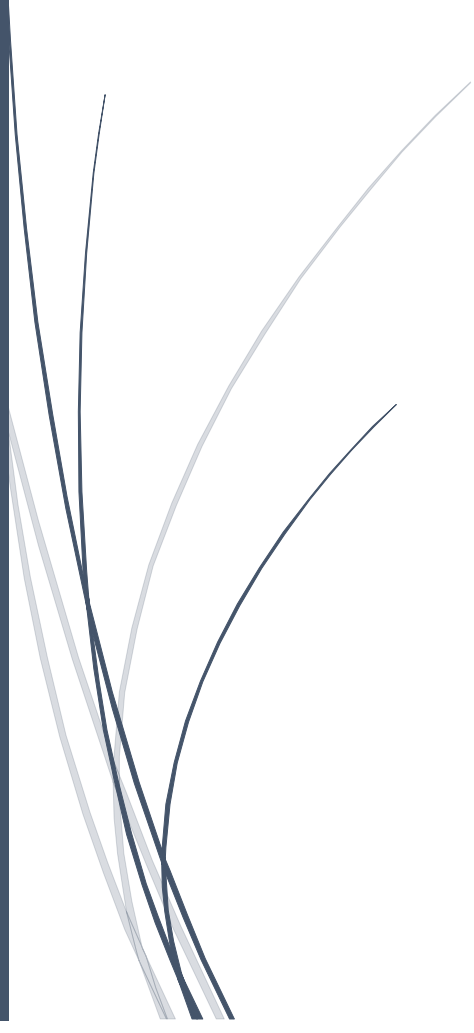
TARAZ NIR ADAK

EARTHING AND LIGHTNING PROTECTION



WWW.TARAZNIR .COM

Contents

Introduction of Taraz Nir Adak Company:

Taraz Nir Adak Company was established in 2018 for working in the electricity industry as a designer, manufacturer and executor Contractor. For this purpose, we selected our colleagues from among the experts in this field and started working. The main field of the company are lightning protection, earthing and protection against transient overvoltage's, but due to the company's capacity in other field such as transmission and distribution systems, power plant projects and distributed generation, electrical installations are also active. We have. The policy of the company is to translate and use the latest world standards in related projects and to publish these documents in the engineering community.

In 2020, using the latest world standards, we started to update the production method and succeeded in obtaining approval and test certificates in reputable domestic laboratories. The range of products of this company is focused on lightning protection systems and earthing and cabling equipment (trays, cable ladders, conduits, etc.).

Also, this company, by obtaining the necessary licenses from the Technical Protection and Safety Services Research Center of the Department of Labor, has been operating as a technical protection and safety services consultant in the field of electrical safety. It is also possible to issue a certificate of electrical safety of the Department of Labor.

Cooperation with commercial companies as well as consulting engineering in the field of services and equipment of the electricity industry has made it possible for us to work as an EPC contractor (design and engineering, equipment supply, installation and Executive Contractor) in some projects.

Description of Taraznir Company's engineering activities:

- ✓ Design, implementation and supply of earthing system equipment / lightning protection / protection against transient overvoltage's
- ✓ Design, implementation and supply of equipment for main / secondary / distribution / lighting LV panels
- ✓ Design, implementation and supply of equipment for power factor correction and harmonic filters
- ✓ Design, implementation and supply of emergency power systems / batteries / diesel generators
- ✓ Design, implementation and supply of lighting system equipment
- ✓ Design, implementation and supply of equipment for cathodic protection systems
- ✓ Design, implementation and supply of cabling network equipment
- ✓ Design, implementation and supply of equipment for industrial automation systems

Activity licenses of Taraznir Adak technical committee members:

- ✓ Consultant with the authority of technical protection and electrical safety services of the Department of Labor
- ✓ Standard development expert of the National Organization of Standards of Iran
- ✓ Member of the working group for drafting instructions for the Earthing Committee of the Iranian Electricity Industry Syndicate
- ✓ Member of the Board and Secretary of the Technical Committee TC77 of the Iranian Electricity Industry Syndicate (electromagnetic compatibility)
- ✓ Member of TC81 Technical Committee of the Iranian Electricity Industry Syndicate (Lightning Protection Systems)
- ✓ Member of Standard Development Commission - National Organization for Standardization (INSO-IEC 62793)

Earth system:

The earthing system means grounding a point of the electrical circuit means connecting it to a protective conductor. The earthing system is used for equipment that works with electricity and has a metal body. Earth is one of the main elements of protection of power plants, substations, buildings, etc. in order to protect the health of people, equipment and devices against the risk of short circuits or lightning. To achieve this, all devices, equipment and metal structures must be connected to the earth network by suitable metal conductors, which consist of copper wires, earth rods, clamps and connections, etc., so that in the event of a short circuit or lightning, the above currents from This way they are transferred to the ground.

Hard copper earthing rods:

These rods are made of pure tensile copper grade C102 and C102 according to BS 2874 standard. These rods are used in parts that need corrosion resistance and long life and soils with a pH below 3 or above 8.

d mm	L mm	Thread size mm	Part no.
16	1200	M10	NCU- 16/1200
16	1500	M10	NCU- 16/1500
16	2400	M10	NCU-16/2400
20	1200	M14	NCU- 20/1200
20	1500	M14	NCU- 20/1500
20	2400	M14	NCU- 20/2400

STANDARD: BS 2874 BS EN 13601

*In addition to table sizes, other special sizes are also available.

Side accessories of hard copper earthing rods:

Coupling dowel:

To get more lengths and connect several ground rods to each other, this company offers stainless-steel screws

d mm	Dawel size mm	Part no.
16	M10	ND 16
20	M14	ND 20

STANDARD: BS 970

Driving stud:

In order to easily hammer and prevent the spoilers of the earth rod from being damaged, a feed shock made of high-strength steel is used.

d mm	Size mm	Part no.
16	M10	NH 16
20	M14	NH 20

STANDARD: BS 970

Driving head:

In order to hammer easily and prevent damage to the threads of the earth rod, it is possible to use the shock absorbers, which are produced from high-strength steel.

d mm	Part no.
16	NB 16
20	NB 20

STANDARD: BS 970

Spike:

To facilitate the conduction of the rod into the ground, heat-treated steel with very high strength is used.

d mm	Spike size mm	Part no.
16	M10	NN 16
20	M14	NN 20

STANDARD: BS 970

Stainless steel earth rods:

This type of rod is used in parts where the possibility of forming a galvanic cell due to the burial of dissimilar metals in close proximity to each other. Wires that are made of copper or copper cladding form a galvanic cell due to its heterogeneity and cause corrosion of the structure. Therefore, the best option is to use this type of rods, which are made of stainless steel with grades 304 and 316 in accordance with BS970 standard. These rods have a long service life and show good corrosion resistance in soils with a pH of less than 3 or higher than 8.

d mm	L mm	Thread size mm	Part no.
16	1200	M10	NR-SS 16/1200
16	1500	M10	NR-SS 16/1500
16	2400	M10	NR-SS 16/2400
16	3000	M10	NR-SS 16/3000
20	1200	M14	NR-SS 20/1200
20	1500	M14	NR-SS 20/1500
20	2400	M14	NR-SS 20/2400
20	3000	M14	NR-SS 20/3000

STANDARD: BS 970 IEC 62561-2

Copperbond earth rod:

In the industrialized countries of the world, the production of copper bond rods by thermal and duplexing methods is completely obsolete and now the atomization method is used. In this method, first the steel core is acid-washed, deoxidized and degreased, then pure copper with a purity percentage above 99.5% is shown with very high adhesion on the steel core.

Advantages of this method:

- ✓ It is impossible to separate the steel core from the copper layer.
- ✓ Due to the lack of heat in the production process, the steel core does not lose its hardness.
- ✓ Due to the integrity of the copper coating, water cannot penetrate into the rod and the steel core remains intact.
- ✓ Due to the oxidation of the steel core and the absence of iron oxide and fat between the two layers of the steel core and copper, in addition to preventing corrosion, an excellent electrical and mechanical connection is established between copper and the steel core.

Nominal diameter mm	طول mm	d mm	Part no.
16	1200	14.2	NR-FCU 16/1200
16	1500	14.2	NR-FCU 16/1500
20	1200	17.2	NR-FCU 20/1200
20	1500	17.2	NR-FCU 20/1500

STANDARD: UL 467 IEC 62561-2

Copperbond earth rod accessories:

Coupler:

These fasteners are made of copper alloy with high corrosion resistance and strength and also prevent damage to the threads when hammering the earth rod.

d mm	Thread size inch	Part no.
16	5/8"	NC 16
20	3/4"	NC 20

STANDARD: IEC 62561-2

Steel tip:

It is produced from heat treated steel with very high strength, which is used for easy crushing and prevention of damage to the earth rod threads.

d mm	Thread size inch	Part no.
16	5/8"	NF 16
20	3/4"	NF 20

STANDARD: IEC 62561-2

Rod to cable/tape clamps:

These clamps are made of copper alloys with high mechanical strength and electrical conductivity and hot forging technology.

d mm	Cable size mm2	Part no.
16	16-70	NRC-16/70
20	50-120	NRC-20/120
20	70-185	NRC-20/185

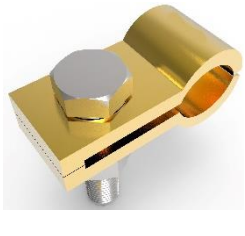
STANDARD: BS 6651

d mm	Cable size mm	Part no.
16-20	70-185	NRU-70/185

STANDARD: BS 6651

d mm	Cable size mm	Part no.
16-20	16-185	NRF16-20

STANDARD: BS 6651



d mm	Cable size mm	Part no.
16-20	20*3	NRB
	20*5	
	30*3	
	30*5	

STANDARD: BS 6651

d mm	Cable size mm	Part no.
16-20	20*3	NRUB-25*3
	25*3	
	30*3	

STANDARD: BS 6651

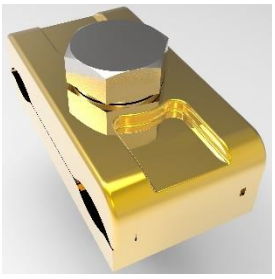
Earthing clamps:

All these clamps are produced from copper alloys with high mechanical resistance and electrical conductivity.

