



CONSTRUCTION PRODUCTS ♦ CONSTRUCTION PRODUCTS ♦ CONSTRUCTION PRODUCTS

NEW **NORTON SILENCIO** **NEW**
Technical and sales argumentation



350mm



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1. Reducing diamond blades impacts

Saint-Gobain Abrasives is a responsible company, constantly looking at reducing the impact of its products on the environment, either during the manufacturing, or while it will be in the hands of the users.

Our policy for a sustainable development integrates a strong management of the environment, health & safety impacts at our manufacturing facilities, as well as a constant effort in Research & Development to reduce the impact of our products, through the improvement of our manufacturing processes (energy & wastes savings) or by providing better usage conditions for the users of our products (low-vibration machines, silent blades...).

For instance, the management systems at our manufacturing plant in Bascharage, Luxembourg have been certified to the Environmental and Health & Safety standards ISO 14001 and OHSAS 18001, proving our concern in those matters.

One of the worst impact of a diamond blade is the high-frequency noise generated during the cut by the resonance of the steel-center. This noise can reach harmful levels and disturbs constantly the surrounding area around the building site.

The operator using the blade, the other workers on the building site, the public in the surrounding area are concerned with this distressing noise.

2. What is noise ?

Noise is defined as unwanted or disturbing sound. It is a subjective concept : the same sound can be useful, pleasant or disturbing according to which ears and at which moment. Beyond a certain limit (very high noise level), all the sounds are disturbing and even dangerous.

Noise is a problem which relates to everyone, in the domestic or working environment. It is in the beginning of a lot of deafness but also of other pathologies (stress, tiredness...). Multiple means of action can be set up on the place of work to limit the exposure of the employees, and of the surrounding area.

2.1. Sound levels

By sound, one understands mechanical oscillations and acoustic waves spreading in a firm body, liquids or gases. They are defined by their frequency, in Hertz (Hz).

Sound frequencies scale :

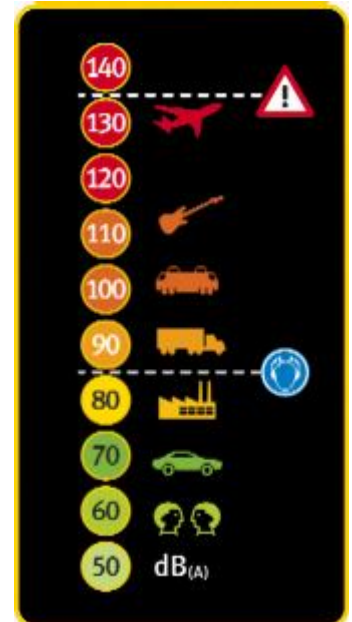
fast variations = high frequency = treble sound
slow variations = low frequency = bass sound

Infrasound	Audible sound by the human ear	Ultrasound
< 20 Hz	20 to 20 000 Hz	> 20 000 Hz
	Speech : 100 à 6 000 Hz	

The sound level is measured in decibels, symbol dB(A).

To take into account the level really perceived by the ear, a "physiological" decibel is used, called decibel A, whose abbreviation is dB(A). Measurements are done mainly using sonometers.

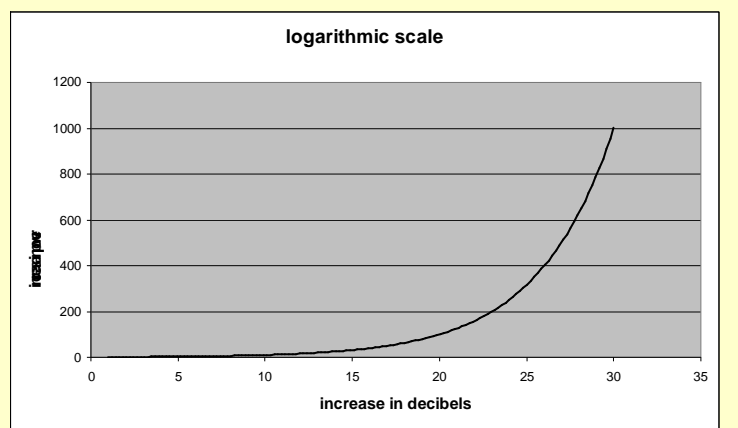
0 dB(A) = the weakest noise that a human ear can perceive
50 dB(A) = usual level of conversation
85 dB(A) = threshold of harmfulness (for an exposure of 8h/j)
120 dB(A) = noise causing a painful feeling
140 dB(A) = harmful noise, causing damages even on short duration.



