drill the holes staggered. This will prevent the concrete from splitting in one line. The aim is to drill and blast only once.

The biggest problem for concrete is that steel reinforcement can hamper the drilling process.

The drill operator should try to guess the pattern of the reinforcing and then drill accordingly. A few test holes will help. A quality stud finder with a steel setting will be very useful.

Drilling Holes for NxbursT

Holes for NxbursT cartridges must be drilled using a form of percussive drill to provide the micro cracks.

The sizes for the different cartridges are:

- 12mm = 14mm hole
- 13mm = 14-16mm hole
- 28mm = 30-34mm hole
- 32mm = 36-42mm hole
- 60mm = 64-76mm hole

Holes must be cleaned from dust before loading cartridges. Blowing compressed air down the hole is the recommended way. Eye protection is important at this point.

Loading the NxbursT cartridge

- Take the cartridge and **unwind** the igniter lead do not just pull it.
- Measure the resistance of the cartridge. (recommended)
- Slide the cartridge down the hole with the wedge shape facing the top of the hole.
- Using a rod (wood or plastic) push the cartridge to the bottom of the hole.

Stemming the holes

- It is important to take care during the stemming process to ensure that the cartridge wires are not damaged.
- Keep the wires to the side of the drill hole when stemming.
- Begin to stem the hole using 5mm unwashed crusher dust (AP5) which is moistened enough to hold its shape when squeezed in your hand.
- Stem the hole in small steps (100mm to 150mm segments for 28 – 60mm sizes).
- Tamp each segment until the stemming is solid and a hollow sound can be heard from the hole.
- Continue to stem and tamp until the hole is solidly packed to the collar.
- Always test the cartridges in the stemmed holes for resistance after stemming. The reading should match the resistance before stemming.

Wiring up NxbursT™

NxbursT™ cartridges must always be wired in series!

The reason for this is, parallel wiring requires an increase in firing current for each additional cartridge. Very quickly the required current exceeds the capacity of most if not all firing units.
The Elex 7 blaster (the recommended blaster) can fire in parallel:

- NexFuse fuse heads 5 cartridges.

The Elex 7 blaster can fire in series:

- NexFuse fuse heads 140 cartridges (1.8m leads).

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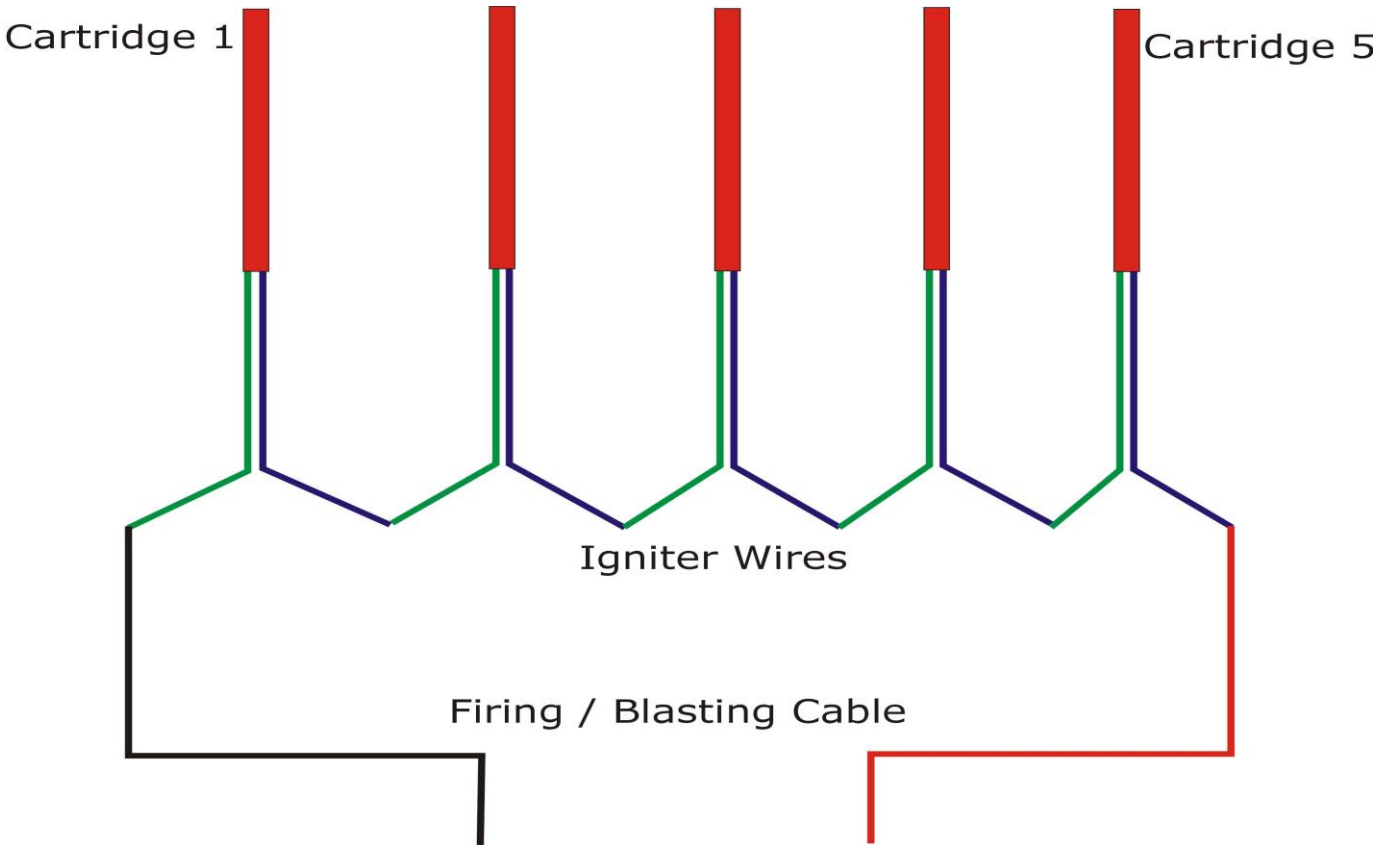
Description of a series connection

