

# NAK

## MUFFLERS



AIR DISTRIBUTION PRODUCTS SINCE 1976



[www.nakhoulcorp.com](http://www.nakhoulcorp.com)

## 1- General Information

Internal Combustion engines, in particular diesel engines, are one of the major source of noise pollution. As a means to control and suppress the high intensity pressure wave generated by the combustion process, mufflers are usually installed at the exhaust gas outlets of these engines.

To address the problem of noise pollution, **NAKHOUL CORPORATION**, optimized the design, manufactured, and supplied the **NAK Muffler**, all in accordance with the relevant codes and applicable industry standards.

A properly designed muffler is reflected in terms of the following criteria:

- The acoustic criterion, which relates to the required noise reduction.
- The aerodynamic criterion, which relates to the allowable pressure drop across the muffler.
- The geometrical criterion, which relates to the allowable size.
- The construction material criterion, which specifies the appropriate construction materials to be used.

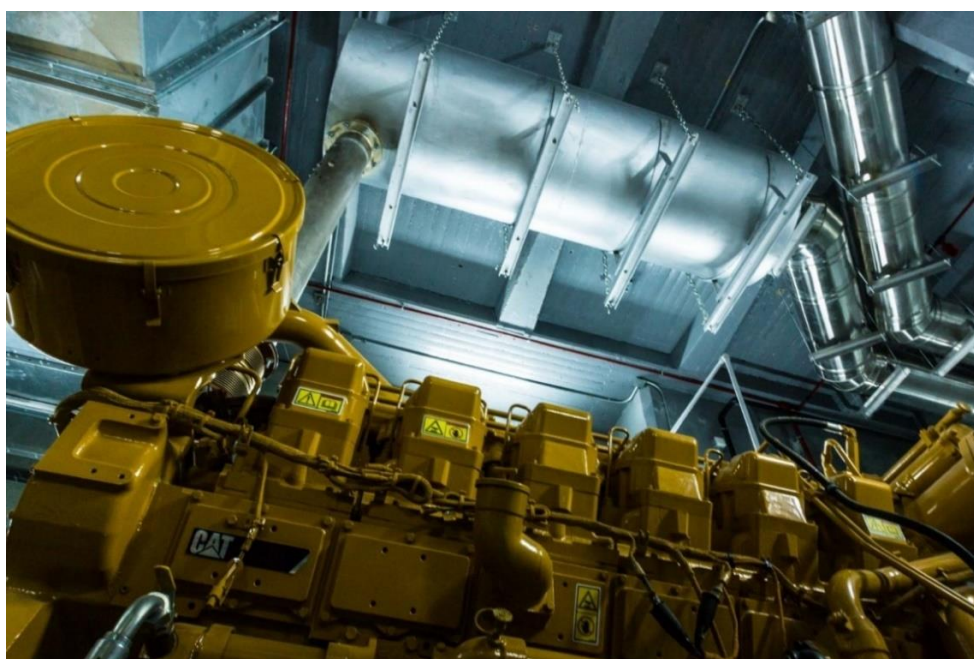
## 2- Mufflers' Grades

A series of grades, describing the approximate insertion loss performance of mufflers, was developed. Refer to below table 1 showing the basic aspects of the different Mufflers' grades.

Although size is not the only factor that affects mufflers' performance, high insertion loss mufflers will be dimensionally larger than lower insertion loss units.

## 3- Muffler design

To silence the exhaust noise from diesel engines, reactive mufflers, and combined reactive / absorptive mufflers are usually used. The noise reduction is achieved by forcing the exhaust gas to pass through a series of tubes and chambers.