Tower and plate earth clamps:

Cable size mm²	Bolt size mm	Part no.
35-185	M10	NDS 185

STANDARD: BS 7430

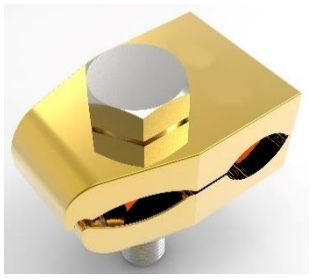


Cable size mm²	Dawel size mm	Part no.
70-120	M10	NSC 120
150-240	M12	NSC 240

STANDARD: BS 7430

Cable size mm²	Bolt size mm	Part no.
35-185	M10*50	NTC 185

STANDARD: BS 7430



Cable fastener:

This clamp is produced from hot-dip galvanized sheet with rubber coating. The rubber cover prevents damage to the cable

d mm	Part no.
25	NPLC 25
29	NPLC 29
33	NPLC 33
41	NPLC 41

STANDARD: BS 7430

Wire-to-wire connector:

Cable size mm²	Bolt size mm	Part no.
25-70	M6	NPC 35/70
95-185	M8	NPC 95/185

STANDARD: BS 7430

Split bolt connector:

Cable size mm²	Part no.
16-35	NBS 35
50-70	NBS 70
95-120	NBS 120
150-185	NBS 185

STANDARD: BS 7430

Earth point:

Cable size mm²	Part no.
50	NER1-50
70	NER1-70
50	NER2-50
70	NER2-70

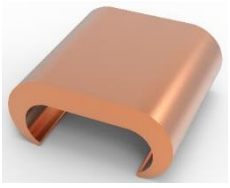
STANDARD: BS 7430

Compression connectors (C clamp):

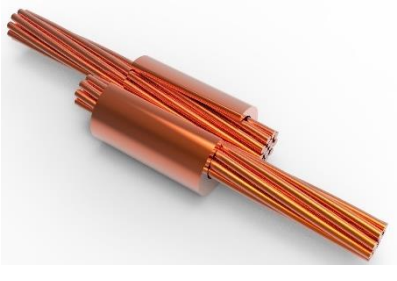
This clamp is produced by extrusion method with pure copper and is used to connect two copper wires to each other. The design of this clamp is such that there is no need to cut the main wire to branch.

A mm²	B mm²	Part no.
10	10	NCC 20
16	10	NCC 26
	16	NCC 44
25	10	NCC 44
	16	
	25	
35	10	NCC 44
	16	
	25	NCC 60
	35	NCC 76
50	10	NCC 76
	16	
	25	
	35	
	50	NCC 98
70	10	NCC 76
	16	
	25	NCC 98
	35	
	50	
	70	NCC 122
95	10	NCC 98
	16	
	25	
	35	NCC 122
	50	NCC 154
	70	
	95	NCC 190
120	**16**	**NCC 122**
	25	
	35	**NCC 154**
	50	
	70	
	95	**NCC 240**
	120	

A mm²	B mm²	Part no.
150	**16**	**NCC 154**
	25	
	35	
	50	**NCC 190**
	70	
	95	**NCC 240**
	120	**NCC 288**
	150	
185	**16**	**NCC 154**
	25	
	35	**NCC 190**
	50	
	70	**NCC 240**
	95	**NCC 288**
	120	
	150	**NCC 365**
	185	
240	**16**	**NCC 240**
	25	
	35	
	50	
	70	**NCC 288**
	95	
	120	**NCC 365**



STANDARD: BS 7430



Cable shoe:

Cable shoe is made of copper with very high electrical conductivity and with tin coating that has high corrosion resistance according to UL 486 standard in two forms of single and double holes.

Cable size mm²	Hole size mm	Part no.
6	6	NKL 6/6
	8	NKL 6/8
10	6	NKL 10/6
	8	NKL 10/8
16	8	NKL 16/8
	10	NKL 16/10
25	8	NKL 25/8
	10	NKL 25/10
35	8	KL 35/8
	10	KL 35/10
50	8	KL 50/8
	10	KL 50/10
70	10	KL 70/10
	12	KL 70/12
95	10	KL 95/10
	12	KL 95/12
120	10	KL 120/10
	12	KL 120/12
150	12	KL 150/12
	14	KL 150/14
185	12	KL 185/12
	14	KL 185/14
240	14	KL 240/14
	16	KL 240/16

Cable size mm²	Hole size mm	D center- center mm	Part no.
50	8	25	NKLD 50/8-25
	8	40	NKLD 50/8-40
	10	25	NKLD 50/10-25
	10	40	NKLD 50/10-40
70	10	25	NKLD 70/10-25
	10	40	NKLD 70/10-40
	12	25	NKLD 70/12-25
	12	40	NKLD 70/12-40
95	10	25	NKLD 95/10-25
	10	40	NKLD 95/10-40
	12	25	NKLD 95/10-25
	12	40	NKLD 95/10-40
120	10	25	NKLD 120/10-25
	10	40	NKLD 120/10-40
	12	25	NKLD 120/12-25
	12	40	NKLD 120/12-40
150	12	25	NKLD 150/12-25
	12	40	NKLD 150/12-40
	14	25	NKLD 150/14-25
	14	40	NKLD 150/14-40
185	12	25	NKLD 185/12-25
	12	40	NKLD 185/12-40
	14	25	NKLD 185/14-25
	14	40	NKLD 185/14-40
240	14	25	NKLD 240/14-25
	14	40	NKLD 240/14-40
	16	25	NKLD 240/16-25
	16	40	NKLD 240/16-40

STANDARD: UL 486

Earth plate:

These hard copper plates are used in earthing systems and in places where it is not possible to hammer the earth rod. (Earth well)

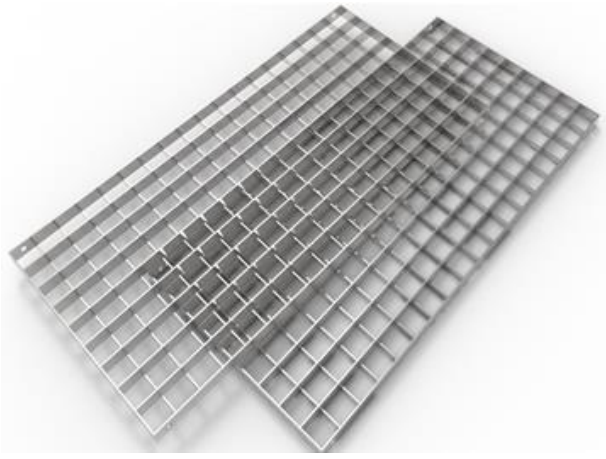
Dimensions mm.mm.mm	Part no.
660*660*3	NSU 663
660*660*5	NSU 665
1000*660*3	NSU 1063
1000*660*5	NSU 1065

*other special sizes are also available.

Earth mat:

These plates are made of st 37 steel with hot galvanized coating according to ASTM A123 standard.

Dimensions mm.mm.mm	Tape size mm.mm	Part no.
800*50*20	20*3	NEM 852
800*500*30	30*3	NEM 853
1000*500*20	20*3	NEM 1052
1000*500*30	30*3	NEM 1053



STANDARD: BS 2874

*other special sizes are also available.

Earth enhancing compound(backfill)

In order to protect the lives of employees and protect equipment and prevent malfunctions of devices against voltages caused by lightning, short circuit, etc., it is necessary that the metal body of all devices, masts and even metals used in the building in one environment Industrial connected to the ground system, which transmits electricity to the ground with the lowest impedance. In previous years, coal and salt were used to reduce the ground resistance, which caused severe corrosion of the joints, and the system after a few years of It worked. Bentonite was then used, which is not recommended in accordance with IEEE 80, BS7430 and ITU-T standards because bentonite was separated from the electrode during the dry months of the year and increased resistance.

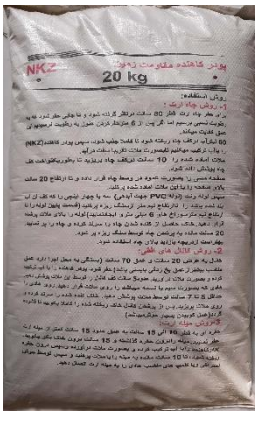
The recommendation of the standards (IEEE80) is the use of reducing agents in soils with high soil resistance. The company's powder has been approved by reputable laboratories and is in accordance with IEC62561-7 Standard. Our company's products are very unique and include different types of moisture absorbing materials, which greatly increase the electrical conductivity of the soil, which affects the efficiency of electrical current discharge of the earth system. The composition of this powder is such that Which prevents corrosion of joints and is free of any organic acids and anaerobic bacteria and is completely environmentally friendly.

The advantages of using company's powder are:

1 .Reducing the resistivity of the soil and finally reducing the resistance of the ground electrode

2 .Fixing the ground electrode resistance in the dry months of the year

3 .Reducing the operating cost of the earthing system



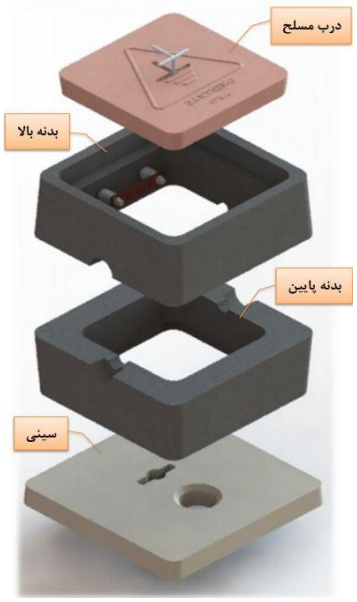
material	weight Kg	resistivity Ω.m	Part no.
powder	20	0.2	NBF1

STANDARD: IEC 62561-7

Inspection pit:

It is used for the availability and testing of connections and earth electrodes. The installation of this inspection pit makes it easy to check the earth system.

