

## **TOWARD A CERTIFICATION OF NIGHT DELIVERY IN URBAN FREIGHT TRANSPORT**

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### **ABSTRACT**

Among the possible solutions to limit traffic jams in large cities, the generalization of night delivery offers several advantages: This solution allows an access to city centers for larger vehicles when the traffic flow is limited - it reduces the time of delivery and consequently the presence of trucks in towns. It also imply an immediate cut of total energy consumption and CO<sub>2</sub> emissions of transport operations, The consequence could be a significant decrease of environmental impact of urban freight transport, including an improvement of air quality. If this project were adopted in large cities another consequence may be an improvement of safety and security due to the restriction of truck traffic during the day. The feasibility of this measure obviously requires an assessment of noise level generated by the activities of night delivery. Refrigerated transport equipments are among the noisiest due to the refrigeration devices. This has led manufacturers of temperature-controlled vehicles to developed new equipment with a maximum noise level of 60 dB(A). This new development was particularly pushed and promoted by the market itself and the certification of equipment though the Piek program. The aim of the PIEK program is to reduce noise levels in the evening and night, of supply traffic, loading and unloading activities in residential areas. These experiences also underline that the silent equipments are not sufficient to guarantee silent delivery and this paper proposes an original complementary approach for certification of low noise delivery service.

### **THE CONTEXT**

Every day to deliver more than 700 000 establishments and around 11 millions of people, 1 million of deliveries and removals are done in Ile de France. Most of these deliveries are done with a start and/or a finish point in an urban area and are realized during the day, with all the strain of space and insertion it involves.

Among those flows, an important part of them concerns the deliveries under temperature-controlled that contribute to city centers day congestion but also to an increase of the total energy consumption of the vehicles due to the use of the refrigerated device.

This report realized in Ile de France is also true for all the important agglomeration in France and in Europe.

Thereby, among the ideas to relieve congestion in the access in big city centers, the generalization of night deliveries of small and medium shops (or some restaurant chain) could offer several advantages:

- This solution would allow an access to city-centers for larger vehicles when the traffic flow is limited.
- This could have as immediate consequences a limitation of the total energy consumption of the vehicles, a decrease of environmental impact of urban freight transport, an improvement of air quality, safety and security due to the restriction of truck traffic during the day.

The feasibility of this measure obviously requires an assessment of noise level generated by the activities of night delivery.

If this goal is achieved, night deliveries would allow transporters to avoid urban congestion, so to increase their productivity and to ameliorate the energy balance of their delivery rounds. An experimentation done in

Netherlands by the supermarket chain Albert Heijn in 10 shops of 9 cities showed that it allows to reduce CO2 emissions by almost one third!

Other experimentations realized in Ile de France thanks to the work of the Club Demeter confirm the feasibility of night deliveries without noise for neighbors.

The stake for professionals of under controlled- transport to associate the master of the Cold Chain to the master of the Silence-Chain to limit deliveries environmental impact is considerable.

### **SILENCE, WE DELIVER!**

The first requirement to realize silent night deliveries is to dispose of silent equipments but first it is advisable to define precisely the notion of silence and quantify it.

But, to be pertinent, this measure of the acoustical phenomena has to be adapted in terms of auditory sensation. It is necessary to describe in an objective way the sonorous impacts of the activities that we want to evaluate in order to put them in relation with the proper perception of the concerned population. This population can have many different behaviors depending on regions, ages, hours of deliveries...

The most adapted method depends on the notion of emergence that seeks to quantify the difference between the origin of the noise generated by the delivery activity and the residual surrounding sound when there is no delivery. In fact, the real feeling of the measure depends on the auditory difference (called emergence) between the noise we want to quantify considered singular or disturbing (the delivery), and the residual surrounding noise (other noise of the city).

Meanwhile various norms allowing to qualify or measure the acoustic characteristic of a machine or a vehicle, the Dutch government defined in 1998 the thresholds to respect in the "Decree Retail Trade Environmental Protection": 65 dB(A) between 7pm and 11pm and 60 dB(A) after.

