

The following stainless steel grade must be used for **bakeable** CF flanges and for CF flanges **for use at cryogenic temperatures**, respectively:

1.4429	X2CrNiMoN17-13-3	316LN	
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Quality: **forged ESR (EFR)**

The material must be non-porous and free of any cavities or gas inclusions. Prior to the final mechanical treatment the material has to be vacuum-fired (see Technical Guideline F-TG-V-2.5e).

For rotatable outer flanges following stainless steel grades with similar proved properties can be used:

1.4404	X2CrNiMo17-12-2	316L	
1.4435	X2CrNiMo18-14-3	316L	
1.4541	X6CrNiTi18-10	321	must not be vacuum-fired at 950°C, may only be vacuum-fired at max 600°C

**Chemical composition of 1.4429**

Element	Chemical composition in % by mass
Cr	16.00 – 18.50 *
Ni	12.00 – 14.00 *
C	0.030 max.
Si	1.00 max.
Mn	2.00 max.
Mo	2.00 – 3.00 *
N	0.14 – 0.20 *
P	0.030 max. *
S	0.010 max. *
Fe	Remainder

\* According to CERN Technical Specification N° 1001 – Ed. 5, 2013-12-11, Stainless steel forged blanks for ultra-high vacuum applications, 1.4429, X2CrNiMoN17-13-3, AISI 316LN

**Material properties of 1.4429 at room temperature after solution annealing**

Tensile strength	$R_m$ @ RT	min.	600 N / mm <sup>2</sup>
Yield stress	$R_p$ 0.2% @ RT	min.	300 N / mm <sup>2</sup>
Elongation at break	A5 @ RT	min.	35%
Brinell hardness	HB		150 – 190

A (DIN) EN 10204 certification (type 3.1 inspection certificate) is demanded as part of the documentation. The documentation must contain the following:

- **Chemical composition**
- **Inspection and checking of dimensions**
- **Intergranular corrosion test**
- **Hardness test**
- **Ultrasonic testing** or alternatively **Eddy current testing** according to ISO 15549
- **Measurement of relative magnetic permeability**

ESR = Electroslag remelting, or EFR = Electroflux remelting

ESR quality: Electroslag remelting process for improvement of microstructure and purity

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