Dimensions mm.mm.mm	Busbar mm.mm	Part no.
300*300*16	NO	NEP-1
300*300*16	YES	NEP-2
300*300*16	Yes/tin coated	NEP-3
300*300*230	NO	NEP-4
300*300*230	YES	NEP-5
300*300*230	Yes/tin coated	NEP-6
400*400*370	NO	NEP-7
400*400*370	YES	NEP-8
400*400*370	Yes/tin coated	NEP-9
600*600*350	NO	NEP-10
600*600*350	YES	NEP-11
600*600*350	Yes/tin coated	NEP-12

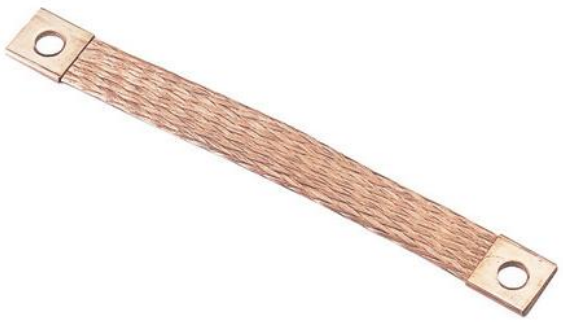


STANDARD: IEC 62561-5

Flexible flat copper braid bond:

It is produced from annealed copper wire with a purity of over 99.5% and grade C 101 according to BS 4109 standard.

Cable size mm	L mm	Part no.
20*2	200	NFKB 2022
	400	NFKB 2024
20*3	200	NFKB 2032
	400	NFKB 2034
25*2	200	NFKB 2522
	400	NFKB 2524
25*3	200	NFKB 2532
	400	NFKB 2434
30*3	200	NFKB 3032
	400	NFKB 3034



STANDARD: BS 4109

*other special sizes are also available

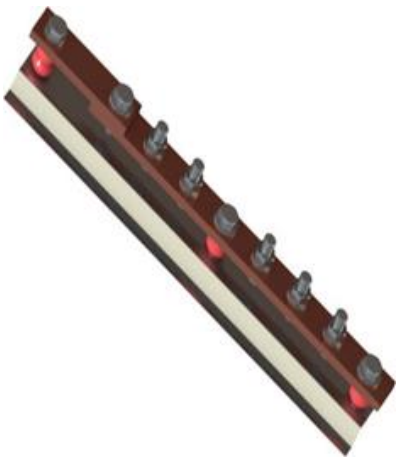
Earth busbars:

These busbars are made of copper with electrical conductivity and high purity and can also be provided with stainless steel bases. In addition to table sizes, other special sizes are also available. These busbars are also made of stainless steel with grades 304 and 316.

Tape size mm.mm.mm	Part no.
120*30*3	NEK 1/1 *A
120*50*5	NEK 1/1 *B

Ways	Tape size mm.mm.mm	Part no.
2	160*30*3	NEK 2
3	200*30*3	NEK 3
4	240*40*5	NEK 4
5	280*40*5	NEK 5
6	320*40*5	NEK 6
8	440*40*5	NEK 8
10	520*40*5	NEK 10
12	600*40*5	NEK 12

Ways	Tape size mm.mm.mm	Part no.
3	275*50*5	NEK 3/1
4	315*40*5	NEK 4/1
5	355*40*5	NEK 5/1
6	395*40*5	NEK 6/1
8	515*40*5	NEK 8/1
10	595*40*5	NEK 10/1
12	675*40*5	NEK 12/1



Ways	Tape size mm.mm.mm	Part no.
3	350*40*5	NEK 3/2
4	390*40*5	NEK 4/2
5	430*40*5	NEK 5/2
6	470*40*5	NEK 6/2
8	590*40*5	NEK 8/2
10	670*40*5	NEK 10/2
12	750*40*5	NEK 12/2

STANDARD: BS 4109

*other special sizes are also available

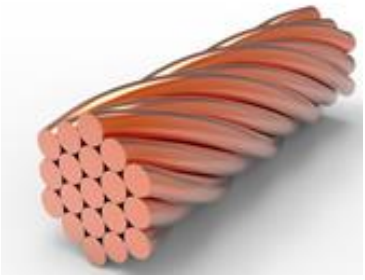
Earth and lightning protection conductors:

The types of conductors used in earthing and lightning protection systems are produced and tested in accordance with IEC 62305-IEC 62561-BS 7430-BS 6651 standard tables.

Bare stranded copper cable:

High purity copper cables can be supplied annealed according to IEC 60228 standard with maximum electrical resistivity (Ω.m) of 7.8 × 10 ^ (-8). (Stranded Copper Conductor)

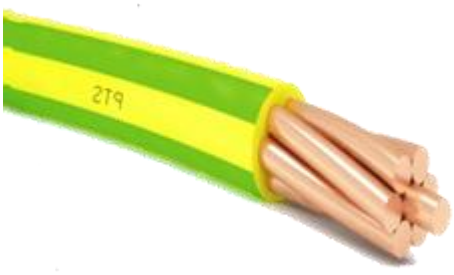
Cable size mm²	Part no.
16	NWR 016
25	NWR 025
35	NWR 035
50	NWR 050
70	NWR 070
95	NWR 095
120	NWR 120
150	NWR 150
185	NWR 185
240	NWR 240



STANDARD: IEC 60228

Green & yellow PVC insulated stranded copper cable:

Cable size mm²	Part no.
16	NYG 016
25	NYG 025
35	NYG 035
50	NYG 050
70	NYG 070
95	NYG 095
120	NYG 120
150	NYG 150
185	NYG 185
240	NYG 240



STANDARD: IEC 60228

Bare Copper tape:

Copper tape are used in earthing and lightning protection. These tapes are produced according to BS EN 13601 standard with grade C101 and C103 .

Tape size mm.mm	Part no.
20*3	NTC 20*3
25*3	NTC 25*3
30*3	NTC 30*3
50*5	NTC 50*5
60*5	NTC 60*5

STANDARD: IEC 60228

Bare stainless-steel tape:

Stainless-steel tape with grades 304 and 316 in accordance with BS970 standard are produced for use as a down conductor and air termination of lightning protection system and ground electrode. These tapes are cheaper and more economical than the similar model of copper tape. Its test requirements are in accordance with IEC 62561.

Tape size mm.mm	Part no.
20*3	NTS 20*3
25*2	NTS 25*2
25*3	NTS 25*3
30*3	NTS 30*3
50*5	NTS 50*5
60*5	NTS 60*5

STANDARD: IEC 62561-2

Hot dip galvanized steel tape:

HOT DIP GALVANIZED tapes are produced in accordance with ASTM 123A standard for use as a down conductor and air termination of lightning protection system and ground electrode. These tapes are cheaper and more economical than the similar model of copper and steel. Test requirements Complies with IEC 62561 standard.

Tape size mm.mm	Part no.
20*3	NTG 20*3
25*2	NTG 25*2
25*3	NTG 25*3
30*3	NTG 30*3
50*5	NTG 50*5
60*5	NTG 60*5

STANDARD: IEC 62561-2

Bare solid circular:

Stainless-steel:

Stainless steel Bare solid circulars with grades 304 and 316 are produced in accordance with BS970 standard for use as a down conductor and air termination of lightning protection system and ground electrode. Its testing requirements are in accordance with IEC 62561 standard.

d mm	Part no.
8	NRS 8
10	NRS 10

STANDARD: IEC 62561-2

Hot-dip galvanized:

Hot-dip galvanized solid circulars in accordance with ASTM 123A is produced for use as a down conductor and air termination of lightning protection system and ground electrode.

d mm	Part no.
8	NRG 8
10	NRG 10

STANDARD: IEC 62561-2

Aluminum:

Aluminum solid circulars is produced in accordance with IEC 62305, IEC 62561 standards for use as a down conductor and air termination of lightning protection system.

d mm	Part no.
8	NRA 8
10	NRA10

STANDARD: IEC 62561-2

Temporary Earthing System:

Portable Earthing & Short-Circuiting Kits provide safe and secure clamping on extra high voltage overhead distribution lines during maintenance or erection and are available with a choice of earth clamps for both live end and earth end, jumper clamps for low voltage switchboards and overhead line clamps.

Portable earthing equipment for high voltage electricity networks provides safe and reliable earth clamping where connections are to be made to copper or aluminum busbars. this includes portable earthing systems for 33kV, 66kV, 132kV, 275kV and 400kV.

HV and EHV earth clamps suit 5-120mm diameter copper or aluminum conductor clamping with a test current of 40 kA/1s.Flexible portable earthing leads (copper and aluminum) are available as 70sqmm, 95sqmm, 120sqmm or 150sqmm insulated with transparent PVC sheath.

Lightning protection system:

Lightning is a natural phenomenon caused by separation of electrical positive and negative charges by atmospheric processes. When the separated charge gets very large, the air between the positive and negative regions breaks down in a giant spark (an intra-cloud stroke), or a charged region breaks down to ground (a cloud-ground stroke). The resulting current flow ionizes and heats the air along the path to ~30,000 K (54,000° F). The ionized air glows brightly (the lightning), and the sudden increase in temperature expands the channel and nearby air, creating a pressure wave that makes the thunder. Most (~80%) lightning strokes are within a cloud; most of the remainder are cloud-ground strokes. Strokes between clouds are relatively rare. Most cloud-ground strokes transfer negative charge from the cloud to ground. Most lightning properties are beyond normal human experience. The cloud to ground voltages leading to the discharge are tens of millions volts or more. The peak discharge currents in each stroke vary from several thousand amperes to 200,000 A or more. The current rises to these values in only a few millionths of a second (microsecond), and the major part of each stroke usually lasts much less than a thousandth of a second. Each visible event, referred to as a flash, typically consists of 1–6 (or more) individual strokes, separated by <0.1 second.
Lightning behaves very capriciously. Cloud-ground strokes have been recorded reaching as far as 18.6 miles (30 km) horizontally from the base of the cloud. The frequency of lightning flashes varies widely with location and season.

