Nitro V:

NJSB has been supplying AEB-L for a number of years after recognizing its place and history in the knife industry. We are also aware of manufacturers and large scale production custom makers that have also worked with the 14C28N from European suppliers. While looking at our efforts for growth and expanding inventory options, our relationship with our foundry enabled us to consider the potential benefits to a hybrid between these two families of steel, giving way to Nitro-V. By combining fine carbide structure and higher stain resistance, we would be able to offer an affordable high performance steel as an option to more expensive boutique stainless super steels. Likewise, as a proprietary steel to NJSB, we would be able to offer a stable formula for consistent results that customers request--ease to work with, easy to finish, and easy to maintain.

Nitro-V is a high carbon stainless with the addition of nitrogen and vanadium. Vanadium has long been regarded a principle alloying element for hard working steels, from simple tool steels to aerospace parts. By increasing grain refinement and assisting in carbide formation, edges are easier to retain and maintain, whether as a razor, luxury kitchen knife, or tactical folder. Nitrogen has only been an industry staple the past decade, nitrides increase stain resistance by bonding with chromium oxide layers naturally formed during grinding and polishing operations. The chromium and nitrogen oxide combination then allows exposure to more severe environments, specifically and especially wet working conditions such as professional kitchens or off-shore. Together, nitrogen and vanadium bring Nitro-V into a whole new category apart from either predecessor, enabling it to be used in applications and methods previously ill-suited to 14C28N and AEB-L.

Users will find Nitro-V easy to work both annealed and hardened, while offering the most economical use of consumables like belts or easy heat treating comparative to other super stainless steels. Due to its characteristics, Nitro-V is ideal in most stock removal situations such as waterjet or metal bandsaw while annealed, and relatively forgiving when ground fully hardened from blank. Due to the material's properties, swarf is typically large, and removes easily despite its abrasion resistance characteristics. As it is so relatively easy to grind, it also polishes with minimal extra needs or materials, a maker can be assured that hand sanding nitro-V will be no more or less difficult than their standard knife in a carbon or simple stainless steel. We concurrently suggest one of two methods for heat treating with and without cryo, however, its chemistry needs only a minimal subzero treatment to within -98°F to -94°F degrees for a minimum time only as long as needed to soak through and chill the steel. In this fashion, NJSB is proud to say that Nitro-V is not just an economical choice as a material, but affords the maker a steel that is equally low in overhead.

Nitro-V
Hardening : (with Cryo)

****Knives should be cleaned by washing with blue Dawn dish soap to avoid nitrides and then either placed into foil pouch or coated with high temperature anti-scale/decarburization compound prior to heat treat if not using Oxygen free heat treat equipment.
*****Skipping stages such as pre-heating and equalizing or cryo will result in lower hardness, higher

amounts of Retained Austenite (RA), impaired stain resistance or other issues. Ramp AFAP (as fast as possible) between preheating and austenizing temps.
********Clamping flat after quench during cryo or tempering recommended to avoid thermal shock induced warp.
*******Figures represent quenching under positive pressure with aluminum plates and compressed air to at or below 125°F / 50°C**--alternative quenching methods may present lower hardness, high RA, or other issues.

Pre-Heat/Equalizing	Austenizing temperature	Expected Rc (as quenched prior to cryo)
1,500°F / 815°C (hold 15 minutes)	1,900°F / 1037°C Soak 5-10 minutes	63Rc (64 after Cryo)

Cryogenic Treatment:
A cryogenic treatment is recommended to convert retained austenite, and can either be done before or after the first temper cycle.
While liquid nitrogen is preferred, a sub zero bath with dry ice and kerosene will suffice for -100°F / -74°C.
Submerge in sub-zero treatment 1 hour depending on thickness and number of blades.

**A cryogenic treatment can be done immediately done after quench, but it is recommended blades be clamped flat to avoid thermal shock induced warp--cryo treatment should always be followed by a tempering cycle.

Tempering:
Once blade is quenched and near ambient temperature, blades should be tempered accordingly, the times suggested are to ensure even, consistent temperature.
Figures supplied are as representative of industrial standards.
*If using a small toaster oven or household kitchen oven for tempering, using a blade holding rack made from kiln furniture, a roasting tray lined with fine sand, or similar large object will help retain thermal mass to reduce wide swinging temperatures as the device fluctuates trying to maintain temperature.
Note: Final hardness values vary based on initial as-quenched hardness and percentage of conversion to Martensite. Only reliable testing methods, e.g. calibrated Rockwell hardness tester, can provide actual hardness values--hardness calibrated files and chisels are relative testing methods and inaccurate for true hardness value reading.
Temper twice for 2hrs.

Temperature:	Hardness (2 hour x2 guideline):
300°F / 149°C	64
350°F / 177°C	63
400°F / 204°C	62
450°F / 232°C	61
500°F / 260°C	60

600°F / 316°C	58

**Manufacturers warn against tempering at 800°F / 425°C and above as sensitization will result in reduction of toughness and corrosion resistance.

Hardening: (Without Cryo)

****Knives should be cleaned by washing with blue Dawn dish soap to avoid nitrides and then either placed into foil pouch or coated with high temperature anti-scale/decarburization compound prior to heat treat if not using Oxygen free heat treat equipment.
*****Skipping stages such as pre-heating and equalizing will result in lower hardness, higher amounts of Retained Austenite (RA), impaired stain resistance or other issues. Ramp AFAP (as fast as possible) between preheating and austenizing temps.
******Clamping flat after quench during tempering recommended to avoid thermal shock induced warp.
*******Figures represent quenching under positive pressure with aluminum plates and compressed air to at or below 125°F / 50°C**--alternative quenching methods may present lower hardness, high RA, or other issues.

Pre-Heat/Equalizing	Austenizing temperature	Expected Rc (as quenched prior to cryo)
1,725°F / 940°C (hold 20 minutes)	1,900°F / 1037°C Soak 15 minutes	62Rc

Tempering:
Once blade is quenched and near ambient temperature, blades should be tempered accordingly, the times suggested are to ensure even, consistent temperature.
Figures supplied are as representative of industrial standards.
*If using a small toaster oven or household kitchen oven for tempering, using a blade holding rack made from kiln furniture, a roasting tray lined with fine sand, or similar large object will help retain thermal mass to reduce wide swinging temperatures as the device fluctuates trying to maintain temperature.
Note: Final hardness values vary based on initial as-quenched hardness and percentage of conversion to Martensite. Only reliable testing methods, e.g. calibrated Rockwell hardness tester, can provide actual hardness values--hardness calibrated files and chisels are relative testing methods and inaccurate for true hardness value reading.
Temper twice for 2hrs.

Temperature:	Hardness (2 hour x2 guideline):
300°F / 149°C	62
350°F / 177°C	60
400°F / 204°C	58
450°F / 232°C	56