Decibels follow a logarithmic scale, and thus the difference between two sound levels is not proportional :

Variation in decibels :

- + 1 dB = increase of approx. + 26 %.
- + 2 dB = increase of approx. + 58 %.
- + 3 dB = increase of approx. x 2.
- + 6 dB = increase of approx. x 4.
- + 7 dB = increase of approx. x 5.
- + 9 dB = increase of approx. x 8.
- + 10 dB = increase of exactly x 10.
- + 20 dB = increase of exactly x 100.
- + 30 dB = increase of exactly x 1 000.



Caution, the noise levels are not added, they "are composed".

For instance, if a machine generates a noise level of 80 dB(A), then:

- 2 machines generate 83 dB(A)
- 3 machines produisent 85 dB(A)
- 4 machines produisent 86 dB(A)
- 5 machines produisent 87 dB(A)
- 10 machines produisent 90 dB(A)

When 2 machines generating the same noise level function simultaneously, the fact of stopping one of them only decreases the level of noise of 3 dB(A).

2.2. Risks

For one working day (8 hours), one considers that hearing is in danger from 85dB(A). The European regulation imposes that ear-defenders must be worn constantly in working environment with noise levels above 85 dB(A).

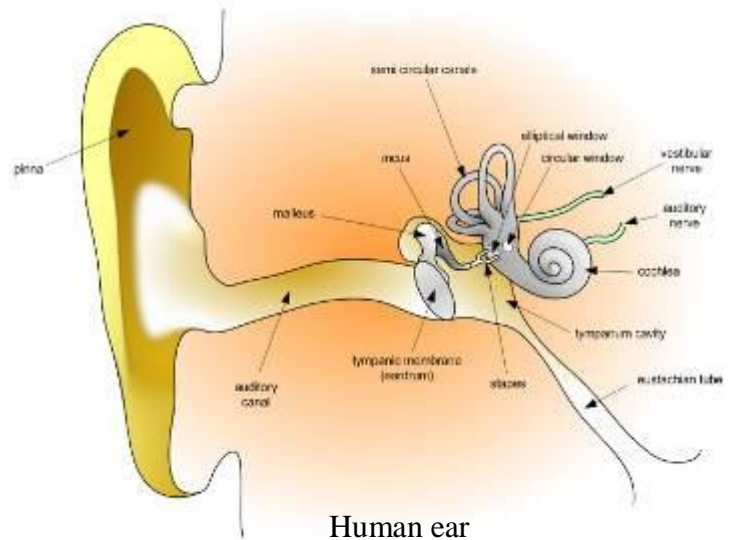
If the level of noise is higher, the exposure must be of shorter duration.

If the level is extremely high (superior to 140 dB(A)), any exposure, even of very short duration, is dangerous.

Noise can cause various effects :

Auditive tiredness :

Following an exposure to an intense noise, one can suffer temporarily from whistling in the ears, buzzes (acouphenes) as of a fall of the auditive acuteness. Degradations of hearing are in particular at the level of the high medium and the treble frequencies, which gives the feeling to listen with "cotton in the ears". This auditive tiredness takes a few weeks without over-exposure to noise to disappear. Noise is the cause of tiredness even under the regulated thresholds of 85 dB(A).



Human ear

Deafness :

The prolonged exposure to intense levels of noise destroys little by little the receptive cells of the inner ear. It leads gradually to deafness, which is irreversible. In this case, the surgery is not of any help. Equipment by electronic prostheses allows amplifying residual acuity, but it does not restore the hearing function as a whole.

Levels of deafness		
1 st level	Light deafness	The person does not realize of its hearing loss because the speech frequencies are untouched.
2 nd level	Medium deafness	The treble frequencies of speech are touched, the subject becomes "hard of ear" and does not understand distinctly any more what is said.
3 rd level	Deep and irreversible deafness	There are other deafnesses whose causes are without relationship with this type of exposure and who can, in certain cases, being operated or corrected.

Non-traumatic effects :

The noise can also involve non-traumatic "or" extra-auditive "effects", i.e. harmful for other functions as hearing. The non-traumatic effects of the noise appear at physiological and behavioral levels.