The consequences of lightning can be devastating:

- Direct lightning strikes damage structures, and create fire, explosion and electric shock hazards.
- Indirect lightning (up to a kilometer away) creates transient overvoltage's which degrade electronic systems and disrupt essential services.

Secondary effects of lightning

The effects of a direct strike are obvious and immediately apparent - buildings damaged, trees blown apart, personal injuries and even loss of life. However, the secondary effects of lightning - the short duration, high voltage spikes called transient overvoltage's - can, and do, cause equally catastrophic, if less visually obvious, damage to electronic systems within structures.

The need for a Total Solution

Lightning protection throughout the world is now governed by National and International standards which stress the need for a comprehensive solution. Simply put, a structural lightning protection system cannot and will not protect electronic systems from lightning currents and transient overvoltage's, that's why we advocate a Total Solution to earthing and lightning protection. This approach to lightning protection is now fully endorsed by the IEC/BS EN 62305, as well as NFPA 780 standards.

Simple copper air rod:

This lightning air rod is produced from pure copper with a purity of over 99.5%

d mm	L mm	Part no.
16	500	NLP 16/500
16	1000	NLP 16/1000
16	1200	NLP 16/1200
16	1500	NLP 16/1500
16	2000	NLP 16/2000
20	500	NLP 20/500
20	1000	NLP 20/1000
20	1200	NLP 20/1200
20	1500	NLP 20/1500
20	2000	NLP 20/2000

STANDARD: BS EN 50 164-2

UL 96

Multi-branch Copper air rod:

This lightning air rod is produced from pure copper with a purity of over 99.5%

d mm	L mm	Part no.
16	500	NLPM 16/500
16	1000	NLPM 16/1000
16	1200	NLPM 16/1200
16	1500	NLPM 16/1500
16	2000	NLPM 16/2000
20	500	NLPM 20/500
20	1000	NLPM 20/1000
20	1200	NLPM 20/1200
20	1500	NLPM 20/1500
20	2000	NLPM 20/2000

STANDARD: UL 96

BS EN 50 164-2

*other special sizes are also available

Simple stainless steel air rod:

These lightning air rods are made of stainless steel with grades 304 and 316

d mm	L mm	Part no.
16	500	NLS 16/500
16	1000	NLS 16/1000
16	1200	NLS 16/1200
16	1500	NLS 16/1500
16	2000	NLS 16/2000
20	500	NLS 20/500
20	1000	NLS 20/1000
20	1200	NLS 20/1200
20	1500	NLS 20/1500
20	2000	NLS 20/2000

STANDARD: UL 96

BS EN 50 164-2

Multi-branch Simple stainless steel air rod:

These lightning air rods are made of stainless steel with grades 304 and 316

d mm	L mm	Part no.
16	500	NLSM 16/500
16	1000	NLSM 16/1000
16	1200	NLSM 16/1200
16	1500	NLSM 16/1500
16	2000	NLSM 16/2000
20	500	NLSM 20/500
20	1000	NLSM 20/1000
20	1200	NLPM 20/1200
20	1500	NLPM 20/1500
20	2000	NLPM 20/2000

STANDARD: UL 96

BS EN 50 164-2

*other special sizes are also available

Air rod bases:

These bases are produced from copper alloys with electrical conductivity and ultra-high strength according to BS EN 1982 standard.

NSD Air rod bases for wires:

These bases have the ability to restrain the rod with a maximum length of 2.5 meters.

d mm	Cable size mm²	thread size mm	Part no.
16	35	M 16	NSD 16/35
	50	M16	NSD 16/50
	70	M16	NSD 16/70
	95	M16	NSD 16/95
	120	M16	NSD 16/120
	185	M16	NSD 16/185
20	35	M20	NSD 20/35
	50	M20	NSD 20/50
	70	M20	NSD 20/70
	95	M20	NSD 20/95
	120	M20	NSD 20/120
	185	M20	NSD 20/185

STANDARD: BS EN 1982

NSD Air rod bases for tape:

These bases have the ability to restrain the rod with a maximum length of 2.5 meters.

d mm	Cable size mm²	thread size mm	Part no.
16	20*3	M 16	NSDB 16/25*3
	25*3	M16	NSDB 16/25*3
	30*3	M16	NSDB 16/30*3
20	20*3	M20	NSDB 20/25*3
	25*3	M20	NSDB 20/25*3
	30*3	M20	NSDB 20/30*3

STANDARD: BS EN 1982

NSDW rod brackets:

These bases have the ability to restrain the rod with a maximum length of 2.5 meters.

d mm	thread size mm	Part no.
16	16	NSDW 16
20	20	NSDW 20

STANDARD: BS EN 1982

Free-standing hot-dip galvanized bases:

These masts are made of ST37 steel pipes with steel plate and are heated according to ASTM A123 galvanized standard.

L m	Part no.
2	NTHD 2
3	NTHD 3
4	NTHD 4
5	NTHD 5
6	NTHD 6
8	NTHD 8
10	NTHD 10

Conductor clips:

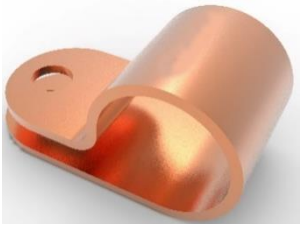
These clips are made of pure copper and copper alloys with high strength and electrical conductivity or stainless steel according to BS EN 1982 standard.

Tape clip:

These fasteners are made of pure copper and can also be made of stainless steel and aluminum.

Cable size mm²	body material	Part no.
35	copper	NFC1-35
50	copper	NFC1-50
70	copper	NFC1-70
95	copper	NFC1-95
120	copper	NFC1-120

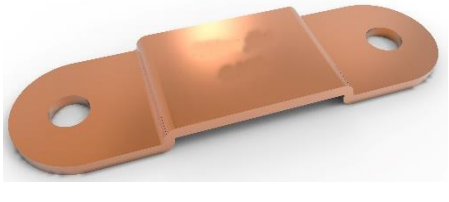
STANDARD: BS EN 1982



One hole cable clip:

These fasteners are made of pure copper and can also be made of stainless steel and aluminum

Tape size mm.mm	body material	Part no.
20*3 & 25*3	copper	NFB2-25*3
20*3 & 25*3	stainless-steel	NFB3-25*3



STANDARD: BS EN 1982

Tape and cable clip:

These fasteners are made of alloy and are made with hot forging technology.

Cable size mm²	body material	Part no.
35	copper alloy	NFC2-35
50	copper alloy	NFC2-50
70	copper alloy	NFC2-70
95	copper alloy	NFC2-95
120	copper alloy	NFC2-120

Tape size mm.mm	body material	Part no.
20*3&25*3	copper alloy	NFB1- 25*3
30*3	copper alloy	NFB1- 30*3

STANDARD: BS EN 1982

Three-way and four-way clamps for wires and tapes:

These fasteners are made of alloy and are made with hot forging technology.

Cable size mm²	body material	Part no.
35	copper alloy	N4W 35
50	copper alloy	N4W 50
70	copper alloy	N4W 70
95	copper alloy	N4W 95
120	copper alloy	N4W 120

Tape size mm.mm	body material	Part no.
20*3 & 25*3	copper alloy	N4B 25*3
30*3	copper alloy	N4B 30*3

Cable size mm	cable size mm²	Part no.
(20-25-30)*3	50	NTC2- 50
	70	NTC2- 70
	95	NTC2- 95

STANDARD: BS EN 1982

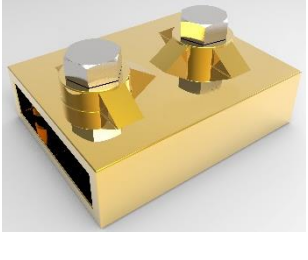
Test clamp:

These fasteners are made of alloy and are made with hot forging technology

Cable size mm²	body material	Part no.
35	copper alloy	NTC1- 35
50	copper alloy	NTC1- 50
70	copper alloy	NTC1- 70
95	copper alloy	NTC1- 95
120	copper alloy	NTC1- 120

STANDARD: BS EN 1982

Tape size mm.mm	body material	Part no.
20*3 & 25*3	copper alloy	NTB 25*3
30*3	copper alloy	NTB 30*3



Exothermic welding

In this welding method, a powder consisting of copper oxide, aluminum and special catalysts is used. This welding is possible in graphite moulds and these molds are made of high-quality graphite resistant to high heat shock in different models. The following must be observed during welding:

*Conductors must be preheated well before welding, so that there is no moisture.

*Preheat the mold to about 130 degrees before welding

*After all three consecutive welds, stop the welding operation for 10 minutes to cool the mold.

*The mold must be cleaned for the next weld.

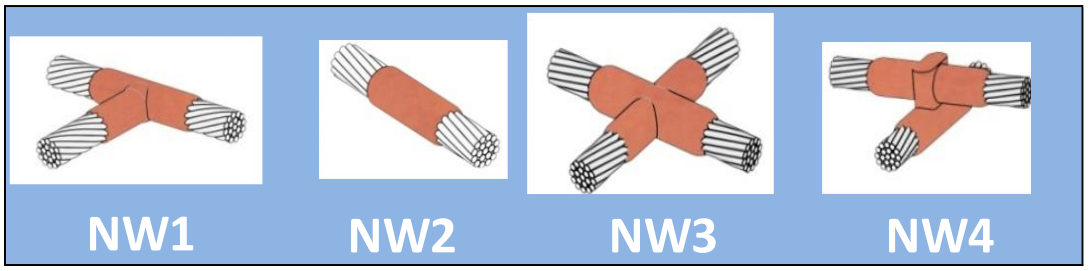
*The powders of this company connect all sections of copper to copper and copper to iron with different shapes.