A series connection is where one wire from the first cartridge is connected to one wire of the next cartridge. The unconnected wires are connected to the firing cable.
The advantages of a series connection are:

- Breaks in connections always show up
- Current required is not dependant on the number of cartridges
- Easy to wire

Series Wiring Diagram.



Legislative Requirements

General

- All NxbursT™ products must be stored in their original packaging in a secure locked area or box.
- Any NxbursT™ products that are left over after breaking must be returned in their original packaging to the designated secure locked area or box.
- Keep the various cartridges in their original containers.
- Damaged NxbursT cartridges should be marked as damaged, returned in marked boxes then stored in a marked area. At the first opportunity they should be removed and destroyed by authorized personnel.
- NxbursT should be stored in a magazine that has been approved for storage of 1.4S explosives.
- While on the site NxbursT must be stored more than 20m from electrical installations, substations, electrical boxes or open flames.
- The ideal storage temperature for NxbursT is 2º-25º Celsius.
- Prevent long term temperature fluctuations above 32 º Celsius.

Transport of NxbursT

The following regulations must be adhered to when transporting NxbursT:

- The NxbursT cartridges must be in a secure container during transit. The container can be utility box equipped with a secure locking mechanism.
- The NxbursT MSDS sheets must be carried in the vehicle transporting the cartridges at all times.
- NxbursT should not come into contact with any heat sources.
- The transport of NxbursT should comply with the Land Transport Safety Authority regulations regarding the transport of dangerous goods.

General Safety Instructions

- Only NxbursT trained operators are allowed to use NxbursT cartridges.
- NxbursT trained operators must supervise the drilling of the holes, charging operations, personally initiate the circuit and personally inspect the results and declare the area safe.
- All equipment must be tested and inspected for serviceability.
- Personal Protective Equipment minimum requirements are: Hearing, Eye and Foot Protection with Gloves, and High Vest clothing.
- Precautions must be considered against possible fly rock. Preventative measure must be taken if considered necessary.
- The safe operating instructions must be adhered to.
- NxbursT trained operators must adhere to the required regulations regarding the transport, storage and use of NxbursT.

Method Statement for Breaking boulders

NoneX is effective to break loose rocks which are close to buildings or machinery, both in civil construction and mining sites.

Procedure:
1. Measure the size of the rock.
2. Select the correct size of cartridge from the table below:

Note: The charge size will need to be increased to suit rock that is porous, fissured, or full of cracks.

