LINCOLN ELECTRIC

NERTAJET HPi

Automated plasma installations
for High Precision cutting

NERTAJET HPi

We have been designing **NERTAJET** systems for over 40 years to provide the best HP plasma cutting with a wide range of applications:

› Dry cutting or water vortex process above or below water
› Wide thickness range from less than 1mm to 100mm
› On any kind of material that conducts electricity: carbon steels, stainless steels, as well as copper, brass, etc

NERTAJET HPi is the evolution of the traditional plasma process representing the alternative to laser cutting:

Quality

This cutting tool is used to obtain the following:

› dimensional and geometrical accuracy of the pieces cut on a wide range of materials,
› smoother quality of the cut face (roughness far below that of a laser),
› lower slag deposits (range 2 to 4 in accordance with ISO 9013),
› remarkable hole straightnesson carbon steel with **HOLE MASTER**,
› reduce slag adherence,
› quality maintained through optimized life time and wear compensation function **CDHC** of plasma components.

Productivity

› Adjustment of the electrical power in relation to the desired speed for each material thickness,
› combining several **NERTAJET HPi** plasma installations,
› combining several speed ranges on the same geometry with the **HPC2 DIGITAL PROCESS** control,
› combining cutting and marking operations,
› automatically managing the adjustment of cutting parameters,
› using the **CYCLE BOOST** and **INSTANT MARKING** functions, thereby reducing the marking and cutting time.

Operating costs

With **NERTAJET HPi** systems, everything contributes to obtaining an economical cutting price:

› extended life time for wear parts,
› low gas consumption unlike a laser,
› high cutting speed associated with the advanced **CYCLE BOOST** and **INSTANT MARKING** functions,
› cutting with several **NERTAJET HPi** plasma systems *(e.g. dual torch)*.

The NERTAJET HPi system consists of:

HPi plasma cutting...

...and plasma marking...

Digital Process HPC2 control interface

BRGi gas & BRTi torch connection box

THDi digital TH (tool-holder)

CPM400 Black or CPM600wi torch head-piece

Its sturdy design, together with its intelligent and intuitive HPC2 control system make it a tool ideally suitable for a number of industrial segments such as boiler making, metalwork, TP or agricultural engine manufacturers and contractor cutters.

High Plasma HP current power source

TeacHPi autonomous console for retrofit

FRIOJET cooling unit

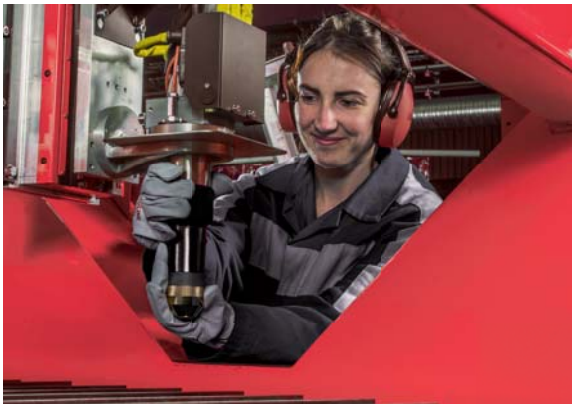
Here are the plasma torch heads used with NERTAJET HPi:

CPM400 Black: for HP dry cutting on steel, stainless steel and aluminium up to 400A @ 100%.

CPM600wi: for HP cutting based on a water vortex process above or below water for stainless steel and aluminium up to 600A @ 100%.

"Easy Wear Parts Storage" dispenser:
For a simplified management of wear parts giving an accurate indication of your stock levels. This visual storage tool also reduces any risk of assembly errors of wear parts.

The torch heads are mounted onto the HPi connector harness:
Quick and easy assembly saving time and making wear parts easier to change.



NERTAJET HPi

The **NERTAJET HPi** system consists of sturdy elements perfectly integrated on Lincoln Electric's cutting machine range: **OXYTOME**, **PLASMATOME**, **ALPHATOME**... They implement various advanced functions that increase the quality of cuts whilst optimising operating costs.

HPC2 digital process

Numerical control fitted on a number of Lincoln Electric machines. Managing the whole of the cutting machine: from the trajectory to the process. Making a user-friendly and easy to use make it a unique tool acclaimed on the thermal plasma cutting market.

How does the automatic adjustment of processes work on HPC2 DIGITAL PROCESS?

Phase 1:

After selecting the program, the operator chooses the material to be cut.