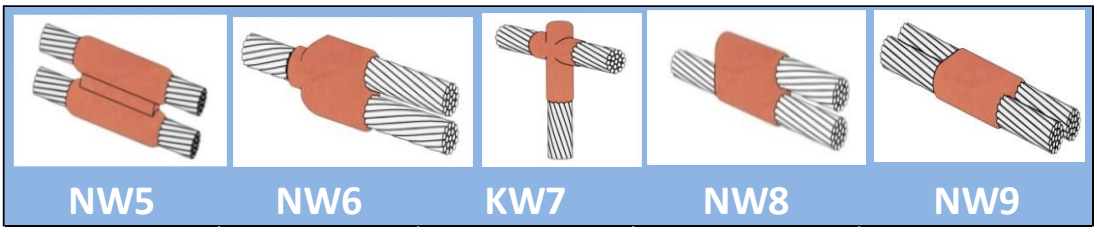
Exothermic welding powder:

These powders are packaged in packages with a specific weight and each pack is suitable for creating a connection.

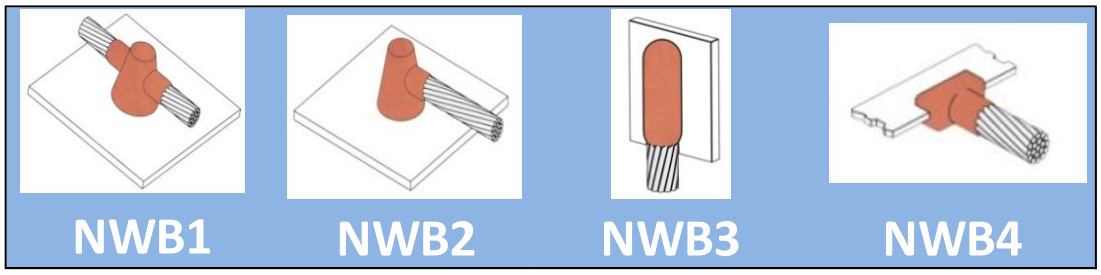
weight gr	QTY	Part no.
32	12	W-32
45	12	W-45
65	12	W-65
90	12	W-90
115	12	W-115
150	12	W-150
200	12	W-200
250	12	W-250

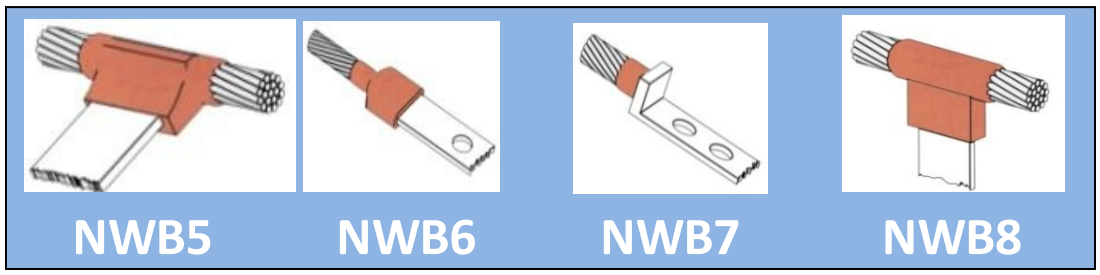
Cable to cable:

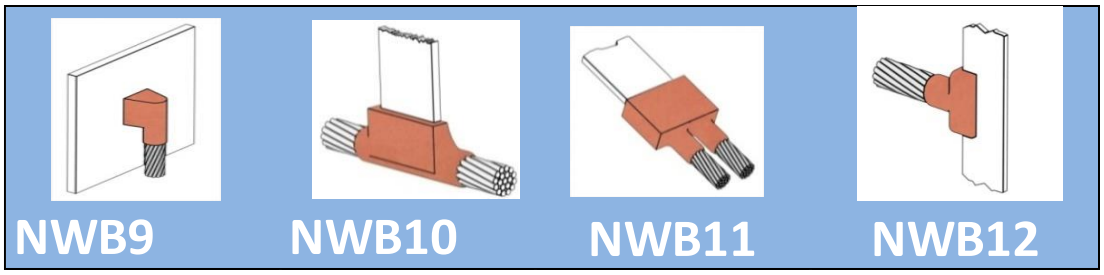


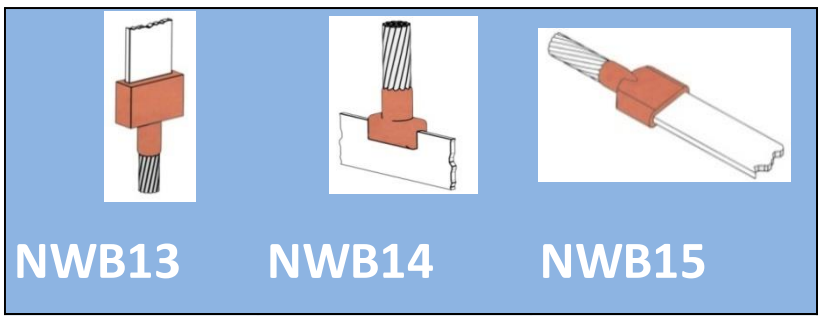


Cable to tape / Cable to plate

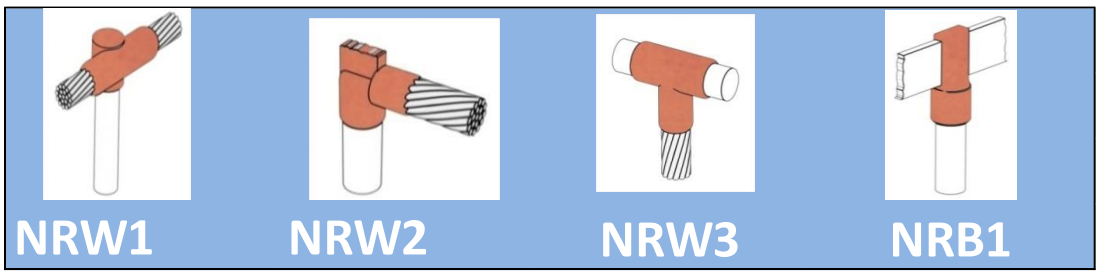


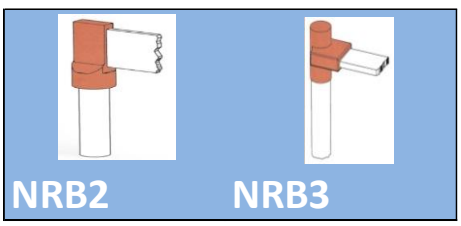




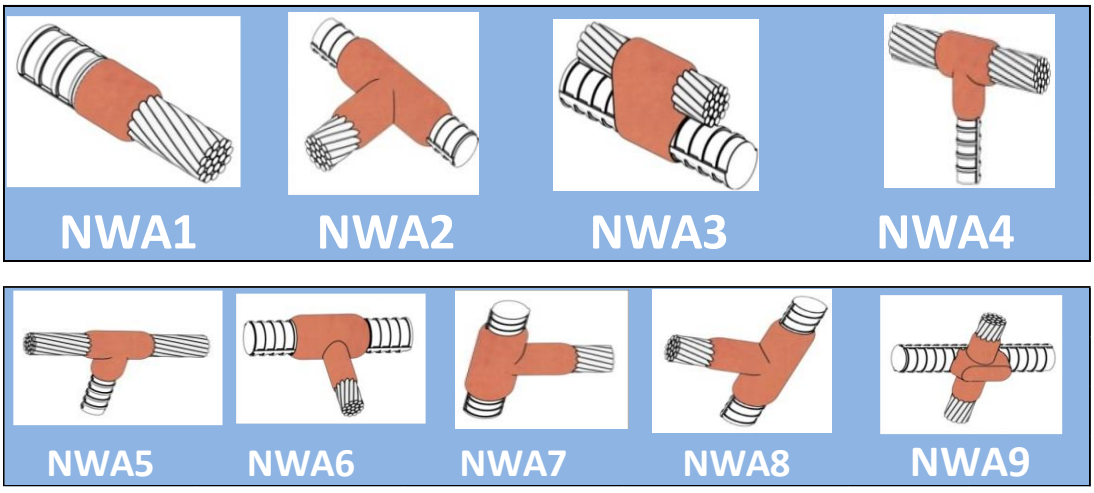


Cable to rod/ Tape to rod

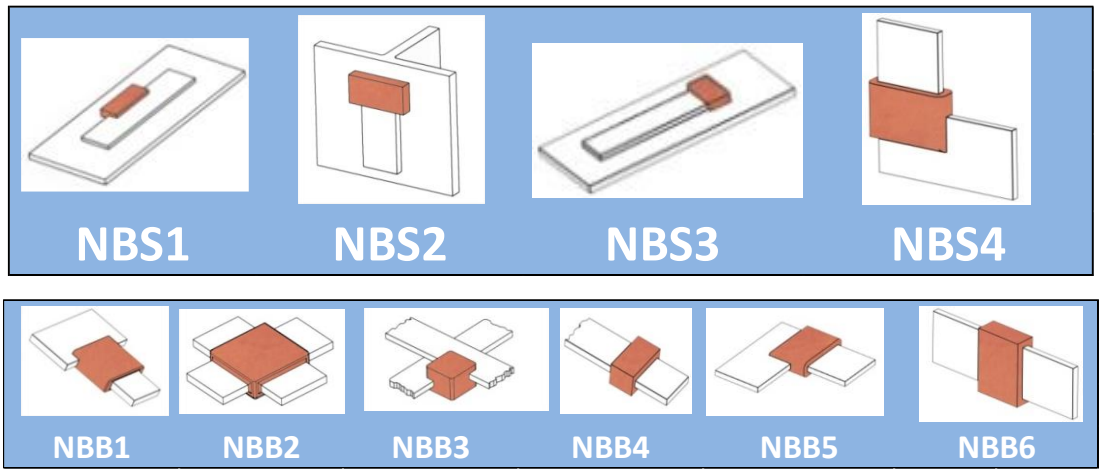




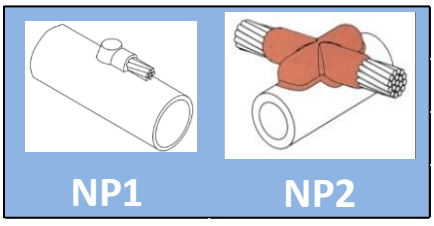
Cable to reinforcing bar



Tape to tape/ Tape to plate



Cable to pipe

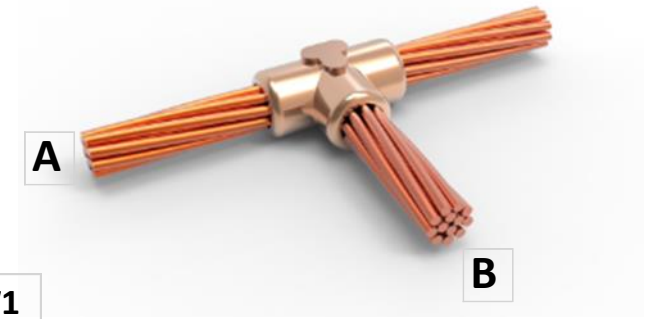


Welding mould selection tables, handles and determining the amount of powder

Cable to cable

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	16	45	NHC-50	NW1 16/16
25	16	45		NW1 25/16
	25	45		NW1 25/25
35	16	45	NHC-50	NW1 35/16
	25	45		NW1 35/25
	35	45		NW1 35/35
50	16	65	NHC-50	NW1 50/16
	25	65		NW1 50/25
	35	65		NW1 50/35
	50	90		NW1 50/50
70	25	65	NHC-50	NW1 70/25
	35	65		NW1 70/35
	50	90		NW1 70/50
	70	90		NW1 70/70
	95	90		NW1 70/95
95	25	90	NHC-50	NW1 95/25
	35	90		NW1 95/35
	50	90		NW1 95/50
	70	90		NW1 95/70
	95	115		NW1 95/95
	120	150	NHC-80	NW1 95/120
120	25	90	NHC-50	NW1 120/25
	35	90		NW1 120/35
	50	90		NW1 120/50
	70	90		NW1 120/70
	95	115	NHC-80	NW1 120/95
	120	150		NW1 120/120

A mm²	B mm²	powder gr.	handle clamp	Part no.
150	35	115	NHC-80	NW1 150/35
	50	115		NW1 150/50
	70	115		NW1 150/70
	95	150		NW1 150/95
	120	150		NW1 150/120
	150	200		NW1 150/150
	185	200		NW1 150/185
185	35	115	NHC-80	NW1 185/35
	50	115		NW1 185/50
	70	150		NW1 185/70
	95	150		NW1 185/95
	120	200		NW1 185/120
	150	200		NW1 185/150
	185	200		NW1 185/185
240	35	150	NHC-80	NW1 240/35
	50	150		NW1 240/50
	70	150		NW1 240/70
	95	150		NW1 240/95
	120	200		NW1 240/120
	150	200		NW1 240/150
	185	250		NW1 240/185
	240	2*150+45		NW1 240/240



Code:NW1

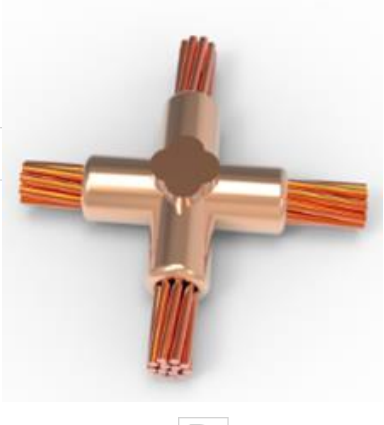
Welding mould selection tables, handles and determining the amount of powder

Cable to cable

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	16	45	NHC-50	NW3 16/16
25	16	45		NW3 25/16
	25	45		NW3 25/25
35	16	65	NHC-50	NW3 35/16
	25	65		NW3 35/25
	35	65		NW3 35/35
50	16	90	NHC-50	NW3 50/16
	25	90		NW3 50/25
	35	90		NW3 50/35
	50	90		NW3 50/50
70	25	115	NHC-50	NW3 70/25
	35	115		NW3 70/35
	50	115		NW3 70/50
	70	115		NW3 70/70
	95	150	NHC-80	NW3 70/95
95	25	115	NHC-80	NW3 95/25
	35	115		NW3 95/35
	50	115		NW3 95/50
	70	150		NW3 95/70
	95	150		NW3 95/95
	120	200		NW3 95/120
120	25	115	NHC-80	NW3 120/25
	35	115		NW3 120/35
	50	150		NW3 120/50
	70	150		NW3 120/70
	95	200		NW3 120/95
	120	200		NW3 120/120

A mm²	B mm²	powder gr.	handle clamp	Part no.
150	35	150	NHC-80	NW3 150/35
	50	150		NW3 150/50
	70	150		NW3 150/70
	95	200		NW3 150/95
	120	250		NW3 150/120
	150	250		NW3 150/150
	185	250		NW3 150/185
185	35	115	NHC-80	NW3 185/35
	50	200		NW3 185/50
	70	200		NW3 185/70
	95	200		NW3 185/95
	120	250		NW3 185/120
	150	250		NW3 185/150
	185	150+115		NW3 185/185
240	35	200	NHC-80	NW3 240/35
	50	250		NW3 240/50
	70	250		NW3 240/70
	95	250		NW3 240/95
	120	150+115		NW3 240/120
	150	2*150		NW3 240/150
	185	2*150		NW3 240/185
	240	2*150		NW3 240/240

Code:NW3



Welding mould selection tables, handles and determining the amount of powder

Cable to cable

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	16	115	NHC-80	NW4 16/16
25	16	115		NW4 25/16
	25	115		NW4 25/25
35	16	115		NW4 35/16
	25	115		NW4 35/25
	35	115		NW4 35/35
50	16	115		NW4 50/16
	25	115		NW4 50/25
	35	115		NW4 50/35
	50	150		NW4 50/50
70	25	115		NW4 70/25
	35	150		NW4 70/35
	50	150		NW4 70/50
	70	150		NW4 70/70
95	25	200		NW4 95/25
	35	200		NW4 95/35
	50	200		NW4 95/50
	70	200		NW4 95/70
	95	200		NW4 95/95
120	25	250		NW4 120/25
	35	250		NW4 120/35
	50	250		NW4 120/50
	70	250		NW4 120/70
	95	250		NW4 120/95
	120	250		NW4 120/120

A mm²	B mm²	powder gr.	handle clamp	Part no.
150	70	250		NW4 150/70
	95	300		NW4 150/95
	120	300		NW4 150/120
	150	300		NW4 150/150
185	50	250		NW4 185/50
	70	250		NW4 185/70
	95	300		NW4 185/95
	120	300		NW4 185/120
	150	300		NW4 185/150
	185	2*150+32		NW4 185/185
240	70			NW4 240/70
	95			NW4 240/95
	120			NW4 240/120
	150			NW4 240/150
	185			NW4 240/185
	240			NW4 240/240

Code:NW4

Welding mould selection tables, handles and determining the amount of powder

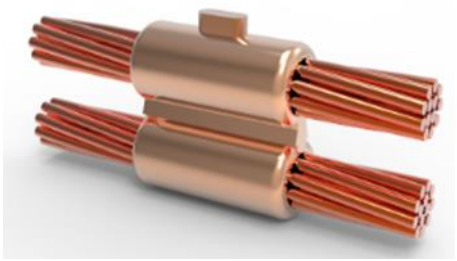
Cable to cable

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	16	65	NHC-50	NW5 16/16
25	16	65		NW5 25/16
	25	65		NW5 25/25
35	16	65	NHC-50	NW5 35/16
	25	65		NW5 35/25
	35	65		NW5 35/35
50	16	65	NHC-50	NW5 50/16
	25	65		NW5 50/25
	35	90		NW5 50/35
	50	115	NHC-80	NW5 50/50
70	25	90	NHC-80	NW5 70/25
	35	90		NW5 70/35
	50	115		NW5 70/50
	70	115		NW5 70/70
95	25	115	NHC-80	NW5 95/25
	35	115		NW5 95/35
	50	115		NW5 95/50
	70	150		NW5 95/70
	95	150		NW5 95/95
120	25	150	NHC-80	NW5 120/25
	35	150		NW5 120/35
	50	150		NW5 120/50
	70	150		NW5 120/70
	95	200		NW5 120/95
	120	250		NW5 120/120

A mm²	B mm²	powder gr.	handle clamp	Part no.
150	70	150	NHC-80	NW5 150/70
	95	200		NW5 150/95
	120	200		NW5 150/120
	150	250		NW5 150/150
185	50	150	NHC-80	NW5 185/50
	70	150		NW5 185/70
	95	200		NW5 185/95
	120	200		NW5 185/120
	150	250		NW5 185/150
	185	250		NW5 185/185
240	70	200	NHC-80	NW5 240/70
	95	250		NW5 240/95
	120	250		NW5 240/120
	150	2*150		NW5 240/150
	185	2*150		NW5 240/185
	240	2*150		NW5 240/240