- The noise increases the risk of industrial accident for several reasons: it may mask the signals of alarm; it disturbs the verbal communication; it diverts the attention.
- According to epidemiologic studies, the cardiovascular disorders, in particular hypertension, are more frequent in the workers exposed to noise.
- Noise exposure during work has negative consequences on the quality of the sleep. For example, 12 hours a diurnal exposure to 85 dB(A) causes a reduction of the number and duration of the cycles of sleep; so that the noise interferes with the "resting" function of the sleep and can involve a chronic tiredness.

- The noise can also constitute a factor of stress to work, especially when it is chronic and unforeseeable.
- The disturbance related to noise is also associated with the dissatisfaction at work, irritability, anxiety, and even with aggressiveness.
- Lastly, the noise deteriorates the performance of the workers in the cognitive tasks, especially when they request the short-term memory. One recommends 55 dB(A) maximum for a work requiring a constant attention.

2.3. Noise from cutting with diamond blades

Diamond blades, when used predominantly on petrol handheld saws, floor saws and masonry saws, generate noise up to 115 dB(A), which equals nearly to rock concerts or airplanes. The sound of cutting is mainly generated by the microscopic oscillations of steel-center under the pressure of the cut.

Why use "silent" steel centers on diamond blades?

The worker at the building site usually carries ear-defenders and is sufficiently protected. However, cutting is usually accomplished directly in the open, where the noise can spread to adjacent areas and troubles the public.

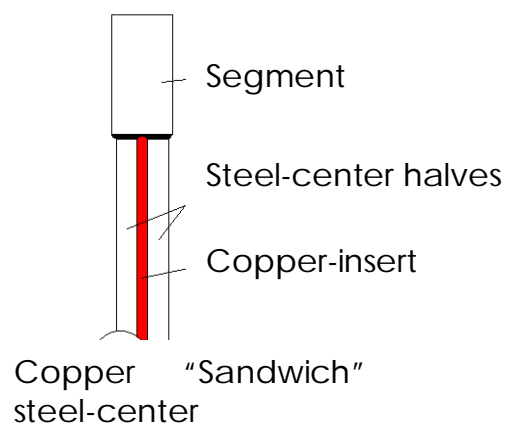
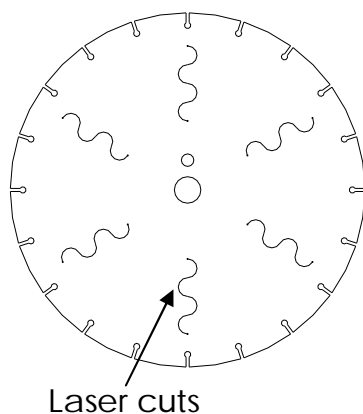
In addition, within buildings, the smallest amount of noise as possible is desired. The noise from cutting is even strengthened here by the reflection at walls and covers.

Locations especially sensitive to noise, like pedestrian or residential areas, city-centers, schools or hospitals for instance find themselves more and more protected by local regulations to prevent heavy noises during the most disturbing hours.

Silent diamond blades become therefore ever more relevant, since they can reduce drastically the sound generated directly at the job site.

Current methods for noise reduction with diamond blades :

Most silent diamond blades available today in the market are based on a special steel-center configuration. The simplest method is based on laser-cuts on the steel-center, while the most frequently used steel-center types are so-called "sandwich" laminated steel-centers.

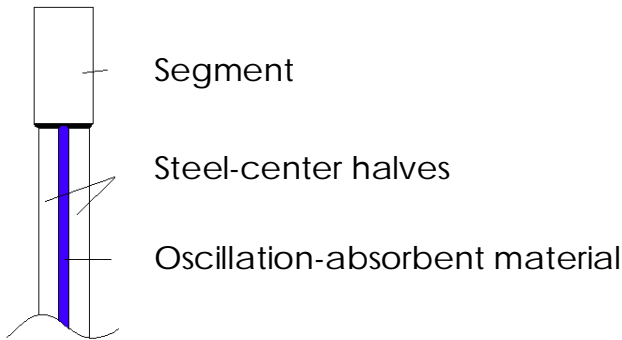


The laser-cut steel-center can provide a noise reduction of approx. 3 dB(A), and the laminated sandwich steel-center (Steel/Copper/Steel) can reach a noise reduction of up to 6 dB(A).

This noise-reducing effect is reached with the sandwich steel-centers by the separation of the two steel-center halves with a layer of copper. Softer copper partly absorbs the oscillations of the harder steel-centers halves and thus reduces the sound of cutting. However, this method does not exhibit tremendous noise reduction, since copper is also a metal and the oscillations are only partly absorbed.