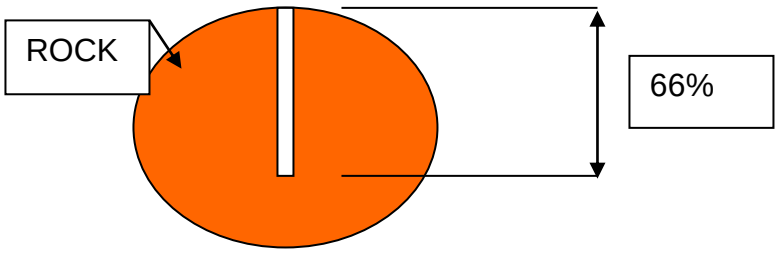
Nxburst 12mm Rock Popper Cartridge	Charge Weight g		Boulder Thickness mm	Boulder Horizontal diameter mm	Hole Length mm	Cubic Meters m^3	Powder Factor kg/m^3
0212	2		400	400	264	0.050	0.04
0312	3		500	500	330	0.098	0.03
0412	4		600	600	396	0.170	0.02
0512	5		650	650	429	0.216	0.02
0612	6		700	700	462	0.269	0.02
1013	10		800	800	450	0.3	0.03

NxbursT 28mm and 34mm Cartridges	Charge Weight g		Boulder Thickness mm	Boulder Horizontal diameter mm	Hole Length mm	Cubic Meters m^3	Powder Factor kg/m^3
2028 / 2034	20		750	750	495	0.331	0.06
4028 / 4034	40		1000	1000	660	0.785	0.05
6028 /6034	60		1250	1250	825	1.534	0.04
8028 / 8034	80		1500	1500	990	2.651	0.03
10028 / 10034	100		1750	1750	1155	4.209	0.02
12028 / 12034	120		2000	2000	1320	6.283	0.02
14034	140		2200	2200	1452	8.363	0.02
16034	160		2400	2400	1584	10.857	0.01
18034	180		2600	2600	1716	13.804	0.01

NxbursT 60mm Rock breaking Cartridge	Charge Weight g		Boulder Thickness mm	Boulder Horizontal diameter mm	Hole Length mm	Cubic Meters m^3	Powder Factor kg/m^3
20060	200		2800	2800	1848	17.241	0.01
30060	300		3000	3000	1980	21.206	0.01
40060	400		3300	3300	2178	28.225	0.01
50060	500		3500	3500	2310	33.674	0.01

Table for breaking loose rocks

3. Select the correct size of drill bit:
   - For 12mm cartridges = 14 -16 mm drill bits
   - For 13mm cartridges = 15-16mm drill bits
   - For 28mm cartridges = 30mm – 34mm drill bits
   - For 34mm cartridges = 38mm – 42mm drill bits
   - For 60mm cartridges = 72 mm drill bits
4. Drill the holes 66% of the thickness of the boulder:



5. Blow the holes clean with air.
6. The cartridge resistance must be tested prior to inserting the cartridge into the hole. The correct resistance readings for the cartridges with NexFuse Igniters :

12mm Range	1m Lead Wire	1.20 – 1.71 Ω per cartridge
13mm Cartridge	1m Lead Wire	1.20 – 1.71 Ω per cartridge
28mm Range	1.8m Lead Wire	1.23 – 1.75 Ω per cartridge
34mm Range	1.8m Lead Wire	1.23 – 1.75 Ω per cartridge
34mm & 42mm Range	3.5m Lead Wire	1.42 – 1.92 Ω per cartridge
25034 DV Cartridge	3.5m Lead Wire	2.4 – 3.45 Ω per cartridge
60mm Range	3.5m Lead Wire	1.42 – 1.92 Ω per cartridge

7. Insert the cartridge to the bottom of the hole with a charging stick.
   - Begin to stem the hole using 5 mm unwashed crusher dust (AP5) dampened enough to hold shape when squeezed.
   - Stem the hole in 100mm to 150mm segments.
   - Tamp each segment until the stemming is solid and a hollow sound can be heard from the hole.
   - Continue to stem and tamp until the hole is solidly packed to the collar.
8. Test the resistance of the cartridge with an authorized tester. Check that the readings are the same as before stemming to make sure that the wires were not damaged during the loading process.

Charging Up Procedure

1. Make sure that the area is safe. Place guards and warning signs 50m from the sight to insure that no unauthorized personnel enter the danger area.
2. Make sure the Blasting unit is with the responsible person and that the firing cable is not yet connected to the Blasting unit.
3. Pack up all unused cartridges and equipment.
4. Move all vehicles from the area.
5. Ensure that the general area surrounding the charged site is secure a safe distance is at least 30 m.