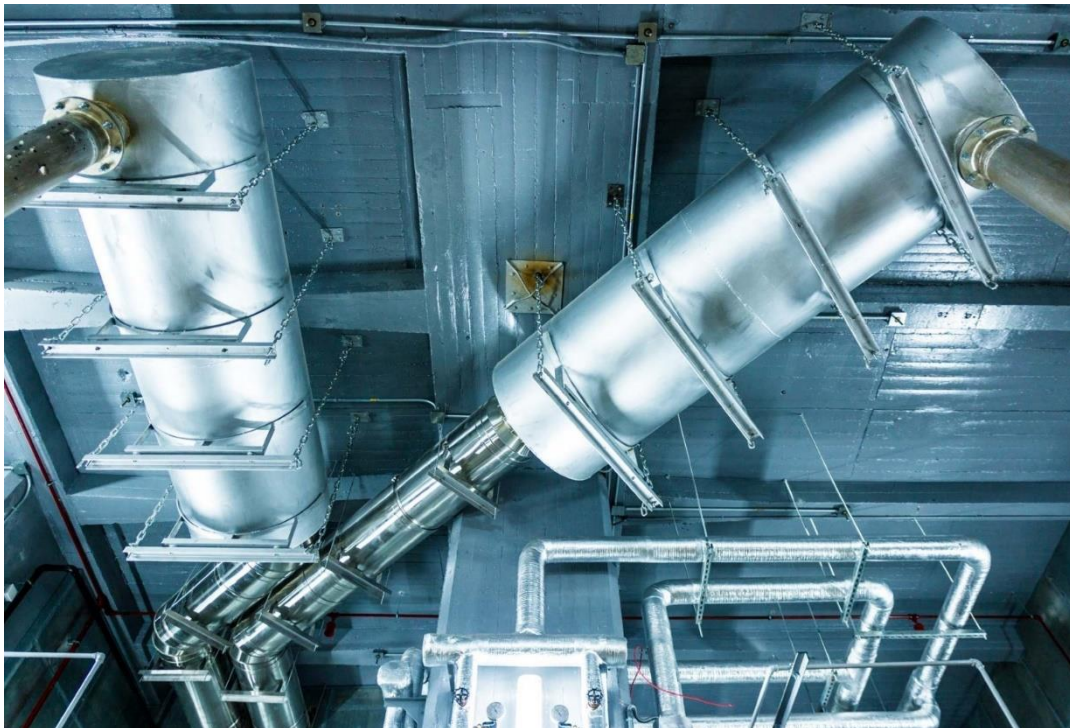


**Fig. 1 - NAK Critical Grade Muffler**

Muffler grades	Insertion loss (IL)	Body/Pipe	Length/Pipe
Industrial/Commercial grade	15 to 25 dB	2 to 2.5	5 to 6.5
Residential grade	20 to 30 dB	2 to 2.5	6 to 10
Critical grade	25 to 35 dB	3	8 to 10
Super critical grade	35 to 45 dB	3	10 to 16

**Table 1: Exhaust Muffler Grades**

Further higher efficiency grades were developed by the Electrical Generating Systems Association (EGSA): Hospital Grade, Hospital Plus Grade, Extreme Grade, and Super Extreme Grade, where the noise reduction at the gas exhaust's outlet could reach up to 60 dBA.



**Fig. 2 - NAK Critical Grade Mufflers**

#### 4- Mufflers' Types

The regular types of mufflers are one of, or a combination of the two following types.

- **Reactive Mufflers**, often referred to as "chamber" mufflers, are of chamber design, composed of up to 4 chambers, with no acoustic material. This type of muffler generally has its maximum Direct Insertion Loss in the 125 Hz and 250 Hz Octave Band Center Frequency.

- **Absorptive Mufflers**, often referred to as "packed" mufflers, are of straight through design, packed with acoustic material that is shielded from the exhaust stream by perforated sheet metal. This type of muffler is generally most effective in the 500 Hz through 8000 Hz Octave Band Center Frequency.



