JACQUES ALLEMANN
NOTZ group advanced metal solutions

1.4452 P2000

		EN-Norm	AFNOR	AISI	DIN
Description	**X13CrMnMoN18**	-	-	-	1.4452

Chemical composition

Fe	C	Mn	Cr	N	Mo	Nb	Ni
Bal.	≤ 0.15	12.0-16.0	16.0-20.	0.75-1.00	2.5-4.2	≤ 0.25	nickel free

Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precisely than the composition indicated.

Typical uses

Pressurised austenites have very high corrosion resistance and exceptional toughness and strength. Tensile strengths of well over 2000 N/mm^2 can be realised through appropriate cold forming. This fact opens up the entire range of applications for this group of materials, from classic spring applications to highly specialised springs in the medical and watchmaking sectors. The addition of nitrogen in the DESU process (pressure electroslag remelting process) beyond the solubility limit is the special feature of these steels. The nitrogen stabilises the austenite structure and increases the strength without reducing the toughness. Corrosion resistance is also increased. The P2000 or 1.4452 is work-hardened according to customer requirements and can therefore be used for a wide variety of applications. Typical areas of application are in the chemical and pharmaceutical industries. However, 1.4452 is also becoming increasingly popular in medical technology and the traditional watchmaking industry. For many applications, 1.4452 is on a par with or even more suitable than Nivaflex material. 1.4452 cannot be magnetised in the work-hardened state and is extremely wear-resistant. The high final strength in combination with the degree of purity achieved by DESU enables excellent polishing results with high resistance to mechanical damage. High nitrogen alloyed austenites are ideal for parts subject to corrosion where high toughness and strength are required at the same time or as a nickel-free spring material alternative to Nivaflex 45/5 or Nivaflex 45/18 in the watch and medical industry.

Dimensions

Products	Ø [mm]	Dimension (mm)	Length (mm)
Wire	0.020 – 4.000		
Bar	0.150 – 4.000		1000 – 4500
Profile rods		0.500 – 6.000	1000 - 4500
Axles	0.150 – 4.000		
Flat wire		0.500 – 6.000	
Profil wire		0.500 – 6.000	

Technical characteristics

Typical application

- Chemistry and pharmaceutical technology
- Medical technology and the watch industry
- Instruments, especially endoscopes
- Springs and spring elements for jewellery / watches

Mechanical characterisics Tensile strengths of over 2400MPa can be achieved.

Heat Treatment

Solution annealing	Solution heat treatment of the nitrogen-alloyed austenites is carried out at 1100°C. They should then be cooled as quickly as possible, preferably by quenching in water.
Stress-relief annealing	Stress-relief annealing may be carried out without hesitation up to a temperature range of 400°C.
Work hardening	Like other austenites, nitrogen-enriched grades are also brought to the desired final strength by work hardening. Depending on the degree of forming, high final strengths can be achieved (see diagram). Due to the enormous hardening potential, the required forming parameters must be checked in advance for technical feasibility.
Tempering resistance	As the austenites are adjusted to their final strength by cold forming, long-term exposure to elevated temperatures has a detrimental effect on strength. However, no reduction in strength is to be expected at temperatures <100°C.
Low temperature suitability	Due to the unusual alloy structure with a high nitrogen content, these materials exhibit superior toughness properties even at low temperatures. The transition temperatures (FATT) for this material group are around -100°C.

Note

All information provided in this data sheet is based on best knowledge and the latest state of technology, but without guarantee. The use of materials should always be discussed with our sales specialists or materials laboratory on a product- and application-specific basis.

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