2.4. Saint-Gobain creates a new generation of silent diamond blades

Saint-Gobain Abrasives research engineers have developed new special absorbent material that can efficiently replace copper in the sandwich steel-center between the two steel halves. Due to its outstanding insulation characteristics, the oscillations of the two steel-center halves are absorbed to unprecedented levels, and the noise generated by the diamond blade reaches levels of up to 15 dB(A) compared to a standard diamond blade.



Such noise reduction is for instance the difference between the noise in a discotheque and a truck in city traffic. The noise reduction of these new developed steel-centers is more as four times as effectively as lasers-cuts and more than twice as effective as conventional copper-sandwich steel-center.

3. Technical description

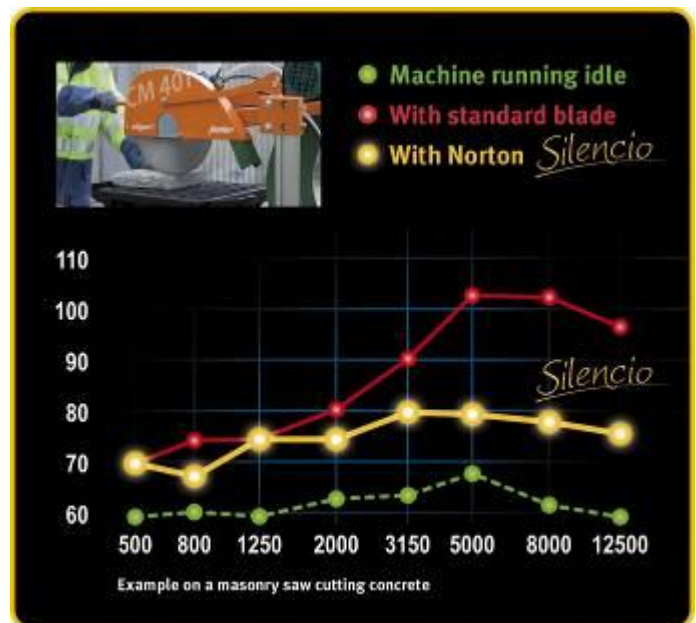
3.1. Noise-damping technology

The NORTON SILENCIO benefits from two complementary solutions to reduce the noise level, and more specifically the high frequencies (2-6kHz), which are the most disturbing to the human ear.

New technology : sandwich steel-center with absorbent material

Saint-Gobain has developed a new sandwich steel-center with a high-end damping internal layer. Up to 20 different types of damper have been tested, with the help of a team from Saint-Gobain Glass R&D specialized in acoustic analysis.

As described on the graph, Norton Silencio is especially efficient in the high-frequencies, which are the most painful and disturbing, and which spread to the farthest distance.



This makes of the Norton Silencio the ideal diamond blade to reduce the noise-impact of the building site on the near surrounding environment.

Patent-pending design : whistle-free steel-center

A whistle noise is generated when a blade is spinning. The noise is generated from the air flow through the gullets. It isn't obvious with an already very noisy standard diamond blade, but the whistling becomes really significant with a very silent blade like the Norton Silencio, especially on masonry and floor saws.

Our new patent-pending design prevents any air flow inside the steel-center gullets, and thus cancels totally the whistling effect.

Both solutions together reduce the total noise level by up to 15 dB(A), and specific frequency bands by up to 25 dB(A) ! The Norton Silencio provides the best noise damping performance.



