

# Electrodes for non- and low alloyed steels



**NST E-6013**  
**NST E-7016**  
**NST E-7018**  
**NST E-7024**  
**NST 7016S**  
**NSSW 16V**  
**NSSW TW-50**

# Electrodes.



## Storage and re-drying.

### **Storage**

Coated electrodes should be stored in it's original packaging/ container until use.  
The withdrawal of electrode packages from stock should be based on the "first-in / first-out" principle.

In order to prevent humidity-induced damage, the electrodes should be stored under climatically controlled conditions with ideal temperatures between 17 and 25°C and a maximum relative air humidity of 60%.

Recommended maximum storage time is 3 years.

### **Re-drying**

Electrodes needs re-drying before use.  
The recommended temperature and period of time are indicated on the electrode packaging labels and technical specification.

Electrodes in vacuum-packed or sealed containers does not need re-drying provided the original packaging seal is unbroken.

No special storage climate control is necessary for these electrodes.

Electrodes exhibiting poor arc-stability, heavy spatter or slag removal difficulties have probably been damaged by moisture pick-up.

In these cases good welding properties can only be restored by re-drying.

It is recommended that the re-drying process takes place immediately prior to welding.  
For basic coated and high alloyed electrodes it is recommended using heated electrode quivers during welding.

# NST E 6013

AWS: A5.1 E 6013

EN ISO 2560-A: E 42 0 1RC 11



## Rutile all round electrode for welding low and unalloyed steels.

### General description:

NST E 6013, is a thick coated rutile-cellulose type electrode for welding low and unalloyed steels. Suitable for welding constructions, maintenance and repairing purposes. Excellent welding properties in all welding positions.

### Welding positions:



### Welding current:

DC+/-/AC

### Redrying:

140 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S					
0,08	0,45	0,65	<0,035	<0,035					

### Diffusible hydrogen content (ml/100g):

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) 0 °C	
≥420	500-640	≥22	≥47	

### Guidance - Ampere (DC+/-/AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	60-85	90-135	130-170

### Packaging information:

2,0 x 300 2,0kg pack, carton 12,0kg  
2,5 x 350 2,0kg pack, carton 12,0kg  
3,2 x 350 2,0kg pack, carton 12,0kg  
4,0 x 350 2,0kg pack, carton 12,0kg

### Approvals:

TÜV, CE

### Reference / date:

NST E 6013, English,  
28.01.2016.

Perfect Welding

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# NST E 7016

AWS: A5.1 E 7016

EN ISO 2560-A: E 42 4 B 12 H10



## All round rutile-basic electrode for welding unalloyed steels.

### General description:

NST E 7016, is a double coated, basic CTOD-tested electrode with excellent welding properties suitable for welding in difficult positions, with the exception of vertical down (PG).

It has a stable welding arc even at low current settings. Ignites and re-ignites easily.

Very suitable for welding root-runs with DC and AC currents.

### New!

This product is now available in a premium vacuum-packed version, with smart 2-in-1 packaging.

VacuumPack SuperDry 2-in-1

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

380 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S					
0,05	0,65	1,00	<0,035	<0,035					

### Diffusible hydrogen content (ml/100g):

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) -40 °C	
≥420	500-640	≥22	≥47	

### Guidance - Ampere (DC+ /AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	60-90	90-140	140-190

### Packaging information:

2,0 x 300 2,0kg pack , carton 12,0kg  
2,5 x 350 2,0kg pack , carton 12,0kg  
3,2 x 450 2,4kg pack , carton 14,4kg  
4,0 x 450 2,6kg pack , carton 15,6kg  
Vacuum pack: 2,5 x 350 1,8kg(2 x 0,9kg) pack, carton 16,2kg  
Vacuum pack: 3,2 x 350 1,6kg(2 x 0,8kg) pack, carton 16,2kg  
Vacuum pack: 3,2 x 450 2,0kg(2 x 1,0kg) pack, carton 16,2kg  
Vacuum pack: 4,0 x 450 1,2kg(2 x 0,6kg) pack, carton 16,2kg

### Approvals:

DNVGL, TÜV, CE

### Reference / date:

NST E 7016,  
English, 24.10.2017.