6. Connect the cartridges in series. Connections must be insulated and protected against moisture or water ingress.
7. Ensure that the far end of the firing cable is shorted. Connect the firing cable to the circuit and ensure the connections are insulated.
8. Move to end of the firing cable which must be at least 30m away from the cartridges and test the circuit for continuity.
9. If the circuit tests ok for continuity, proceed with the firing procedure. If not inspect the wiring for loose or broken connections.

Firing Procedure

1. Make sure the area is safe before connecting the firing cable to the Blasting unit.
2. Connect the wires to the Blasting unit.
3. Be sure that the area is clear before sounding the firing signal which could be by whistle or siren.
4. Insert the key.
5. Give a fire warning "**READY TO FIRE!"**
6. Fire the circuit.

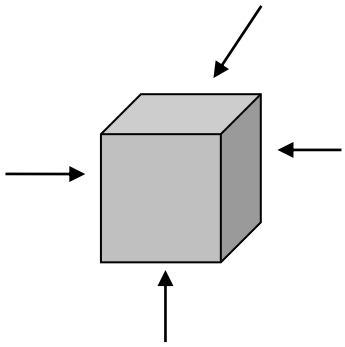
Post firing procedure

1. Ensure that no one enters the area until the technician has declared it safe.
2. Remove the key from the Blasting unit.
3. Remove the firing cable from the Blasting unit.
4. Inspect the break.
   - Holes which have wires protruding from them and have no indication if they have fired should be inspected.
   - If the cartridge shows no continuity, the cartridge has fired but the gases have escaped into voids in the rock or fired through the bottom in the case of a boulder. Or in very unlikely circumstances, the igniter has burned but failed to ignite the contents of the cartridge.
   - Do not insert anything into the hole or attempt to drill the same hole.
   - If the hole cannot be flushed with compressed air or high pressure water and the cartridge retrieved, drill an adjacent hole 3 inches parallel to the existing hole and blast the cartridge out.
   - If mechanical means such as an excavator is used to excavate bedrock, personnel must stay clear of the machine since the bucket on the excavator could ignite the cartridge.
5. If the technician is satisfied that all the cartridges has fired, he may allow personnel and equipment to enter the area.
6. Collect all spend cartridges and packaging and dispose in an appropriate method.

Appendix B

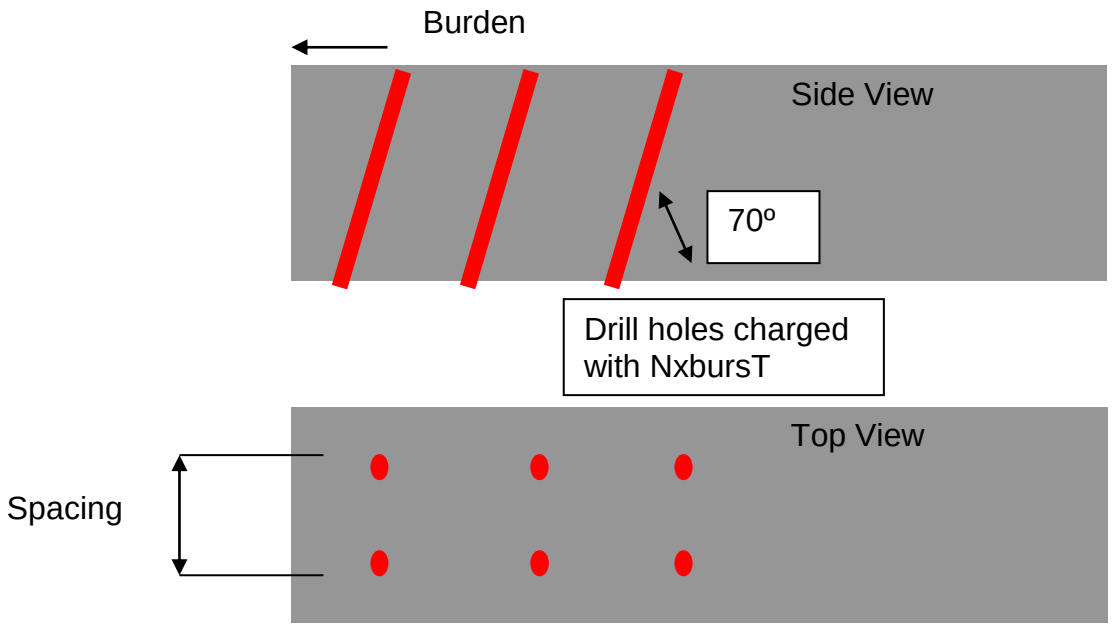
Method Statement for Breaking In-Situ Rock with NoneX™

In-Situ (meaning rock covered with earth rock on four sides)



In situ rock must break towards a “free face”. A “free face” is a part of the rock that has no obstructions where the rock is to break towards.