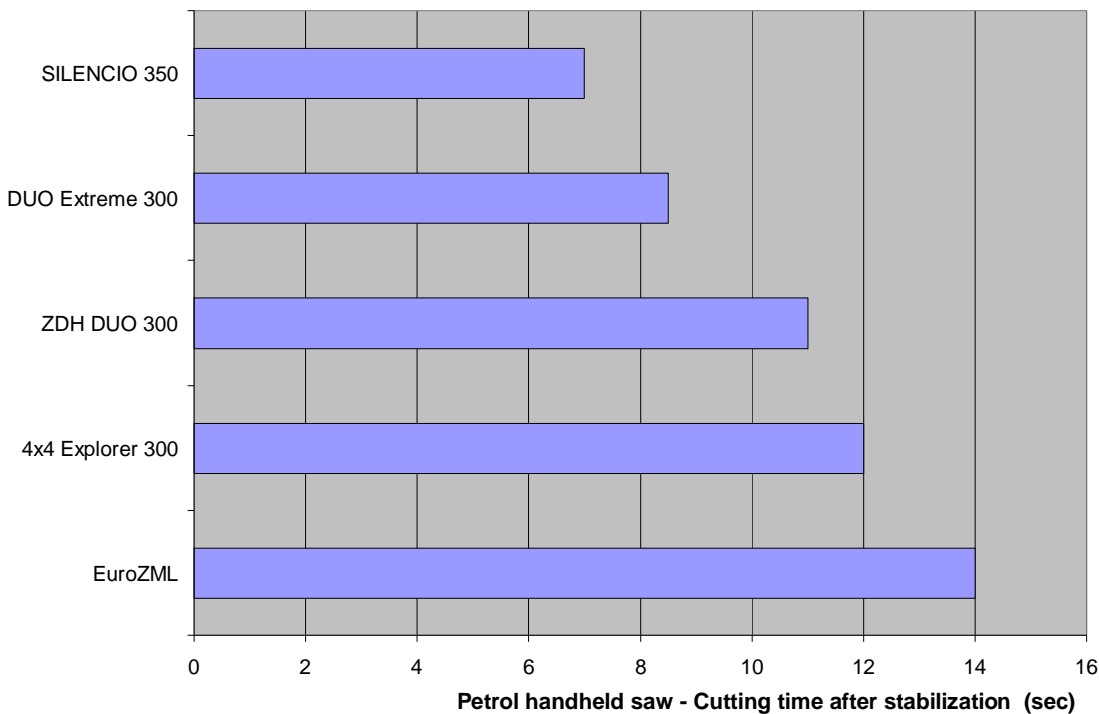
3.2. Performance, features & benefits

The Norton Silencio is available in three different specifications : petrol handheld saws, floor saws and masonry saws. Each of them fine-tuned to get the best cutting performance and reach the best noise-damping effect, taking into account the specific requirements of each application.

The newly developed 15mm segments are adapted to reach the best cutting speed and life depending on each application.

- PETROL HANDHELD SAWS – cutting washed concrete slabs

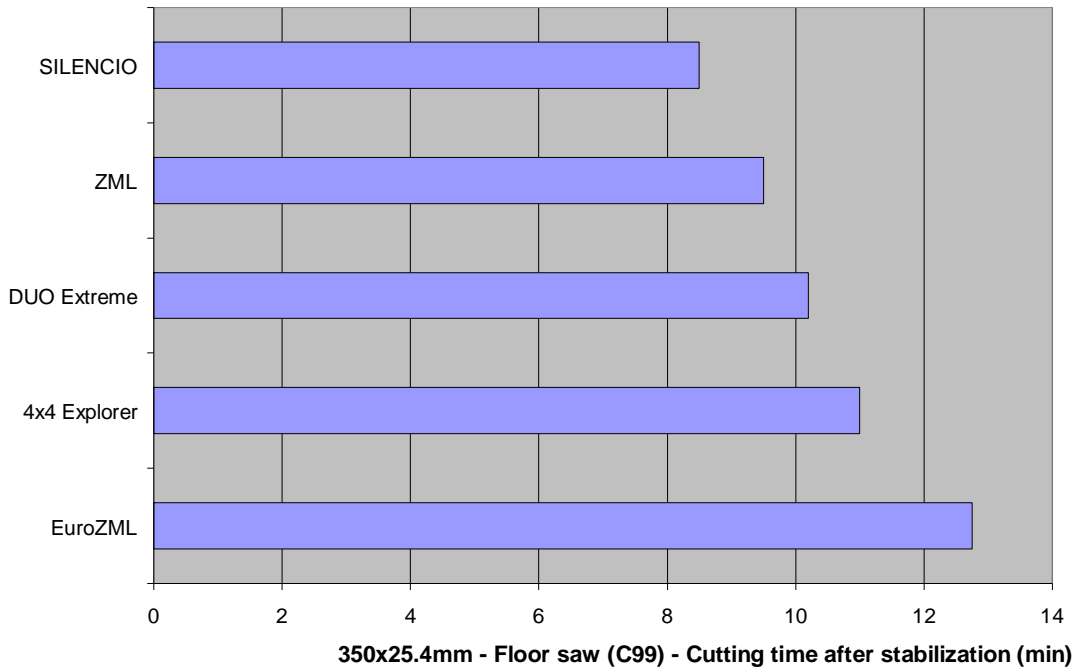
Thanks to a newly developed specification, fine-tuned for each application, the Norton Silencio proves the fastest cutting diamond blade in the Clipper range.