Perfect Welding

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# NST E 7018

AWS: A5.1 E7018

EN ISO 2560-A: E 42 4 B 32 H5



## Basic electrode for welding unalloyed and fine grained steels.

### General description:

NST E 7018 is a basic, CTOD tested electrode with excellent welding characteristics, recommended for welding structural steels and steel castings with tensile strength up to 610 N/mm<sup>2</sup>, and fine grained steels with increased yield strength.

Weld metal Deposits have a very low hydrogen content (HD < 5 ml/100 g).

Excellent welding properties in difficult positions, except vertical down (PG).

Efficiency of approximately 120%.

### New!

This product is now available in a premium vacuum-packed version, with smart 2-in-1 packaging.

VacuumPack SuperDry 2-in-1

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

400 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S					
0,07	0,60	1,00	<0,035	<0,035	66				

### Diffusible hydrogen content (ml/100g):

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) -40 °C	
≥420	500-640	≥22	≥47	

### Guidance - Ampere (DC+ /AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	65-90	110-140	140-180

### Packaging information:

2,0 x 300 1,8kg pack ,carton 10,8kg  
 2,5 x 350 2,0kg pack ,carton 12,0kg  
 3,2 x 450 2,4kg pack ,carton 14,4kg  
 4,0 x 450 2,7kg pack, carton 16,2kg  
 5,0 x 450 2,7kg pack, carton 16,2kg  
 Vacuum pack: 2,5 x 350 2,0kg(2 x 1kg) pack, carton 18kg  
 Vacuum pack: 3,2 x 350 1,6kg(2 x 0,8kg) pack, carton 16kg  
 Vacuum pack: 3,2 x 450 2,2kg(2 x 1,1kg) pack, carton 22kg  
 Vacuum pack: 4,0 x 450 1,4kg(2 x 0,7kg) pack, carton 14kg

### Approvals:

DNVGL, TÜV, CE

### Reference / date:

NST E 7018,  
 English, 24.10.2017.

Perfect Welding

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# NST E 7024

AWS: A5.1 E7024

EN ISO 2560-A: E 42 0 RR 74



## Rutile high efficiency electrode for welding unalloyed steel.

### General description:

NST E 7024 is a high efficiency, rutile electrode for high productivity welding in heavy fabrications and ordinary structural steels, exhibiting excellent welding properties.

Very good choice for vertical fillet welding.

Tensile strength up to 510 N/mm<sup>2</sup> and approximately 200% efficiency.

### Welding positions:



### Welding current:

DC-/AC

### Redrying:

250 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S				
0,08	0,30	0,75	<0,035	<0,035				

### Diffusible hydrogen content (ml/100g):

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) 0 °C	
≥420	500-640	≥22	≥47	

### Guidance - Ampere (DC-/AC):

Electrode diameter	3,2 mm	4,0 mm	5,0 mm
Ampere / Volt	130-180	180-220	240-290

### Packaging information:

3,2 x 450 2,5kg pack, carton 15,0kg

4,0 x 450 2,5kg pack, carton 15,0kg

5,0 x 450 2,5kg pack, carton 15,0kg

### Approvals:

DNV, CE

### Reference / date:

NST E 7024,  
English, 28.01.2016.

Perfect Welding

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# NST 7016 S

AWS: SFA5.1 E 7016

EN 499: E 38 2 B 12 H10

DIN 1912 E 51 43 B R 10



## Basic electrode for low and unalloyed steels of up to 600N/mm<sup>2</sup>.

### General description:

NST 7016 S is a multi-purpose electrode suitable for assembly work, workshop and repair welding. Smooth and clean welds which blend into base metal reducing the chances of undercut. Excellent gap bridging properties. Due to its double covering, the electrode has a stable and concentrated arc and is therefore ideally suited for root pass and positional welding.

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

330 °C/2 hours.

### Typical chemical composition of all-weld-metal:

C	Si	Mn						
0,06	0,70	0,90						

### Diffusible hydrogen content (ml/100g):

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) -20 °C	
≥380	470-600	≥20	≥100	

### Guidance - Ampere (DC+ /AC):

2,0 mm	2,5 mm	3,2 mm	4,0 mm
55-65 A	60-90 A	90-150 A	140-190 A

### Packaging information:

2,0 x 300 2,0kg pack , carton 12,0kg  
2,5 x 350 2,0kg pack , carton 12,0kg  
3,2 x 450 2,4kg pack , carton 14,4kg  
4,0 x 450 2,6kg pack , carton 15,6kg

### Approvals:

VdTÜV, CE

### Reference / date:

NST 7016 S,  
English, 28.01.2016.