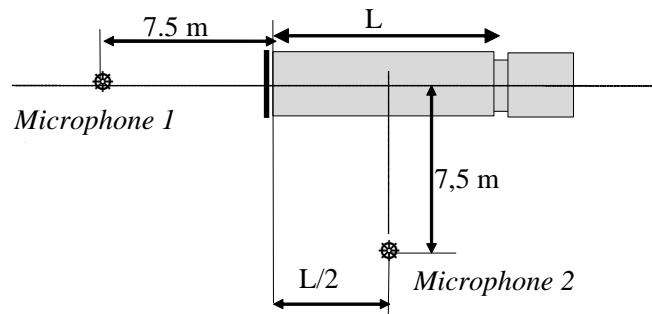
It was the start of an evaluation system of acoustic performance of transport and handling equipments called Piek (\*). To respect the requirements, the vehicles have to respect those thresholds in specified conditions of residual surrounding noise (Residual noise < 50 dB(A)).

### **THE PIEK CERTIFICATION OF TRANSPORT AND HANDLING EQUIPMENTS**

From the origin, the setting of regulation thresholds in the Netherlands has been accompanied by the idea to discriminate the existing material (refrigerant lorry, electrical fork lift ...) which entered in the category in order to impose a distinctive brand (Piek brand). Although Piek is not a brand in the sense of the French code of consumption (which enclose very precisely the recourse to brands or quality labels), Piek has established itself as a distinctive sign allowing to recognize a silent transport or handling equipment.

*(\*) the Association of the Club Demeter Environment and Logistic is a group of private and public actors of the global logistic chain in which the goal is to promote and implement concrete actions, measurable and respecting the 3 spheres economics, social and environmental of Sustainable Development. Created in 2001, it gathers company's leaders of the sectors of distribution, industry (especially agro alimentary) and logistic, as well as public actors. The stake of the association is to implement operational solutions intended to master environmental impacts.*

To establish procedures of reproducible measures which allow certifying vehicles and material answering to the criteria of 60 dBA, a simple test protocol has been elaborated. The protocol lies on measures of emission values of the level of acoustic pressure of emission (LpA) in free field at a distance of 7.5 meters from the source as the illustration 1 shows.



*Illustration 1: Tests in free field*

These tests are realized generating singular actions suitable to the handling of vehicles or material subject to be embarrassing during the deliveries in order to verify that emergences remain inferior to the thresholds of 60 dBA or 65 dBA.

These actions are for example:

- The roll of a trolley in a shell
- Collision with electrical fork lift
- Lateral shocks on the shell walls
- Functioning of refrigerant group
- Functioning noise of a tailgate

In order to simplify, the measure of this cumulated actions (when a risk of simultaneous emergence exists) is not evaluated during tests. Moreover, the Piek protocol authorizes the certification of a vehicle by module which allows evaluating once and for all, without reiterate tests, a constituent vehicle component (a refrigerant group or a tailgate for example).

Being aware that the Dutch initiative could only established itself as a standard in Europe if the test protocol was shared in different countries, the Dutch government has put a consultant in charge of make contact with coordinators in each country willing to apply those rules.

For France, the Cemafruid has been chosen to promote this certification and to implement the tests. The TÜV in Germany and the Noise Abatement Society (NAS) in UK play the same role.

First step in the establishment of a Silent Chain, the Piek certification does not concern vehicles and material of delivery and does not guarantee that night delivery procedure respects the tranquility of the residents. The night delivery procedure means that all the elements which have an impact on the tranquility of the residents (handling equipment, store local, staff attitude during deliveries, site impacts itself).

## **VEHICLES CERTIFIED IN FRANCE**

Piek is a distinctive brand certifying that the product has received a certification of type. The certification lies on 3 steps allowing to beneficiate of the right to use the distinctive brand delivered in France by the Cemafruid:

- >Realization of acoustics tests in a free field by the Cemafruid of the concerned products (tests of type),
- >If the results of the tests comply with the maximum thresholds authorized, allocation to the manufacturer of a certificate of type approval,
- >Allocation of a right of use of the brand in compensation for a commitment of the manufacturer to ensure the conformity of the products manufactured to the type certified by Cemafruid.

