

Flexible connectors • Solderless terminals • Contact-systems

druseidt

Elektrotechnik



Product information

Water cooled high current cables
preferably for electric arc- and ladle furnaces



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Water cooled high current cables preferably for electric arc- and ladle furnaces

For the transmission of high currents within electrically operated melting and heating equipment, such as electric-arc or ultra high power (UHP) furnaces, water-cooled high-current cables with very high conductor cross-sections are required.

Such high current components have to guarantee a reliable current transfer without having too great electrical losses under the consideration of the application with its mechanical and environmental-related influences. Quality, durability and reliability are very important requirements, as unnecessary maintenance and downtime cause substantial costs for the user.

The druseidt company manufactures water cooled high current cables since many years. In standard design in cross-section ranges up to 6500 mm² and with cable head diameters up to 200 mm. Larger sizes for special applications are available on request.

Further developments in materials, manufacturing technology, as well as to guarantee a consistently high quality standard are guidelines and prerequisite to successfully exist in the market. Accordingly to the different requirements and operating conditions the druseidt company offers various kinds of designs exactly coordinated with the application of the user.



High quality and reproducible manufacturing processes

The construction and the manufacturing process of our water cooled high current cables is carried out under the following objectives:

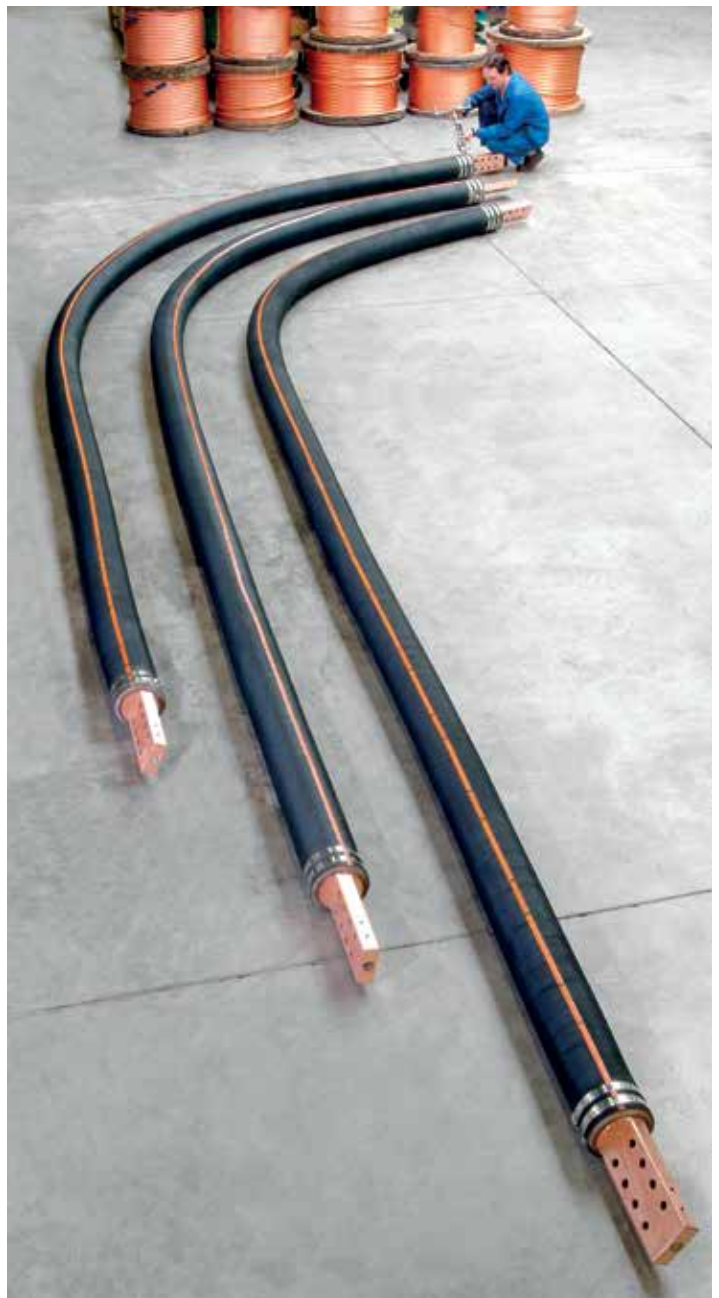
- Optimization of the current transfer process by reducing the electrical resistance and the electrical losses
- Optimization of the cooling water flow
- Protection against heat, abrasion and mechanical wear
- Consideration of possible torsional stress
- Use of high quality materials
- Ensure a constant quality by ensuring the reproducibility of manufacturing processes

Construction and application

Our water cooled high current cables for electric arc- and ladle furnaces are used as flexible connectors between the electrode arms and the transformer system. The construction and the design depends, besides of the necessary current load, on the mounting situation, the planned movements and the general environmental influences. These points are the parameters which have the main influence of the construction and so ultimately of the lifetime of the cables.

druseidt cables in standard design consist out of several flexible stranded copper ropes in a cross-section range of 400 mm² or 500 mm² wrapped around a supporting tube.