Perfect Welding

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# NSSW 16V

AWS: A5.1: E7048



## Basic electrode for welding unalloyed steels in the vertical downward(PG) position.

### General description:

NSSW (Nittetsu) 16V is a low hydrogen type electrode designed especially for vertical down butt and fillet welding.

Welding efficiency is twice as high as vertical up welding since a high current is used.

Deposited metal shows high crack resistance and excellent mechanical properties and therefore is applicable for various types of steel.

Easy slag removal.

Also suitable for tack welding, and welding over using the MIG/MAG process.

### Welding positions:



### Welding current:

AC/DC+

### Redrying:

300 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S					
0,08	0,53	0,84	0,014	0,011					

### Diffusible hydrogen content (ml/100g):

### Typical mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) -20 °C	Charpy V (J) 0 °C
440	540	33	158	170

### Guidance - Ampere (AC/DC+):

Electrode diameter	3,2 mm	4,0 mm	
Ampere / Volt	100-150	160-210	

### Packaging information:

3,2 x 400mm pr. pack 5,0kg, pr. carton 20,0kg  
4,0 x 450mm pr. pack 5,0kg, pr. carton 20,0kg

### Approvals:

ABS, LR, CE

### Reference / date:

NSSW 16V,  
English, 28.01.2016.

Perfect Welding

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# NSSW TW-50

AWS: A5.1: E7048



## Basic low hydrogen electrode for tack welding unalloyed steels.

### General description:

NSSW (Nittetsu) TW-50 is a low hydrogen type electrode for tack welding in all positions of mild steels and 490 N/mm<sup>2</sup> high tensile strength steels for ships, structures and bridges.

Crack resistance, slag removal and resistance to moisture absorption are excellent.

Ignites and re-ignites easily.

Vertical downward welding is easy and assures high efficiency using the same current as flat position.

The weld deposit is suitable to be welded over by a mechanised or manual MIG/MAG process.

### Welding positions:



### Welding current:

AC/DC+

### Redrying:

300 °C/1 hour

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S					
0,08	0,45	1,02	0,010	0,007					

### Diffusible hydrogen content (ml/100g):

### Typical mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) -20 °C	Charpy V (J) 0 °C
460	530	32	126	160

### Guidance - Ampere (AC/DC+):

Electrode diameter	3,2 mm	4,0 mm	5,0 mm
Ampere / Volt	110-170	140-230	200-290

### Packaging information:

3,2 x 350mm pr. pack 5,0kg, pr. carton 20,0kg  
4,0 x 400mm pr. pack 5,0kg, pr. carton 20,0kg  
5,0 x 450mm pr. pack 5,0kg, pr. carton 20,0kg

### Approvals:

ABS, LR, DNVGL, CE

### Reference / date:

NSSW TW-50,  
English, 28.01.2016.

Perfect Welding

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## Electrodes for high alloyed steels



**NST E-309L**

**NST E-316L**

**NST E-309MoL**

# NST E 309L

AWS: A5.4 E 309L-17

EN 1600: E 23 12 LR 32



## Rutile low carbon electrode for welding heat resistant steels.

### General description:

NST E 309L is a rutile, low carbon electrode for welding analogous, heat resistant steels and steel castings. Scaling resistant up to 1000 °C. Suitable for joining dissimilar steels (unalloyed steels with stainless steels), welding steam boiler constructions, hardening plants, crude oil and ceramics industries. Also suitable for buffer layers. Excellent welding properties in all welding positions, except vertical down ward (PG).

### New!

This product will soon be available in a premium 2-in-1 vacuum-packed version.