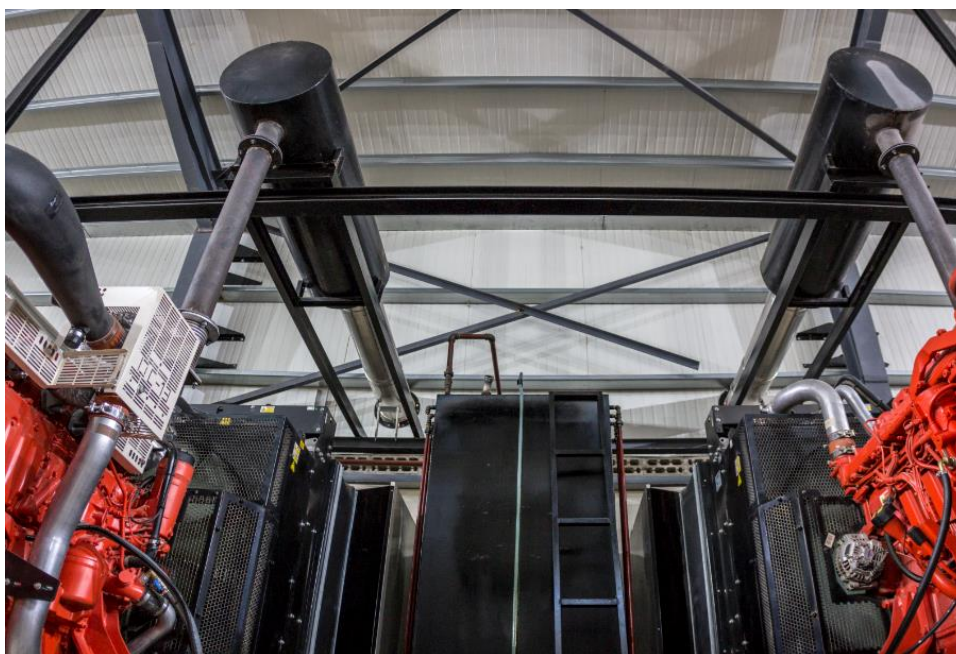
Other types of mufflers, like Resonators, are also available, but their use is limited to specific applications.

**NAKHOUL CORPORATION** manufactures the reactive type mufflers, the absorptive type mufflers, as well as the combination of reactive / absorptive type mufflers, all in line with the different grades mentioned in table 1 above. Due to its broad-band noise control, the most demanded category of **NAK Mufflers** remains the combined reactive / absorptive types, fabricated and supplied in critical grade.

## 5- Muffler Construction Material

**NAK Mufflers** are fabricated from mild carbon steel sheets with a minimum thickness of 2 mm, depending on the size of the muffler.

However, and upon request, **NAK Mufflers** can be manufactured from stainless steel sheets AISI 304 (1.4301) or AISI 316L (1.4404).



**Fig. 3- NAK Critical Grade Mufflers**

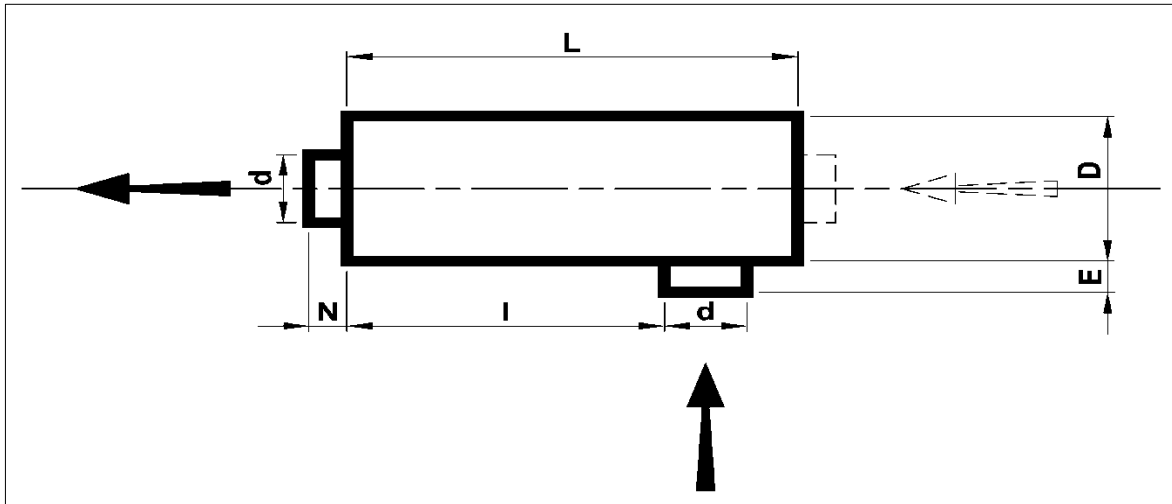
## 6- Right to alterations

As part of its continuous development and innovation program, Nakhoul Corporation reserves its right to alter or amend any data or section of this manual without prior notice.