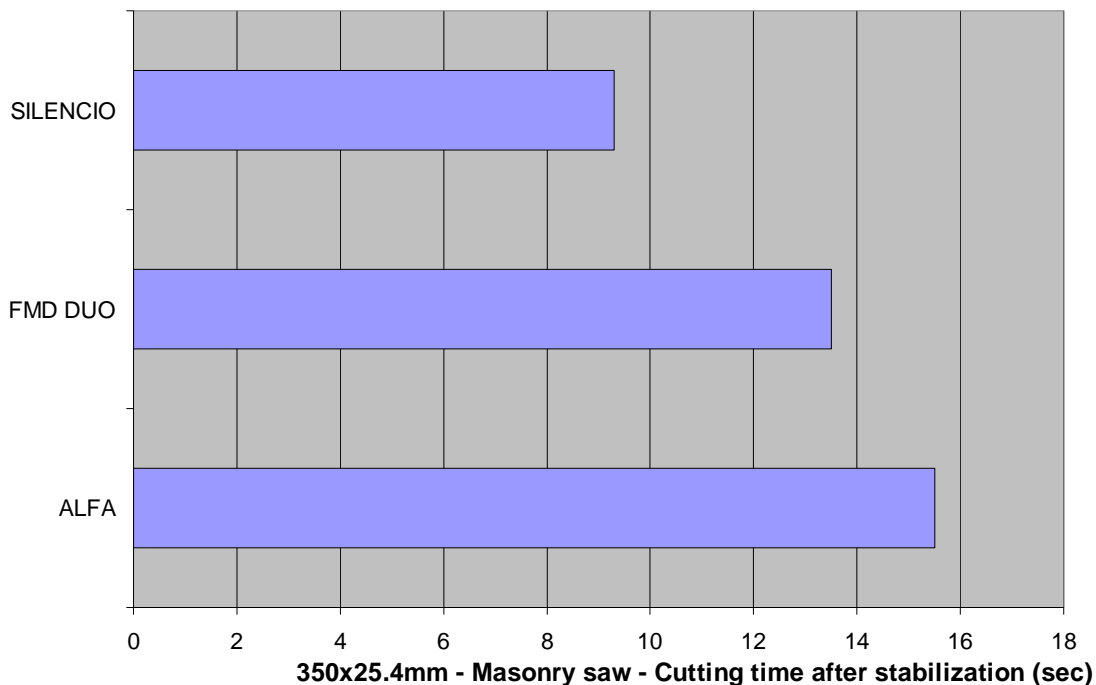
- FLOOR SAWING – cutting in reinforced concrete track

The specification of the 15mm high segments have been especially adapted in order to reach the best cutting speed while providing a very long life to the blade, exceeding DUO EXTREME in both matters.



- MASONRY SAWS – cutting in washed concrete slabs

The specification of the 15mm high segments have been especially adapted in order to reach the best cutting speed while providing a very long life to the blade, exceeding DUO EXTREME in both matters.





Feature	Benefit
Newly developed silent steel-center, based on a new vibration-absorbent material.	Tremendous noise-dampening effects , more efficient than copper-sandwich. The material absorbs the vibrations and prevents noise to be generated.
Optimized sound-damping geometry	Removes the whistle-effect with the blade guard. The blade is absolutely silent while running idle.
15mm segment height	Longer life and better visual aspect.
Trapezoidal segment shape	Lower impacts on material for a better quality of cut that allow for a smoother comfort for the user, close from continuous rim blades. Better material removal participating to improve the cutting speed.
Specification : new diamond and bond	Extreme cutting speed in a large variety of materials
Fully compliant to EN13236 and OSA requirements.	A safe product to protect the end-user.

3.3. End-user safety

We put the end-user safety above all other considerations.

All our products, and off course our new “SILENCIO”, comply with the European safety standard **EN13236**. Saint-Gobain Abrasives is also a registered member of the oSa (Organisation for the Safety of Abrasives), which is a mark of the safety of our products.



EN13236

Intensive research has been run during the development of the “SILENCIO” in order to reach the safest blade under even the most severe conditions. Among the technical solutions implemented on this product range are :

- **Gullet-shape design** that prevents whistle effect and at the same time prevent fatigue cracks in the steel-center
- State-of-the-art **laser-welding attachment process**, by the inventor of the laser-welded diamond blade.
- Each segment from each blade is torque-tested to check for the proper strength of the laser-welding.