The holes drilled into in situ rock must be angled at 70º to the horizontal plane:



- Never drill more than 1.2 m deep holes at a time. If the bottom of the hole blows out drill a new hole but only 600mm or less. Reload and blast.
- Drill the first row so that there is always a free face of max 500mm.
- It is advisable to have not less than 500mm stemming on top off a cartridge.
- Holes should be drilled at a 70 ° angle to facilitate a break point.

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1 Choose the correct cartridges from the table below:

NoneX 12mm RockPopper Cartridge	Charge Weight g		Burden mm	Hole Spacing mm	Hole Depth mm	Cubic Meters m^3	Powder Factor kg/m^3
0212	2		150	100	250	0.004	0.53
0312	3		175	175	300	0.009	0.33
0412	4		200	200	350	0.014	0.29
0512	5		225	225	400	0.020	0.25
0612	6		250	250	400	0.025	0.24

NoneX 13mm RockPopper Cartridge	Charge Weight g		Burden mm	Hole Spacing mm	Hole Depth mm	Cubic Meters m^3	Powder Factor kg/m^3
0513	5		225	225	300	.015	.33
1013	10		300	300	400	.036	.27

NoneX 28mm and 34mm Cartridges	Charge Weight g		Burden mm	Hole Spacing mm	Hole Depth mm	Cubic Meters m^3	Powder Factor kg/m^3
2028 / 2034	20		250	250	800	0.050	0.40
4028 / 4034	40		300	300	1000	0.090	0.44
6028 /6034	60		350	350	1200	0.147	0.41
8028 / 8034	80		400	400	1200	0.192	0.42
10028 / 10034	100		450	450	1200	0.243	0.41
12028 / 12034	120		500	500	1200	0.300	0.40
14034	140		550	550	1200	0.363	0.39
16034	160		600	600	1200	0.432	0.37
18034	180		650	650	1200	0.507	0.36

NoneX 60mm Rock breaking Cartridge	Charge Weight g		Burden mm	Hole Spacing mm	Hole Depth mm	Cubic Meters m^3	Powder Factor kg/m^3
20060	200		700	700	1300	0.637	0.31
30060	300		1000	1000	1400	1.400	0.21
40060	400		1500	1500	1500	3.375	0.12
50060	500		2000	2000	1600	6.400	0.08

Table for breaking In-Situ rocks

2 Mark the holes for drilling.
3 Select the correct size of drill bit.
- For 12mm cartridges = 14 -16mm drill bits
- For 13mm Cartridges = 15 -16mm drill bits
- For 28mm cartridges = 30mm – 34mm drill bits
- For 34mm cartridges = 38mm – 42mm drill bits
- For 60mm cartridges = 72-76 mm drill bits

4 Drill the holes at 70º.
5 Blow the holes clean with air.
6 The cartridge resistance must be tested prior to inserting the cartridge into the hole. The correct resistance readings for the cartridges with NexFuse Igniters:

12mm Range	1m Lead Wire	1.20 – 1.71 Ω per cartridge
13mm Cartridge	1m Lead Wire	1.20 – 1.71 Ω per cartridge
28mm Range	1.8m Lead Wire	1.23 – 1.75 Ω per cartridge
34mm Range	1.8m Lead Wire	1.23 – 1.75 Ω per cartridge
34mm & 42mm Range	3.5m Lead Wire	1.42 – 1.92 Ω per cartridge
25034 DV Cartridge	3.5m Lead Wire	2.4 – 3.45 Ω per cartridge
60mm Range	3.5m Lead Wire	1.42 – 1.92 Ω per cartridge

7 Insert the cartridge to the bottom of the hole with a charging stick.
- Begin to stem the hole using 5mm crusher dust (AP5) dampened enough to hold shape when squeezed.
- Stem the hole in 100mm to 150mm segments.
- Tamp each segment until the stemming is solid and a hollow sound can be heard from the hole.
- Continue to stem and tamp until the hole is solidly packed to the collar.