Phase 2:

HPC2 provides one or more solutions adapted to the application.

Phase 3:

After accepting the proposal, the setting of each parameter is done automatically.

Phase 4:

When the tool (plasma torch or oxyfuel torch) is equipped with consumables recommended, the machine is ready to cut.

Fitted with the @-SERVICES option by Lincoln Electric, HPC2 is connected to our support service. You can also quickly benefit from advice on processes, further training or support to solve issues.

TeacHPi

Its autonomous interface is used to control the HPi plasma system, with it's cycle box. They are interconnectable with a wide variety of machines, robotized systems or mechanizations.

THDi

Digital tool-holder fitted with a magnetic 'choc' torque and advanced "intelligent" functions.

Its features:

- Available stroke 160 or 350 mm.
- Maximum shifting speed: 15 m/min.
- Adjust the tension to constantly keep the torch at the same height despite the flatness defects of the sheet metal and ensure optimum cutting quality.
- Accurate and rigid guiding through its tracks with bearings.
- Magnetic 'choc' torch with a wide range. Manual control of the upward/downward movement located on the THDi tool holder is used to easily release the torch after a shock.

- **CYCLE BOOST** function, which is used to increase the productivity of your machine.
- **CDHC** function: automatic wear compensation for wear parts, which allows for greater cutting quality throughout your production.
- **TOUCH & GO** function: this is used to detect the sheet metal during the striking phases or avoid an obstacle during the cut limiting stops in production (tipped piece, large-sized slag...).

BRGi & BRTi

Automatic management boards managing the energies and fluids of the plasma torch.

They act dynamically on the following:

- Automatic gas selection and regulation according to the selected material and thickness.
- Plasma arc striking.
- Optimisation of wear parts' life time.
- The **INSTANT MARKING** function used to instantly switch from marking to plasma cutting or vice versa.
- The **TWIN DETECT** function. It is used to change the detection mode to adapt to the most difficult cutting, supporting such as highly oxidised sheet metal, sheet metal with plastic film, tilted or convex surfaces,...

- The **SOFT PIERCING** function. NERTAJET HPi's piercing cycle is designed to limit spatter and thereby reduce pollution and clogging of the various elements of the cutting machine, such as its guides, numerical control...
- The **SOFT IGNITION** function. The pilot arch striking with argon gas significantly reduces electromagnetic pollution. This makes it easier to incorporate the HPi system into technological upgrades.

The NERTAJET HPi current power sources and the FRIOJET cooling units

NERTAJET HPi comes with various power values: 150 A, 300 A, 450 A and 600 A.

The power combinations are obtained by using one or several HP150 and HP300 HIGH PLASMA power sources.

For each power value, the size FRIOJET cooling unit is specifically designed to obtain the optimum cooling of the torch offering a 100% duty factor.

The power sources and cooling units are separated to make maintenance work easier, namely filling up FRIOJET with the heat-transfer liquid FREEZCOOL GREEN -5 °C or RED -35 °C.

NERTAJET power sources have been acclaimed for their reliability and performance for over 40 years.

NERTAJET HPi

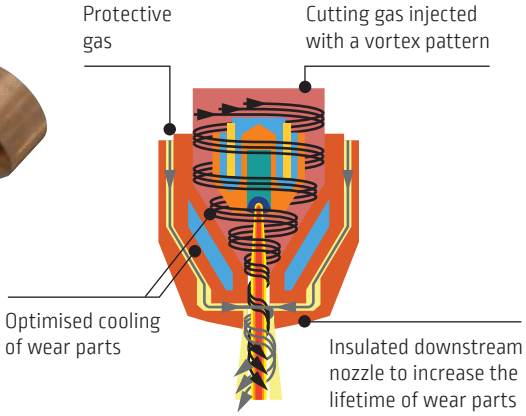
The torch head technology.

Dry plasma cutting with CPM400 Black

The CPM400 Black torch has been specifically designed to process steels, stainless steel and aluminium with dry HP cuts up to 400A.

Its dual flux technology gives it various advantages:

- Cut with reduced angles.
- Protection of cut faces for greater weldability.
- Longer life time of its wear materials.