A

B



Code:NW3

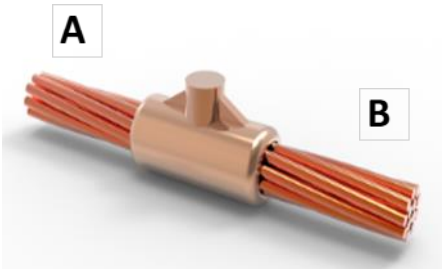
Welding mould selection tables, handles and determining the amount of powder

Cable to cable

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	16	32	NHC-50	NW2 16/16
25	16	32		NW2 25/16
	25	32		NW2 25/25
35	16	45	NHC-50	NW2 35/16
	25	45		NW2 35/25
	35	4		NW2 35/35
50	16	45	NHC-50	NW2 50/16
	25	45		NW2 50/25
	35	45		NW2 50/35
	50	45		NW2 50/50
70	25	65	NHC-50	NW2 70/25
	35	65		NW2 70/35
	50	65		NW2 70/50
	70	65		NW2 70/70
95	25	65	NHC-80	NW2 95/25
	35	65		NW2 95/35
	50	65		NW2 95/50
	70	90		NW2 95/70
	95	90		NW2 95/95
120	25	90	NHC-80	NW2 120/25
	35	90		NW2 120/35
	50	90		NW2 120/50
	70	115		NW2 120/70
	95	115		NW2 120/95
	120	115		NW2 120/120

A mm²	B mm²	powder gr.	handle clamp	Part no.
150	70	115	NHC-80	NW2 150/70
	95	115		NW2 150/95
	120	115		NW2 150/120
	150	115		NW2 150/150
185	50	115	NHC-80	NW2 185/50
	70	115		NW2 185/70
	95	115		NW2 185/95
	120	150		NW2 185/120
	150	150		NW2 185/150
	185	150		NW2 185/185
240	70	150	NHC-80	NW2 240/70
	95	150		NW2 240/95
	120	200		NW2 240/120
	150	200		NW2 240/150
	185	200		NW2 240/185
	240	200		NW2 240/240

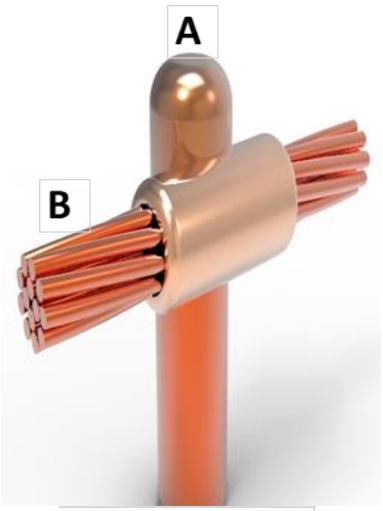
Code:NW2



Welding mould selection tables, handles and determining the amount of powder

Cable to rod

A mm²	B mm²	powder gr.	handle clamp	Part no.
15	16	115	NHC-50	NRW1- 14.5/16
	35	115		NRW1- 14.5/35
	50	115		NRW1- 14.5/50
	70	115		NRW1- 14.5/70
	95	115		NRW1- 14.5/95
	120	150		NRW1- 14.5/120
	150	200		NRW1- 14.5/150
	185	200		NRW1- 14.5/185
	240	200		NRW1- 14.5/240
16	16	115	NHC-80	NRW1- 16/16
	35	115		NRW1- 16/35
	50	115		NRW1- 16/50
	70	115		NRW1- 16/70
	95	115		NRW1- 16/95
	120	150		NRW1- 16/120
	150	200		NRW1- 16/150
	185	200		NRW1- 16/185
	240	200		NRW1- 16/240
17	16	115	NHC-80	NRW1- 17.5/16
	35	115		NRW1- 17.5/35
	50	115		NRW1- 17.5/50
	70	115		NRW1- 17.5/70
	95	115		NRW1- 17.5/95
	120	150		NRW1- 17.5/120
	150	200		NRW1- 17.5/150
	185	200		NRW1- 17.5/185
	240	250		NRW1- 17.5/240
20	16	115	NHC-80	NRW1- 20/16
	35	115		NRW1- 20/35
	50	115		NRW1- 20/50
	70	115		NRW1- 20/70
	95	115		NRW1- 20/95
	120	150		NRW1- 20/120
	150	200		NRW1- 20/150
	185	200		NRW1- 20/185
	240	250		NRW1- 20/240



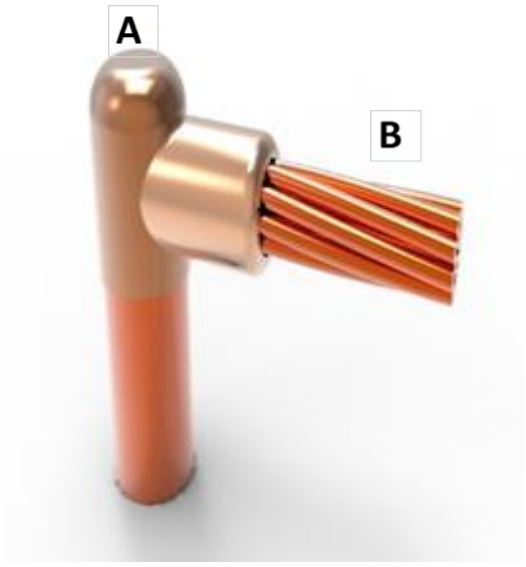
Code: NRW1

Welding mould selection tables, handles and determining the amount of powder

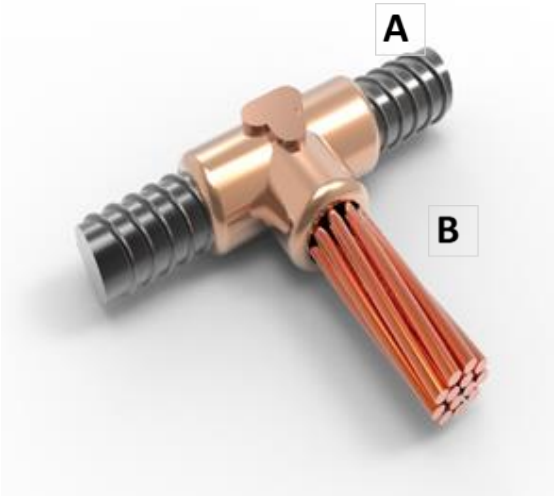
Cable to rod/ reinforcing bar

A mm²	B mm²	powder gr.	handle clamp	Part no.
14	50	115	NHC-80	NRW2 14.5/50
	70	115		NRW2 14.5/70
	95	115		NRW2 14.5/95
	120	115		NRW2 14.5/120
	150	150		NRW2 14.5/150
	185	150		NRW2 14.5/185
	240	150		NRW2 14.5/240
16	50	115		NRW2 16/50
	70	115		NRW2 16/70
	95	115		NRW2 16/95
	120	115		NRW2 16/120
	150	150		NRW2 16/150
	185	150		NRW2 16/185
	240	150		NRW2 16/240
17	70	150		NRW2 17.5/70
	95	150		NRW2 17.5/95
	120	150		NRW2 17.5/120
	150	150		NRW2 17.5/150
	185	150		NRW2 17.5/185
	240	150		NRW2 17.5/240
20	70	150		NRW2 20/70
	95	150		NRW2 20/95
	120	150		NRW2 20/120
	150	150		NRW2 20/150
	185	150		NRW2 20/185
	240	150		NRW2 20/240

A mm²	B mm²	powder gr.	handle clamp	Part no.
Ø 10	16	90	NHC-80	NWA2 10/16
	25	90		NWA2 10/25
	35	90		NWA2 10/35
	50	115		NWA2 10/50
	70	115		NWA2 10/70
	95	115		NWA2 10/95
Ø 16	16	115		NWA2 16/16
	25	115		NWA2 16/25
	35	150		NWA2 16/35
	50	150		NWA2 16/50
	70	150		NWA2 16/70
	95	200		NWA2 16/95
Ø 20	16	150		NWA2 20/16
	25	150		NWA2 20/25
	35	150		NWA2 20/35
	50	200		NWA2 20/50
	70	200		NWA2 20/70
	95	200		NWA2 20/95
	120	250		NWA2 20/120
Ø 22	16	150		NWA2 22/16
	25	150		NWA2 22/25
	35	200		NWA2 22/35
	50	250		NWA2 22/50
	70	300		NWA2 22/70
	95	350		NWA2 22/95
	120	350		NWA2 22/120



Code: NRW2

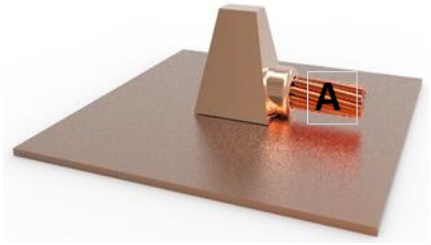


Code: NWA2

Welding mould selection tables, handles and determining the amount of powder

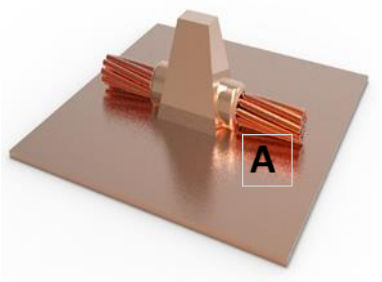
Cable to plate

A mm²	powder gr.	handle	Part no.
16	65	NHC-80	NRB2- 25
25	65		NRB2- 35
35	90		NRB2- 50
50	115		NRB2- 70
70	115		NRB2- 95
95	115		NRB2- 120



Code: NWB1

A mm²	powder gr.	handle	Part no.
25	115	NHC-80	NRB1- 25
35	115		NRB1- 35
50	150		NRB1- 50
70	150		NRB1- 70
95	150		NRB1- 95
120	200		NRB1- 120
185	250		NRB1- 185