8 Test the resistance of the cartridge with an authorized tester. Check that the readings are the same as before stemming to make sure that the wires were not damaged during the loading process.

Charging Up Procedure

1. Make sure that the area is safe. Place guards and warning signs 50m from the site to insure that no unauthorized personnel enter the danger area.
2. Make sure the Blasting unit is with the responsible person and that the firing cable is not yet connected to the Blasting unit.
3. Pack up all unused cartridges and equipment.
4. Move all vehicles from the area and ensure that the general area surrounding the charged site is secure. A safe distance is at least 30m.
5. Connect the cartridges in series. Connections must be insulated and protected against moisture or water ingress.
6. Ensure that the far end of the firing cable is shorted. Connect the firing cable to the circuit and ensure the connections are insulated.
7. Move to end of the firing cable which must be at least 30m away from the cartridges and test the circuit for continuity.
8. If the circuit tests ok for continuity, proceed with the firing procedure. If not inspect the wiring for loose or broken connections.

Firing Procedure

1. Make sure the area is safe before connecting the firing cable to the Blasting unit.
2. Connect the wires to the Blasting unit.
3. Be sure that the area is clear before sounding the firing signal which could be by whistle or siren.
4. Insert the key

5. Give a fire warning "**READY TO FIRE!"**.
6. Fire the circuit.

Post firing procedure

1. Ensure that no one enters the area until the technician has declared it safe.
2. Remove the key from the Blasting unit
3. Remove the firing cable from the Blasting unit
4. Inspect the break
   - Holes which have wires protruding from them and has no indication if they have fired should be inspected.
   - If the cartridge shows no continuity, the cartridge has either fired but the gases have escaped into voids in the rock or fired through the bottom in the case of a boulder. Or in very unlikely circumstances, the igniter has burned but failed to ignite the contents of the cartridge.
   - Do not insert anything into the hole or attempt to drill the same hole.
   - If the hole cannot be flushed with compressed air or high pressure water and the cartridge retrieved, drill an adjacent hole 3 inches parallel to the existing hole and blast the cartridge out.
   - If mechanical means such as an excavator is used to excavate bedrock, personnel must stay clear of the machine since the bucket on the excavator could ignite the cartridge.
5. If the technician is satisfied that all the cartridges has fired, he may allow personnel and equipment to enter the area.
6. Collect all spend cartridges and packaging and dispose in an appropriate method.

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Product Code	Description	Charge weight (g)	Outside Dia. (mm)	Length (mm)	Hole Dia. (mm)	Quantity per Box	Weight / box (kg)	EXPL Weight /box (kg)
0212-R	0212 Cartridge	2	12	77	14	200	2.40	0.40
0312-R	0312 Cartridge	3	12	115	14	100	1.70	0.30
0412-R	0412 Cartridge	4	12	153	14	100	2.17	0.40
0512-R	0512 Cartridge	5	12	191	14	100	2.60	0.50
0612-R	0612 Cartridge	6	12	229	14	100	3.00	0.60
0513-R	0513 Cartridge	5	13	70	16	100	1.57	0.5
1013-R	1013 Cartridge	10	13	139	16	100	2.65	1.0
2028-R	2028 Cartridge	20	28	70	30 - 34	100	6.28	2.00
4028-R	4028 Cartridge	40	28	140	30 - 34	100	11.5	4.00
6028-R	6028 Cartridge	60	28	180	30 - 34	80	11.2	4.80
8028-R	8028 Cartridge	80	28	220	30 - 34	50	8.5	4.00
10028-R	10028 Cartridge	100	28	260	30 - 34	40	7.8	4.00
12028-R	12028 Cartridge	120	28	300	30 - 34	40	9	4.80
2034-R	2034 Cartridge	20	34	70	36 - 42	100	10.2	2.00
4034-R	4034 Cartridge	40	34	100	36 - 42	100	11.3	4.00
6034-R	6034 Cartridge	60	34	133	36 - 42	80	11.4	4.80
8034-R	8034 Cartridge	80	34	167	36 - 42	50	9.08	4.00
10034-R	10034 Cartridge	100	34	200	36 - 42	40	8.63	4.00
12034-R	12034 Cartridge	120	34	211	36 - 42	40	9.09	4.80
14034-R	14034 Cartridge	140	34	245	36 - 42	40	10.43	5.60
16034-R	16034 Cartridge	160	34	270	36 - 42	40	11.47	6.40
18034-R	18034 Cartridge	180	34	300	36 - 42	40	12.44	7.20
25034	25034 Cartridge	250	34	460	36 - 42	40	18.2	10
6042	6042 Cartridge	60	42	70	45 - 50	50	8.26	3.0
8042	8042 Cartridge	80	42	92	45 - 50	50	9.51	4.0
12042	12042 Cartridge	120	42	140	45 - 50	50	12.13	6.0
18042	18042 Cartridge	180	42	207	45 - 50	40	14.44	7.2
24042	24042 Cartridge	240	42	277	45 - 50	40	17.92	9.6
20060-R	20060 Cartridge	200	60	142	64-76	24	11.50	4.80
30060-R	30060 Cartridge	300	60	180	64-76	24	13.75	7.20
40060-R	40060 Cartridge	400	60	220	64-76	24	16.80	9.60
50060-R	50060 Cartridge	500	60	260	64-76	24	18.38	12.00