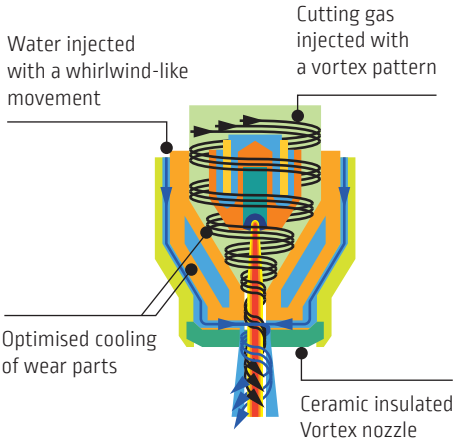


Water vortex plasma cutting with CPM600wi

The CPM600wi torch is designed to process stainless steel and aluminium with HP water vortex cuts up to 600 A.

Its dual water VORTEX flux gives it various advantages:

- Work on water or immersed, thereby reducing inconveniences in terms of noise and light below normal tolerance thresholds.
- Wide operating range: from 1 to 90 mm.
- Cut with reduced angles.
- Protection of cut faces for greater weldability.
- The cutting area affected from a thermal point of view and deformation of the pieces is considerable reduced.
- The cost for use on stainless steel or aluminium is extremely competitive: good cutting speed, cost of fluids, life time of wear parts, even very powerful ones...

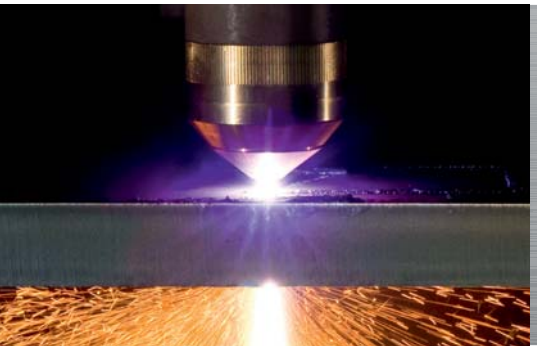


The CPM400 Black and CPM600wi heads are manufactured by following strict procedures used to obtain extreme reliability and sturdiness.

HOLE MASTER technology

Lincoln Electric constantly offers its clients the best plasma cutting technology. After identifying that cutting holes with a small diameter is a major issue in a number of operating sectors, Lincoln Electric responded to these expectations with the **HOLE MASTER** technology.

Based on the latest-generation **NERTAJET HPi** plasma system and an efficient management of parameters, the **HOLE MASTER** technology lets you achieve higher quality levels in terms of making holes in carbon and low-alloy steels where the diameter/thickness of the sheet metal is close to 1.



Advanced functions on **NERTAJET HPi** let you optimise your production costs and increase cutting quality: **CDHC**, **INSTANT MARKING**, **CYCLE BOOST** and **TWIN DETECT**.

Digital Compensation of the Cutting Height - CDHC function

It is very important to keep the torch at the same height (arc length) to have an optimum cutting quality. Conventional height-adjustment systems operate well when wear parts are new, but become less efficient as they become worn out: the torch moves closer as the cuts are performed on the sheet metal.

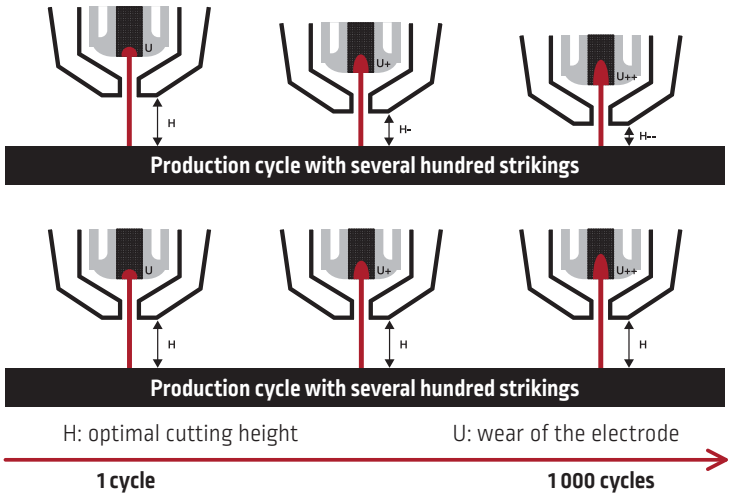
On **NERTAJET HPi**, thanks to the **CDHC** function, there is a constant cutting height, regardless of the wear of wear parts.
This extends the cutting quality of the pieces across production.

Without CDHC

The torch moves down. The cutting angle and state of the surface are affected over the course of production.

With CDHC

The cutting height remains constant. The cutting quality is extended over the course of production.