Code: NWB2

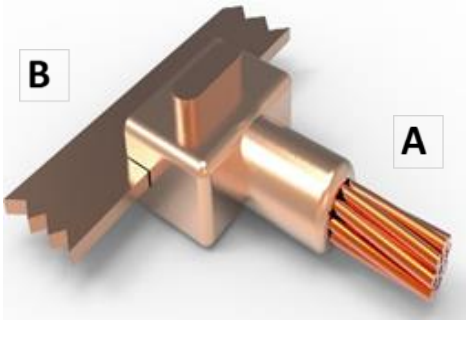
A mm²	powder gr.	handle	Part no.
25	65	NHC-50	NWB3- 25
35	65		NWB3- 35
50	90	NHC-80	NWB3- 50
70	90		NWB3- 70
95	115		NWB3- 95
120	115		NWB3- 120
150	150		NWB3- 150
185	200		NWB3- 185
240	250		NWB3- 240

Code: NWB3

Welding mould selection tables, handles and determining the amount of powder

Cable to tape

A mm²	B mm²	powder gr.	handle clamp	Part no.
16	20*3	90	NHC-80	NWB4- 16/20*3
	25*3	90		NWB4- 16/25*3
25	20*3	90		NWB4- 16/20*3
	20*5	90		NWB4- 25/20*5
	25*3	90		NWB4- 25/25*3
35	20*3	90		NWB4- 35/20*3
	20*5	90		NWB4- 35/20*5
	25*3	90		NWB4- 35/25*3
50	20*3	90		NWB4- 50/20*3
	20*5	90		NWB4- 50/20*5
	25*3	90		NWB4- 50/25*3
	30*3	90		NWB4- 50/30*3
	40*3	90		NWB4- 50/40*3
	40*5	90		NWB4- 50/40*5
70	20*3	90		NWB4- 70/20*3
	20*5	90		NWB4- 70/20*5
	25*3	90		NWB4- 70/25*3
	30*3	90		NWB4- 70/30*3
	40*3	90		NWB4- 70/40*3
	40*5	90		NWB4- 70/40*5
95	20*3	90		NWB4- 95/20*3
	25*3	90		NWB4- 95/25*3
	30*3	90		NWB4- 95/30*3
	40*5	115		NWB4- 95/40*5
	50*5	115		NWB4- 95/50*5
120	25*5	115		NWB4- 120/25*5
	30*5	115		NWB4- 120/30*5
	50*5	115		NWB4- 120*50*5
	25*10	150		NWB4- 120*25*10
	30*10	150		NWB4- 120/30*10
	40*10	150		NWB4- 120/40*10

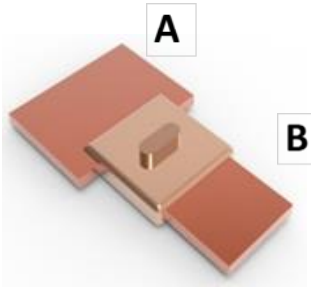


Code: NWB4

Welding mould selection tables, handles and determining the amount of powder

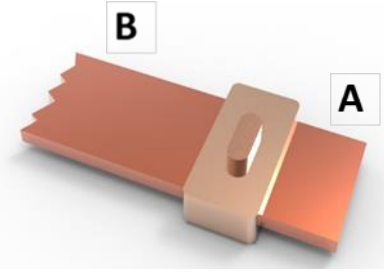
Tape to tape

A mm*mm		B mm*mm	weight gr.	handle clamp	Part no.
20*2	20*3	20*3	90	NHC-80	NBB1- 20*3/20*3
25*2	25*3	25*3	90		NBB1- 25*3/25*3
25*4	25*5	25*5	115		NBB1- 25*5/25*5
30*2	30*3	30*3	115		NBB1- 30*3/30*3
30*4	30*5	30*5	150		NBB1- 30*5/30*5
40*4	40*5	40*5	150		NBB1- 40*5/40*5



Code: NBB1

A mm*mm	B mm*mm	weight gr.	handle clamp	Part no.
20*3	20*3	65	NHC-80	NBB4 20*3/20*3
25*3	25*3	65		NBB4 25*3/25*3
25*5	25*5	90		NBB4 25*5/25*5
30*3	30*3	90		NBB4 30*3/30*3
30*5	30*5	115		NBB4 30*5/30*5
40*3	40*3	90		NBB4- 40*3/40*3
40*5	40*5	150		NBB4 40*5/40*5
40*10	40*10	2*150		NBB4 40*10/40*10



Code: NBB4

Welding mould selection tables, handles and determining the amount of powder

Cable to pipe

A mm²	powder gr.	handle	Part no.
10	32	PHC 50	PM 10/pipe size
16	32		PM 16/pipe size
25	32		PM 25/pipe size
35	32		PM 35/pipe size
50	45	PHC-50	PM 50/pipe size
70	65		PM 70/pipe size
95	90+65		PM 95/pipe size

Code: NWP1

Certificates:

T.M.U
P.O.Box:14115-143
Tehran,I,R,IRAN
Tel:+98-21-82880000
www.modares.ac.ir

Tarbiat Modares University
Faculty of Engineering

LEACHING TEST REPORT

Type Of Material	NKZ
Client	TARAZ NIR ADAK Co (The Selection Of The Testing Sample Has Been Done By The Client)
Date	23 Nov 2020
Report Number	99090301

Chemical Composition

Sample Number	Fe	Cu	Zn	Ni	Cd
01	0.27 mg/L	0.01 mg/L	0.009 mg/L	0.06 mg/L	0.002 mg/L
Co	Pb	As	Ba	Cr	Hg
0.03 mg/L	0.008 mg/L	0.009 mg/L	0.04 mg/L	0.03 mg/L	0.0009 mg/L

Acceptance Criteria According To IGS-I-EL-001(0) Standard

Fe (mg/L)	Cu (mg/L)	Zn (mg/L)	Ni (mg/L)	Cd (mg/L)
0.3 Max.	0.05 Max.	3 Max.	0.07 Max.	0.003 Max.

Co (mg/L)	Pb (mg/L)	As (mg/L)	Ba (mg/L)	Cr (mg/L)	Hg (mg/L)
0.05 Max.	0.01 Max.	0.01 Max.	0.1 Max.	0.05 Max.	0.001 Max.

Corrosion & Protection Lab
Dr. T. Shahrabi

Manager Of Corrosion & Protection Lab
T. SHAHRABI

T.M.U
P.O.Box:14115-143
Tehran,I,R,IRAN
Tel:+98-21-82880000
www.modares.ac.ir

Tarbiat Modares University
Faculty of Engineering

RESISTIVITY TEST REPORT

Type Of Material	NKZ
Client	TARAZ NIR ADAK Co (The Selection Of The Testing Sample Has Been Done By The Client)
Date	23 Nov 2020
Report Number	99090303

Sample Number	Resistivity
01	0.45 Ω-m (Humidity 50 %)
Acceptance Criteria According To IGS-I-EL-001(0) Standard	

Corrosion & Protection Lab
Dr. T. Shahrabi

Manager Of Corrosion & Protection Lab
T. SHAHRABI

T.M.U
P.O.Box:14115-143
Tehran,I,R,IRAN
Tel:+98-21-82880000
www.modares.ac.ir

Tarbiat Modares University
Faculty of Engineering

POLARIZATION RESISTANCE TEST REPORT

Type Of Material	NKZ
Client	TARAZ NIR ADAK Co (The Selection Of The Testing Sample Has Been Done By The Client)
Date	23 Nov 2020
Report Number	99090304

Test Result		
Sample Number	Corrosion Current Density	Polarization Resistance
01	0.21 $\mu A/cm^2$	8.37 $\Omega.m^2$
Acceptance Criteria According To IGS-I-EL-001(0) Standard		

Test Condition	
Reference Electrode	Saturated calomel reference electrode
Working Electrode	Copper
Counter Electrode	Graphite
Scan Rate	0.5 mVs^{-1}
Solution	Made Of The Sent Sample
According To The Standard For Copper Electrodes In Non-Corrosive Environment, Polarization Resistance Must Be More Than 4 $\Omega.m^2$ & In The Corrosive Environment Must Be More Than 8 $\Omega.m^2$.	

Corrosion & Protection Lab
Dr. T. Shahrabi

Manager Of Corrosion & Protection Lab
T. SHAHRABI

T.M.U
P.O.Box:14115-143
Tehran,I,R,IRAN
Tel:+98-21-82880000
www.modares.ac.ir

Tarbiat Modares University
Faculty of Engineering

SULPHUR DETERMINATION TEST REPORT

Type Of Material	NKZ
Client	TARAZ NIR ADAK Co (The Selection Of The Testing Sample Has Been Done By The Client)
Date	23 Nov 2020
Report Number	99090302

Chemical Composition	
Sample Number	Sulphur
01	1.6 %

Acceptance Criteria According To IGS-I-EL-001(0) Standard	
Sulphur	2 % max

Corrosion & Protection Lab
Dr. T. Shahrabi

T. SHAHRABI
Manager Of Corrosion & Protection Lab

T.M.U
P.O.Box:14115-143
Tehran,I,R,IRAN
Tel:+98-21-82880000
www.modares.ac.ir

Tarbiat Modares University
Faculty of Engineering

PAH TEST REPORT

Type Of Material	NKZ
Client	TARAZ NIR ADAK Co (The Selection Of The Testing Sample Has Been Done By The Client)
Date	23 Nov 2020
Report Number	99090305

Chemical Composition	
Sample Number	PAH
01	0.0001 mg/L

Acceptance Criteria According To IGS-I-EL-001(0) Standard	
PAH	0.0002 mg/L Max.

Corrosion & Protection Lab
Dr. T. Shahrabi

Manager Of Corrosion & Protection Lab