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Instruction for disposal of NxbursT cartridges

Application Restrictions

1. This procedure is only to be performed at a blasting site by a trained operator.

Risks

1. The main charge of NxbursT consists of a flammable composition. This composition will burn fast when confined, but will burn with a moderate rate unconfined.
2. The igniter consists of “match head” sized pill of very energetic material which burns rapidly when exposed to heat.
3. Both these compounds will ignite when exposed to an open flame or to excessive impact or friction.
4. The process of destroying cartridges poses the risk of grass fires and should therefore be performed in a suitable open area (of at least 5m radius free of vegetation).

Procedure

1. The cartridge wires are cut 10mm from where the wire exits the cartridge.
    - Cut through the red tube only with a sharp partition knife 50mm from the top of the cartridge around the circumference. (This excludes 2028, 2034 and 12mm units). **Do not** use a hack saw
    - 2028 and 2034 units will be cut 25mm from the top of the cartridge. The 12mm units will be cut 10mm from the top of the cartridge.
    - Separate the cartridge by bending the cartridge on the cut.
    - Empty the contents of the cartridge in a straight line of not more than 10mm x 10mm in dimension.
    - If the contents are stuck, remove by tapping the tube on the side when emptying the contents. **Do not** scrape the contents from the cartridge.
    - Cut the fuse head from the wire 10mm from the connection and place on the emptied contents.
    - Ignite the line from a down wind direction and move back 5m.
    - When the burning is completed, wet the area with water.
    - Rinse the remaining tube with water and dispose of the tube in an appropriate manner. **Do not** leave the tubes at the site.