## 7- Muffler Selection

The below selection data is related to the NAK Critical Grade – Combined Reactive / Absorptive Mufflers. However, data for other types / grades of mufflers is available upon request.

## 7.1 Dimensional Data



**NAK MC 090 – XX – XXX**

**Critical Grade – Combined Reactive / Absorptive Mufflers**

Nominal Diameter ND	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	700	800
d	60	76	89	114	140	168	219	274	324	356	406	457	508	557	609	710	812
D	305	355	405	455	455	608	639	758	799	908	960	1008	1108	1210	1210	1510	1610
L	890	1100	1255	1440	1755	2065	2600	3125	3505	3500	3895	4295	4590	4680	4920	5435	5900
I	730	932	1036	1203	1480	1711	2196	2563	2898	2937	3262	3597	3846	3897	4071	4410	4774
N	70	70	70	70	100	100	110	110	110	120	120	130	130	140	150	150	170
E	73	73	73	73	103	101	121	111	126	121	120	131	131	140	155	155	170

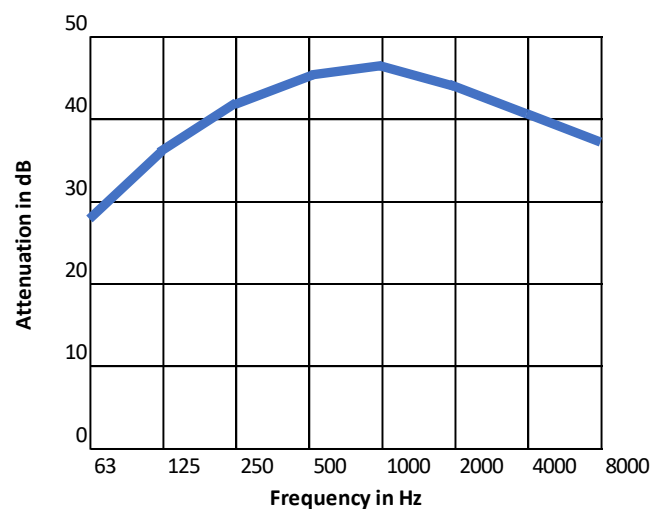
**Table 2: Muffler Dimensions (mm) – Critical Grade –Combined Reactive / Absorptive**

- listed data is subject to change without prior notice.
- Dimensional data for other types and grades of mufflers are available upon request.

## 7.2 Acoustic Performance

The following chart shows the approximate insertion loss as a function of frequency for the Combined Reactive / Absorptive Type, Critical Grade Mufflers.