(\* ) *Piek means summit in Dutch, this system of certification has been implemented and allows evaluating transport vehicles regarding the Dutch regulation requirement.*



*Photo 1: Label of conformity Piek*



*Photo 2: Example of a lorry certified Piek by the Cemafruid*

The Cemafruid in France has certified several types of vehicles for refrigerated transport, accessories like tailgates, fridge units and recently electrical fork lift. The list of products certified is available on [http://piek.cemafroid.fr/produits\\_certifies.php](http://piek.cemafroid.fr/produits_certifies.php)

### REAL ON SITE EXPERIMENTATION SUCCESS

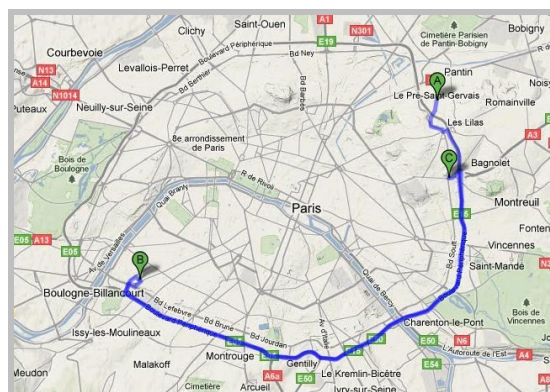
The Club DEMETER gathering public members and companies around the question of the noise has been in 2009 and 2010 on the initiative of several experimentations on night deliveries with low sonorous emission material based on the Dutch experience and the Piek program.

The organization of night deliveries in city proves true a complex task because the urban logistic concerns the whole actors of the city that we can distinguish in 4 big categories:

- The carriers, concerned about the level of their activity performance, about the improvement of their conditions of delivery and parking;
- The store managers, who want being supplied at acceptable costs and with good service conditions;
- The residents, who are at the same time consumers and roads users, and particularly concerned about their living environment
- Local authorities play also an essential role governing the flow inside the cities.

In the frame of these experimentations drove by the Club DEMETER, the Cemafruid intervened as a laboratory to realize acoustics measures on site in real delivery conditions.

The map of the illustration 2 presents the experimentation sites.



*Illustration 2: Cartography of experimentation sites in Ile de France*

The deployment of the Piek transport vehicles for the night delivery is mainly suitable for urban or peri-urban areas. The tests have been done:

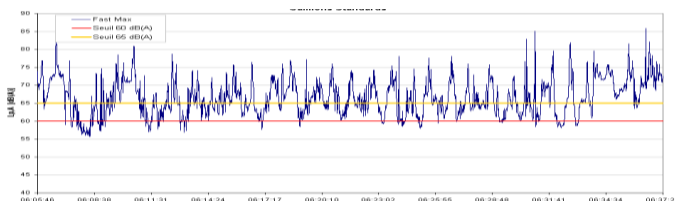
- Au Pré-Saint-Gervais, Seine-Saint-Denis (93),
- à Paris 15<sup>ème</sup>, rue Lecourbe,
- À Paris 20<sup>ème</sup>, porte de Bagnollet.

These 3 sites cover quite well the diversity of the situations meet in Ile de France.

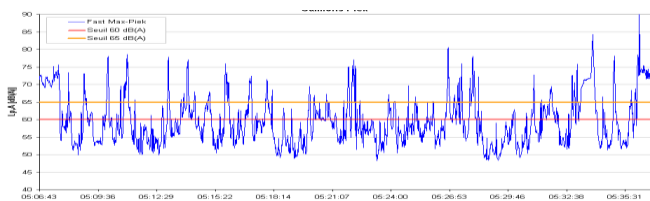
The aim of these experimentations was to notice the impact of the night deliveries, the contribution to use Piek certified equipments and to list the complementary elements to take note of during this night activities.

During these activities, the acoustic measures have been brought closer to external elements of the delivery but which are at the origin of sonorous emergences suitable to generate noise for residents.

In the case of the site of Pré Saint Gervais for example, the illustrations 3 and 4 show that if important emergences exist, the use of Piek equipment limits considerably the duration of thresholds overtaking. It has to be said that overtaking observed for the delivery done with Piek material are not all related with the delivery but with other urban events (scooter, firemen...)



<60 dB(A)	60<=<65	>=65 dB(A)
00:02:49	00:10:19	00:15:03



<60 dB(A)	60<=<65	>=65 dB(A)
00:20:07	00:04:24	00:03:02

**Illustration 3:** Recording of the acoustic power during a delivery with standard material and determination of cumulated periods of acoustic emergences by thresholds

**Illustration 4:** Recording of acoustic power during a delivery with certified Piek material and determination of cumulated periods of acoustic emergences by thresholds

These experimentations also allowed highlighting the diversity of noise sources, the night, without the possibility to attribute it to the delivery. The table 1 lists these events for a delivery realized in the 15<sup>th</sup> arrondissement of Paris:

**Table 1:**

Hour	Event	Emergence
21:23	Handling with the trolley	73 dB(A)
21:30	Passing roll > tailgate > floor	57 dB(A)
21:31	Helicopter	69 dB(A)
21:32	Rolling of the trolley	59 dB(A)
21:35	Loading of a palette by the trolley against the wall	76 dB(A)
21:36	Passing of a scooter	78 dB(A)
21:49	Startup of the tractor	76 dB(A)
21:49	Unlocking of the brakes	77 dB(A)
21:40	Startup of the tractor trailer	50 dB(A)
21:43	Shutting of the iron curtain	63 dB(A)
21:44	Sonorous background level	50 dB(A)

This table presents in red, independent elements of the delivery or of the equipment that can be at the origin of the nuisance for the residents.

The general conclusions of this experimentations show that:

- The level of acoustic pressure between a delivery done with Piek material is lower than the one registered with a “standard” material,
- The environment as well as the material used during the deliveries intervene in a strong way on the fall of the acoustic pressure:
  - Delivery areas have to be conceived and equipped to ensure a night reception,
  - The training of the driver/delivery man as well as staff in charge of the delivery in the store has to include a noise sensitization...

This all led the Club CEMETER to recommend an original step to introduce: in order to take fully advantage of opportunities that offer night deliveries and translate them in perennial and operational implementations, it appears essential to develop a certification of service extended to a complete process of merchandise delivery and not only to the silent vehicles.

This project will be carried by the Cemafruid, and is supported by the piloting committee “night delivery” of the Conseil regional d’Île de France which has as goal to constitute a certification committee in charge to control the following complementary criteria:

- Establishment and configuration of merchandise reception sites (delivery area, residents’ proximity, possibility to operate, unloading bay of reception point, junction between the road and the sidewalk...)
- Validation of the aptitude for the delivery professionals based on a training and a sensitization to limit sonorous nuisance
- The obligation to use transport and handling equipment certified Piek.

### **THE EXPERIMENT « SILENT APPROACH » OF THE NOISE ABATEMENT SOCIETY IN UNITED KINGDOM**

Similar conclusions has been done in United Kingdom by the NAS (Noise Abatement Society) and the FTA (Freight Transport Association) which have implement a complete evaluation method for night deliveries and an original system of complains treatment in case of inconvenience thanks to a telephonic hotline accessible the night.



*Photo 3: Guide Delivery improvement*

The whole step relies on a multipartite contract and on the respect of the requirements present in the guide “Delivery improvement” of the FTA (photo 3). The step, independent from Piek certification of material, integrate all the night delivery impacts (including inconvenience possibly generated by the night lighting) and is probably the most complete in Europe.

## CONCLUSION: TOWARD A TOTAL CERTIFICATION OF NIGHT DELIVERY SERVICE IN FRANCE

In relation to the conclusions of the Club DEMETER and various experimentations leded, the Cemafruid is developing a certification of service extended to the complete process of merchandise delivery and not only on silent vehicles.

The brand project relies on a step of a permanent improvement sets up by the companies concerned by the delivery sites. In this domain, the requirement will carry on the setting up of performance indicators, self-evaluation and residents listening to tend toward an improvement of the service.

In addition, the certification will impose three conditions of means:

- Essential requirements on the type of establishment of those sites (road, location, curtains...)
- The obligation to use transport and handling Piek certified equipments
- The necessity of an attestation of aptitude for the staff based on training and sensitization to limit sonorous disturbances.

In order to distinguish the certification of service and the Piek certification (which is related to the equipments only), a logo, illustrating the brand and easily recognizable for the residents, will be created. Here is the 1<sup>st</sup> project on the photo 4.



*Photo 4: Brand logo project*

It remains now to the professionals gathered in a certification committee and representing all the parts interested by the certification to set these applicable requirements. The referential which will be the result of discussions between professionals should be sufficiently demanding and hardy to sit the trust on the device set up and allow town council to authorize deliveries in city-centers the night on the base of a recognition of the certification delivered.

It is also about to give to town-councils a concrete tool in order to recognize a competitive advantage to enterprises which make efforts on the environment way.

In view of this stakes of public service and industrial expectations of the sectors concerned, this step of referential is a part of the frame of sustainable development policy especially for the region Ile de France which supports the project in its goals of the "Plan de Déplacements Urbains" currently on reconsideration.