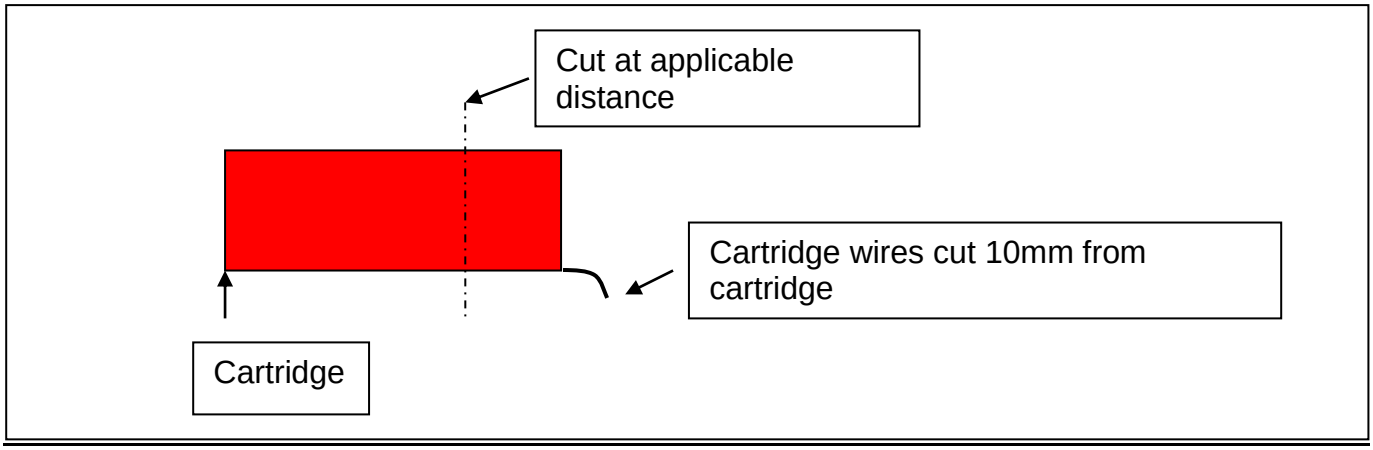

Figure 1: Cutting locations

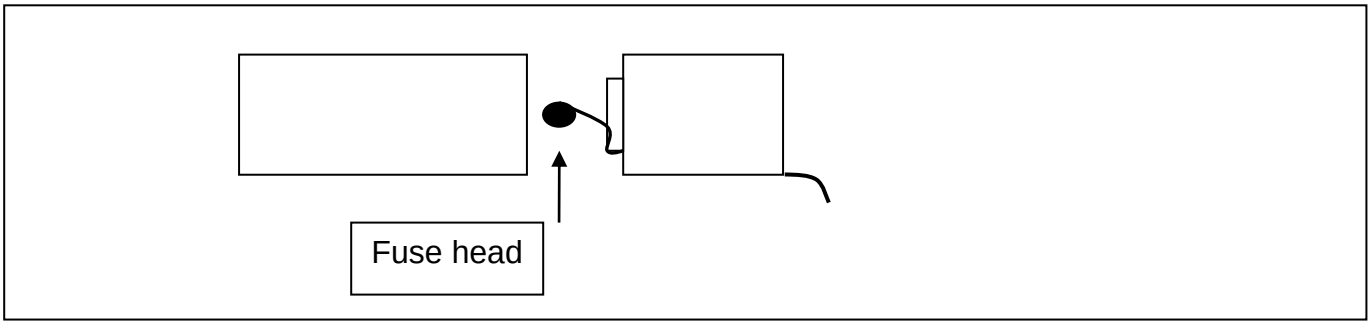

Figure 2: Separating the cartridge

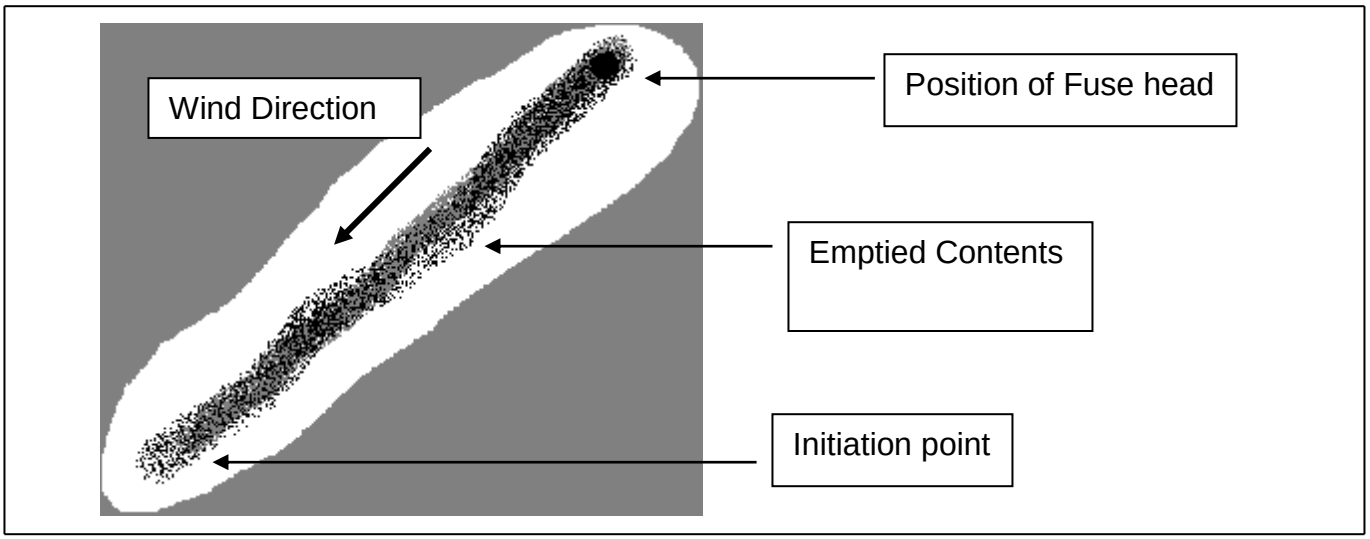

Figure 3: Destroying the contents