4. Product presentation

The Norton SILENCIO carries values of innovation, novelty & technology, and must be at the same time associated with an image of serenity, to emphasize the noise-dampening features.



This is why we have chosen the theme of quiet country-side background, associated with a dynamic signature for the product name.



Even though the product will be used as a separate tool aside from the standard clipper range, its features being so different than standard blades, we have designed the packaging so that all the key informative elements are positioned in similar places as on the Clipper standard blade design.

The back side reminds the main features and benefits of the product, and shows the decibel scale in order to help the end-user understand what means a reduction of up to 15 dB(A) in relation with usual noises.

Front side



Back side



5. Sales argumentation

Norton “SILENCIO” – quick facts

- Innovation : patent-pending technology for a new generation of silent steel-centers
- Silent effect : Silencio features noise reduction levels never heard so far
- Performance : newly developed specification for the best cutting speed in the Clipper range
- Safety : State-of-the-art Norton technology & testing standards

Innovation

- A new generation of sandwich steel-centers, based on a new development by Saint-Gobain. The absorbent material inside the two steel-center halves prevents the noise generation.
- The patent-pending gullet shape prevents the air flow to create a whistling noise, to further reduce the blade sound.
- New graphic artwork, colorful, meaningful and appealing. The product artwork highlights the main features and provides a clear explanation of the purpose, the features and the expected result of the Norton Silencio

Application & Performance

- The Norton Silencio is available in three different specifications : petrol handheld saws, floor saws and masonry saws. Each of them fine-tuned to get the best cutting performance and reach the best noise-damping effect, taking into account the specific requirements of each application.
- The newly developed 15mm segments are adapted to reach the best cutting speed and life depending on each application.
- Their trapezoidal shape provides a constant interval between each segment, and ensures the best material removal with the finest quality of cut. The comfort in cut for the operator is also greatly improved with this feature.
- A new generation of sandwich steel-centers, based on a new patent-pending development by Saint-Gobain. The absorbent material inside the two steel-center halves prevents the noise generation like no other steel-center could do before.

Safety

- The steel-center has been thoroughly tested by the Norton engineers to provide the best strength and fatigue resistance for each application.
- All laser-welded blades manufactured by Norton fully comply with EN13236 and OSA requirements, and handle safety tests exceeding the safety standard requirements.

6. Product reference

NORTON SILENCIO :					
One specification by machine application					
Item no.	Diam.	Bore	Nb segments	Segment height/width	Maximum operating speed

Angle-Grinder - EHH

For concrete and general purpose materials – with offset gullets

70184630308	230	22,23	16	17.0 / 2.8	80m/s – 6650 RPM
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Petrol Handheld saws - THH

For concrete and general purpose materials – standard key-hole gullet shape

70184629000	300	20	18	15.0 / 3.1	100 m/s – 6400 RPM
70184628999	350	25.4	22	15.0 / 3.1	100m/s – 5500 RPM

Masonry saws - MS

For general purpose, concrete and natural stones – with offset gullets

70184628998	350	25,4	24	15.0 / 3.1	100m/s – 5500 RPM
70184630309	500	25,4	35	15.0 / 3.2	63 m/s – 2400 RPM

Floor saws - FS

For concrete cutting on floor saws up to 20 HP – with offset gullets

70184628997	350	25,4	23	15.0 / 3.1	100 m/s – 5500 RPM
70184631020	450	25,4	30	15.0 / 3.2	63 m/s – 2700 RPM
70184630416	500	25,4	35	15.0 / 3.2	63 m/s – 2400 RPM

NORTON recommends the use of the patent-pending NORTON “QUICK FIX” reduction system in order to further improve the inventory management at the distributor level.

"NORTON QUICK FIX * " solves the issue of multiple bore sizes of diamond blades for petrol handheld machines :

With this accessory, the same diamond blade can be used on several types of machines. It allows you to mount diamond blades with 25,4 or 22,23mm bore on a machine equipped with a spindle of 20mm, in a totally safe and reversible way. Reduces the need to keep stock of several bore sizes of the same blade specification!

" NORTON QUICK FIX * ", another Norton innovation.



Item no.	Description
70184622589	QUICKFIX SYSTEM 103X25.4/22.23/20