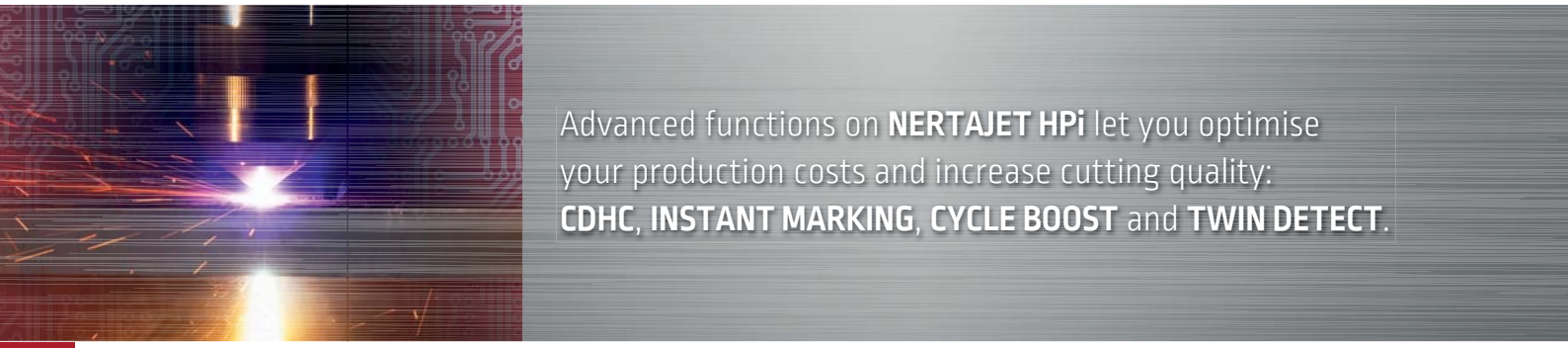
TWIN DETECT function

There are two sheet metal detection cycles on NERTAJET HPi:

- **A cycle with acquisition via an electric contact of the sheet metal with the end of the torch's head**: precision, repeatability and productivity.
- **A cycle with detection via a pilot arc with argon gas**: suitable for all difficult circumstances (plastic film, paper labels, thick oxide layer, etc.).
  The torch looks for the sheet metal with its blown pilot arc.
  The power of the arc breaks the isolating layer without applying a mechanical constraint on the sheet metal and transferring the cut.

The operator can switch from one mode to the other by just switching the HPC's button and thereby quickly adapt to the operating support.

NERTAJET HPi



Advanced functions on **NERTAJET HPi** let you optimise your production costs and increase cutting quality: **CDHC**, **INSTANT MARKING**, **CYCLE BOOST** and **TWIN DETECT**.

INSTANT MARKING function

There are a number of plasma marking steps for the purposes of identification or tracking in the thermal cutting industry. Lincoln Electric provides an innovation with the instant switching function of the INSTANT MARKING process.

INSTANT MARKING is used to save time on:

- **Purge time**: it is performed instantly during the transition from one process to the other (Marking/Cutting or Cutting/Marking).
- **The tool path**: the cutting and marking steps are carried out subsequently on each piece with no superfluous back and forth movement, thereby reducing wear on the machine's drive system.
- **Unloading pieces**: as the marking and cutting are carried on subsequently for each piece, this means they can be unloaded without waiting for the end of the nesting process.

INSTANT MARKING also provides the chance to automatically change the marking quality in relation to the kind of layout to create:

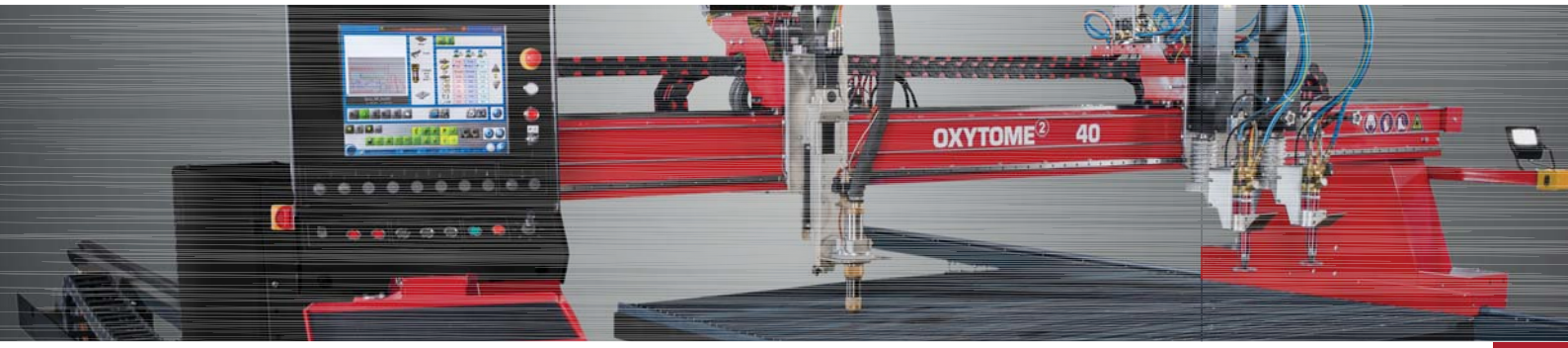
- Accurate and deep marking to identify the pieces.
- Quick and fine marking for the traces (folding steps for instance...)

CYCLE BOOST function

The transitional stages between several plasma cuts are critical for cycle time.

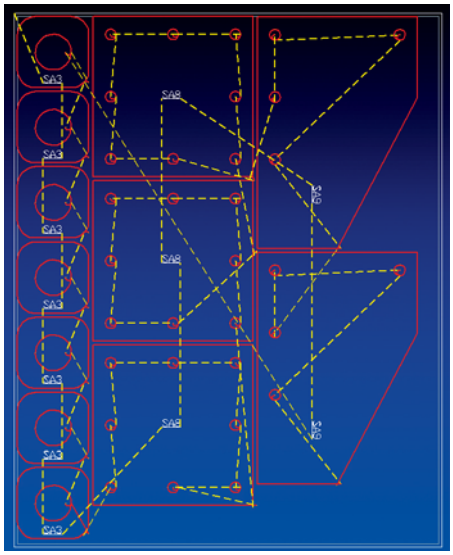
With CYCLE BOOST, NERTAJET HPi considerably reduces production time by acting on:

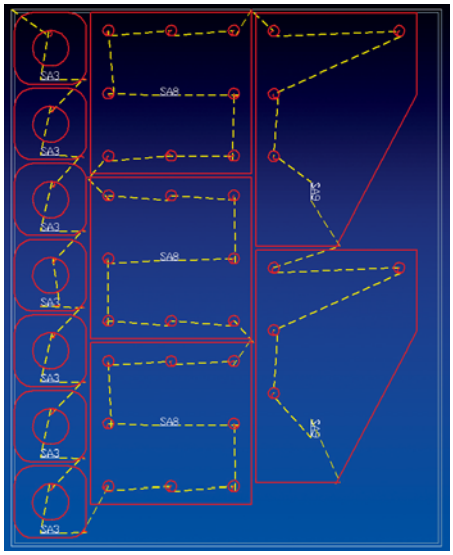
- **The tool-holder speed 15 m/min**: it allows for almost instant positioning and clearing in relation to the sheet metal.
- **The tool-holder withdrawal height**: in relation to the trajectory in-between cuts, the tool positions itself at different heights. In a low position between 2 cuts one after the other or in a high position for greater shifts or the torch might risk reaching an obstacle (a tilted piece for instance).
- **Saving the sheet metal position**: over a series of several cuts one after the other, during the first piecing, the torch detects and saves the position of the sheet metal. The following strikings are performed almost on the fly without a new acquisition phase.
- **The gas purge time**: it is performed in advance during the quick shift of the machine. Therefore, there is no waiting time when the machine reaches the striking point.



Examples of applications using the advanced functions CYCLE BOOST and INSTANT MARKING

› **Example 1:**
Nesting of pieces of various sizes, measuring 10 mm and made of steel, involving plasma marking and cuts.





Thanks to the combined effect of **CYCLE BOOST** and **INSTANT MARKING**, the gain in productivity is estimated to be **30%**.

With **INSTANT MARKING**, the **shift** of the machine is reduced by nearly **20%**.