VacuumPack SuperDry 2-in-1

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

300 °C/2 hours

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S	Cr	Ni			
0,04	0,90	0,70	<0,035	<0,025	23,0	13,0			

### Ferrite content:

FN $\approx$ 15

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) +20 °C	
$\geq$ 320	550-650	$\geq$ 30	$\geq$ 47	

### Guidance - Ampere (DC+/AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	40-80	70-100	110-160

### Packaging information:

2,0 x 250 1,75kg pack, carton 10,2kg  
2,5 x 300 2,00kg pack, carton 10,2kg  
3,2 x 350 2,25kg pack, carton 12,6kg  
4,0 x 350 2,25kg pack, carton 13,2kg

### Approvals:

CE

### Reference / date:

NST E 309L,  
English, 28.01.2016.

Perfect Welding

www.nst.no

# NST E 316L

AWS: A5.4 E 316L-17

EN 1600: E 19 12 3 LR 12



## Rutile electrode for welding stainless 316 steels.

### General description:

NST E 316L is an austenitic rutile, low carbon electrode for welding non-stabilised and stabilised stainless steels. Resistant to inter-granular corrosion up to 350 °C, resistant to oxidation up to 800°C, and good low-temperature ductility down to -120°C. Excellent welding properties in all welding positions, except vertical down (PG). Also suitable for 304 steels.

### New!

This product is now available in a premium vacuum-packed version, with smart 2-in-1 packaging.

VacuumPack SuperDry 2-in-1

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

300 °C/2 hours

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S	Cr	Ni	Mo		
≤0,03	0,80	0,70	<0,030	<0,025	18,5	11,5	2,7		

### Ferrite content:

FN≈8

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) +20 °C
≥320	≥510	≥30	≥47

### Guidance - Ampere (DC+/AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	50-85	70-125	110-165

### Packaging information:

2,0 x 300 1,75kg pack, carton 10,2kg  
2,5 x 350 2,00kg pack, carton 10,2kg  
3,2 x 450 2,20kg pack, carton 12,6kg  
4,0 x 450 2,20kg pack, carton 13,2kg  
Vacuum pack: 2,5 x 300 1,6kg(2 x 0,8kg) pack, carton 14,4kg  
Vacuum pack: 3,2 x 350 1,6kg(2 x 0,8kg) pack, carton 16,0kg  
Vacuum pack: 4,0 x 350 1,0kg(2 x 0,5kg) pack, carton 10,0kg

### Approvals:

TÜV, CE

### Reference / date:

NST E 316L,  
English, 12.10.2017.

Perfect Welding

www.nst.no

# NST E 309MoL

AWS: A5.4 ≈E 309MoL-17

EN 1600: E 23 12 2 LR 32



## Rutile low carbon molybdenum electrode for welding heat resistant steels.

### General description:

NST E 309MoL is a rutile, low carbon electrode for welding analogous, heat resistant steels and steel castings. Scaling resistant up to 1000 °C. Suitable for joining dissimilar steels (unalloyed steels with stainless steels), welding steam boiler constructions, hardening plants, crude oil and ceramics industries. Also suitable for buffer layers. Excellent welding properties in all welding positions, except vertical down (PG).

### New!

This product will soon be available in a premium 2-in-1 vacuum-packed version.

VacuumPack SuperDry 2-in-1

### Welding positions:



### Welding current:

DC+/AC

### Redrying:

300 °C/2 hours

### Typical chemical composition of all-weld-metal:

C	Si	Mn	P	S	Cr	Ni	Mo		
0,04	0,80	0,60	<0,030	<0,025	23,0	13,0	3,0		

### Ferrite content:

FN≈20

### Mechanical properties of all-weld-metal:

Yield and Tensile Strengths			Charpy Impact Test	
Yield Mpa	Tensile Mpa	Elongation %	Charpy V (J) +20 °C	
≥350	≥550	≥25	≥47	

### Guidance - Ampere (DC+/AC):

Electrode diameter	2,5 mm	3,2 mm	4,0 mm
Ampere / Volt	40-80	70-100	110-160

### Packaging information:

2,0 x 250 1,75kg pack, carton 10,2kg  
2,5 x 300 2,00kg pack, carton 10,2kg  
3,2 x 350 2,25kg pack, carton 12,6kg  
4,0 x 350 2,25kg pack, carton 13,2kg

### Approvals:

TÜV, CE

### Reference / date:

NST E 309MoL,  
English, 28.01.2016.

Perfect Welding

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