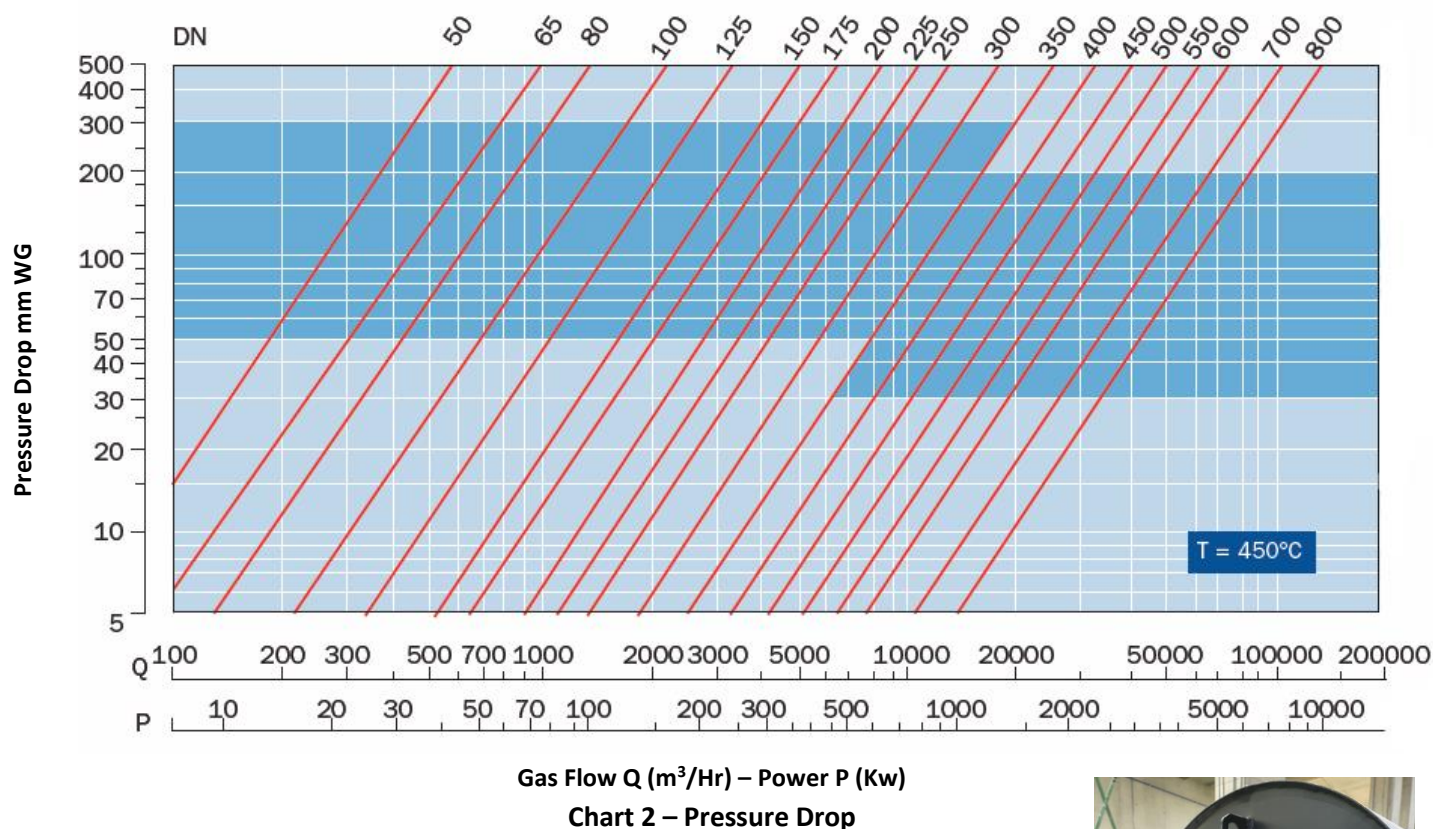
Note that all “insertion loss” values are approximate, since the acoustic performance of any muffler varies considerably depending on the engine.



**Chart 1 – Acoustic Performance**

## 7.3 Muffler Pressure Drop Chart

The following chart shows the approximate pressure drop as a function of diameter, gas flow, and engine power, for the Combined Reactive / Absorptive Type, Critical Grade Mufflers.



## 8- Nomenclature

**NAK MX – XXX – XX – XXX**

Exhaust Pipe Diameter (mm)

Construction Material: 01 = Black Steel Painted  
02 = Stainless Steel AISI 304  
03 = Stainless Steel AISI 316

Inlet / Outlet Orientation: 090 = 90° Orientation  
180 = 180° Orientation

Grade of Muffler: I = Industrial  
R = Residential  
C = Critical  
S = Super Critical



e.g. **NAK MC – 180 – 01 – 50** | NAK critical Grade muffler – Inlet / Outlet @ 180° – Black Steel Painted – Ø 50 mm

*improving  
the Air you Breathe*



# NAK MUFFLERS

## Offices Zouk Mikael

Tel. +961 9 225 888 • Fax +961 9 223 888

Mob. +961 3 195 082 | +961 76 560 003

P.O.Box 182 Zouk Mikael | Lebanon

## Factory Gharzouz

Tel. +961 9 791 442 | +961 9 791 443

Mob. +961 76 400 488

E.mail: [info@nakhoulcorp.com](mailto:info@nakhoulcorp.com)

[www.nakhoulcorp.com](http://www.nakhoulcorp.com)