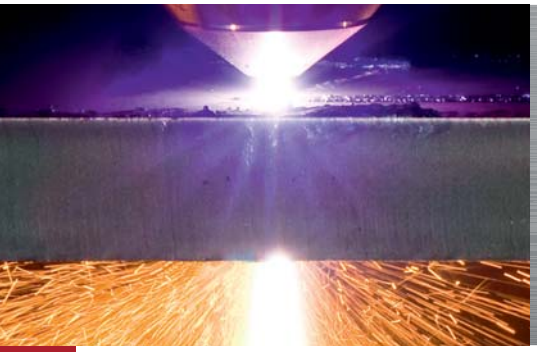
Data	Before NERTAJET HPi		With NERTAJET HPi	
Cutting length	20 847 mm	7 min 11 s	20 847 mm	7 min 11 s
Length of rapid paths	17 947 mm	1 min 11 s	9 758 mm	39 s
Marking length	3 970 mm	1 min 19 s	3 970 mm	1 min 19 s
Number of process changes	1	10 s	24	0 s
Number of strikings	63	5 min 41 s	63	1 min 47 s
Total time	**15 min 32 s**		**10 min 56 s**	

› **Example 2:**
Creation of 8 flanges with a 100 mm diameter and 10 mm thick, made of steel without marking.

Thanks to **CYCLE BOOST**, the gain in productivity is estimated to be **39%**.

Data	Before NERTAJET HPi		With NERTAJET HPi	
Cutting length	5 916 mm	3 min 36 s	5 916 mm	3 min 36 s
Length of rapid paths	2 872 mm	15 s	2 872 mm	15 s
Number of strikings	56	5 min 02 s	56	1 min 35 s
Total time	**8 min 53 s**		**5 min 26 s**	

NERTAJET HPi

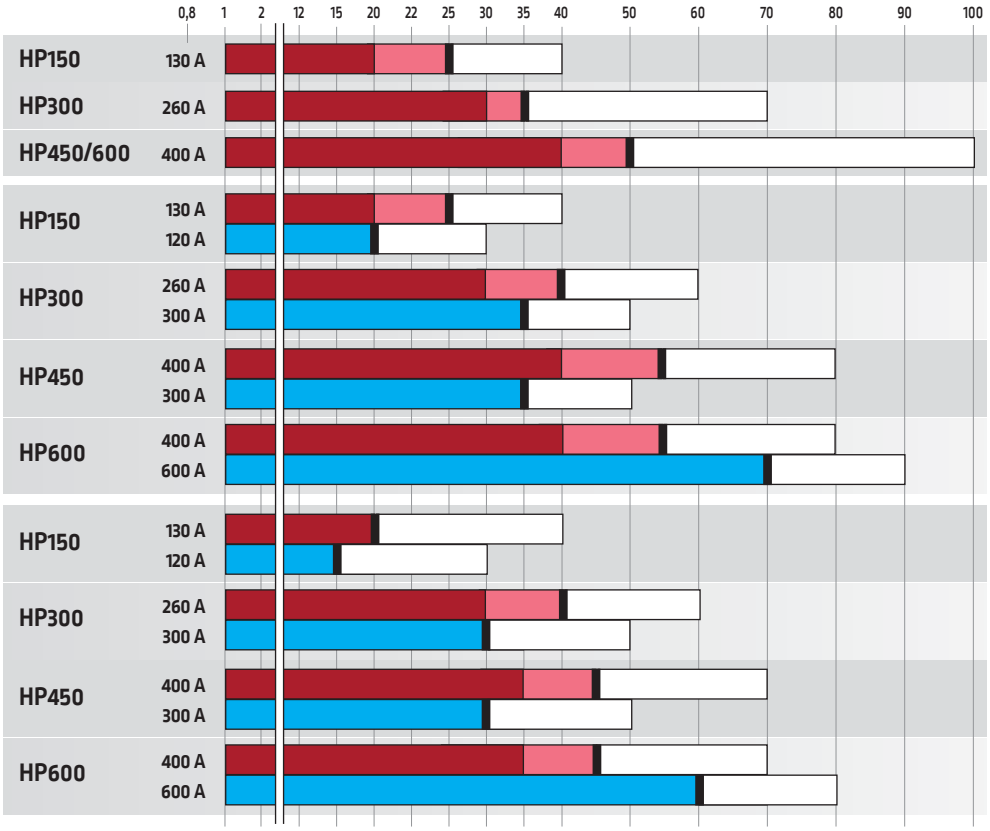


The thickness ranges obtained according to the **torches, power values and processes.**

STEEL

STAINLESS STEEL

ALUMINIUM



Key

- **HPi cut** — With few or no flashes, Full mid-plate striking
- **HPi cut** — With just a few flashes, Full mid-plate striking
- **HPi Water Vortex** — Full mid-plate striking
- Limit of mid-plate piercing
- **Separating cut** — Sheet metal edge striking

Cutting quality level in accordance with ISO 9013:

The ISO 9013 standard applies to the quality of cuts for thermal cutting, especially on corners.

With **HPi** the corner level is:

- On carbon steel less than 30 mm: **range 2/3**
- On stainless steel: **range 2/4**

Indicative values extracted from the ISO 9013 standard:

Thicknesses	Range 2	Range 3	Range 4
10 mm	1,48°	3,43°	6,84°
25 mm	0,78°	1,6°	3,19°

Life time of soft steel:

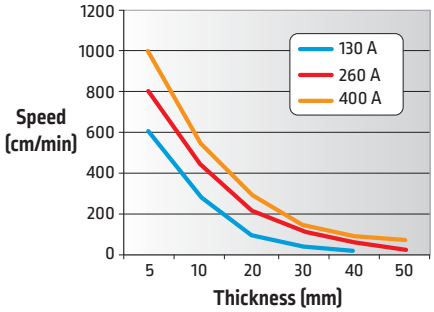
The lifetime of plasma wear parts on soft steel is optimised on **NERTAJET HPi** systems, namely thanks to:

- The quality and control on manufacturing of wear parts.
- The management of the plasma cycle that perfectly synchronises the gas, current and position of the torch.
- The refrigerated system of the FRIOJET cooling system.

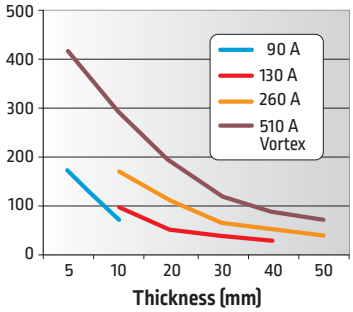
Little wear of wear parts **helps reduce your production costs as well as your environmental impact**.

Indicative performance levels: 80 A: up to 3500 strikings
130 A: up to 1700 strikings
260 A: up to 900 strikings.

Indicative speed values of cuts on carbon steel:



Indicative speed values of cuts on stainless steel:



Processes used: (cutting gas/protection gas)

On carbon steel: O_2/O_2 and O_2/Air

Marking: Ar/Air

On stainless steel and aluminium, dry cutting: N_2/N_2, F_5/N_2 and ArH_2/N_2

Marking: Ar/N_2

On stainless steel and aluminium, cutting over or under water: N_2/Water and N_2H_2/Water

Gas supply pressure: 9,0 bar

Gas required for **soft steel**: **Ar, O_2, Air**

Gas required for **stainless steel**

and **aluminium**: **N_2, ArH_2 (35%), N_2H_2 (5%)**

In the case of **VORTEX**, add **demineralised water** (supply at 4 bar)

CPM400 Black

CPM600wi

Max. flow (l/min)	HP150	HP300	HP450	HP600
Argon (Ar)	7	11	11	11
Oxygen (O_2)	20	28	40	40
Air (N_2O_2)	40	130	130	130
Nitrogen (N_2)	92	110	110	110
Nitrogen/Hydrogen (N_2H_2 - 5%)	17	17	17	17
Argon/Hydrogen (ArH_2 - 35%)	40	49	49	49

Max. flow (l/min)	HP150	HP300	HP450	HP600
Argon (Ar)	25	26	26	30
Nitrogen (N_2)	31	45	45	70
Water	1.5	2	2	2

Power supply	HP150			HP300		
Three-phase power supply (+:- 10%)	230 V	400 V	440 V	230 V	400 V	440 V
Absorbed current	101.2 A	64.3 A	55.2 A	101.2 A	64.3 A	108.7
Cos PHI	0.93	0.85	0.9	0.93	0.85	0.92
Frequency	50/60 Hz					
Duty factor	100% @ 40 °C 150 A - 230 V			100% @ 40 °C 300 A - 230 V		
Protection rating	IP21S					

To calculate the electrical consumption of HP450 or HP600, add the features of HP150 to those of HP300 or multiply by 2 those of HP300.

BEING PRESENT LOCALLY
MAKES US MORE AWARE GLOBALLY

2.6
BILLION USD REVENUE

160
ACTIVE IN 160 COUNTRIES WORLDWIDE

11 000
EMPLOYEES WORLDWIDE

120
YEARS OF EXPERIENCE

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02/2019 - PLDB 12630

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