Every second single conductor rope is protected against abrasion by a perforated hose. The wire diameter and the construction of the copper ropes are selected this way to minimize the mechanical wear as much as possible.



Cable heads and cooling

All druseidt cable heads are manufactured out of E-copper/copper-ETP with extremely high conductivity. To prevent slippage of the cooling water hoses surely, they are equipped additionally with a toothed surface. Both, laterally and front head, a sufficiently sized threaded hole, to hold hose connectors or connection pipes, is inserted. Further all cable heads have a separate borehole per every single conductor rope in order to realize an optimized cooling process.



Cable heads with rotating joints

In order to minimize occurring strong or permanent torsional stress of the coolant water hoses and their connection to the cable head it is possible to equip the cable heads additionally with a rotating joint on one cable side. To obtain the function of the rotating joint as long as possible, even under adverse operating conditions, druseidt equips them with three sealing gaskets and special slide rings.



The sealing gaskets protect the rotating joint against the ingress of dust and other influences. Cable heads with rotating joints will be delivered with a transport part safety to protect them against twisting, so that a correct installation is guaranteed on site.

druseidt crimp technology

The connection between the flexible copper ropes and the cable heads will be realized by a special solderless crimping process. The therefore used special druseidt crimp technology guarantees, in combination with a pressure of some hundred tons, an optimized electrical connection as well as an economical production process.

The flexible conductor ropes are crimped extensively all around and optimally compressed. Compared to the segment pressures of competitors, our crimping technology has the advantage of a much more intensive compaction (see picture). By using stored machine settings the druseidt crimp technology is reproducible at any time, minimizes the electrical resistances, thus reducing the electrical losses.



segment
pressure



druseidt
crimp technology

Especially compared to soldered cables, crimped designs have the following significant benefits:

- Lower electrical resistance and as a result lower electrical losses which contributes to the power increase in the furnaces.
- Better lifetime, since no heat on the E-copper conductors and not a retraction of solder in the flexible part is done (reduce the risk of fracture of the E-copper ropes).
- No crystallization of tin regarding the combination of water and electricity

druseidt crimp technology minimizes the electrical resistance and reduces the electrical losses.

druseidt coolant water hoses

An essential criterion for the life time of water cooled cables is the quality of the coolant water hoses. So we use only high quality standard, practice proven, electrically insulating tubes with flame retardant, self extinguishing cover. According to the stress and the environmental influences we offer three different hose designs.

Technical data

- Electrically insulating tube $R > 10^9 \Omega$
- Water temperature permanent up to $+ 80^\circ \text{C}$, shortly up to $+ 110^\circ \text{C}$
- Operating pressure 6 bar, burst pressure 18 bar
- Outer cover flame retardant, self extinguishing
- High mechanical strength, abrasion resistant

1. Abrasiv-hose with traffic light effect

druseidt standard hose for normal applications. Multilayer built-up cooling water hose with abrasion resistant outer cover. To control the wear and the abrasion the hose is equipped with a so called traffic light effect, which based on the green respectively red rubber layer inside of the hose casing. So it is possible to control the hose condition optically. The latest moment for changing and repairing the cables should be given when the red rubber layer is visible (for example in case of visible burn marks or abrasion).



2. Abrasiv-hose with additional spiral vulcanized abrasion protection

Ideal solution for extreme abrasion problems. Based on our standard Abrasiv-hose but manufactured without the green and red rubber layers. Thickness of the base hose is 12 mm. Thickness of the abrasion protection is 15 mm = ca. 27 mm total thickness including abrasion protection.



3. Abrasiv-hose with additional vulcanized heat protection

If you have problems with radiated heat or metal splashes we recommend to use our Abrasiv-hose with additional vulcanized heat protection. Based on our standard Abrasiv-hose with traffic light effect it is possible to vulcanize an additional heat protection in a length according to customers wishes. The heat protection consists out of a $+ 700^\circ \text{C}$ heat resistant material with an additional $+ 300^\circ \text{C}$ silicone cover.



Protection against abrasion and radiated heat

The operating and environmental conditions have a significant impact of the life time of the water cooled high current cables. Due to the installation location and construction of the plants, in practice often occur particularly serve problems in terms of abrasion or radiated heat.

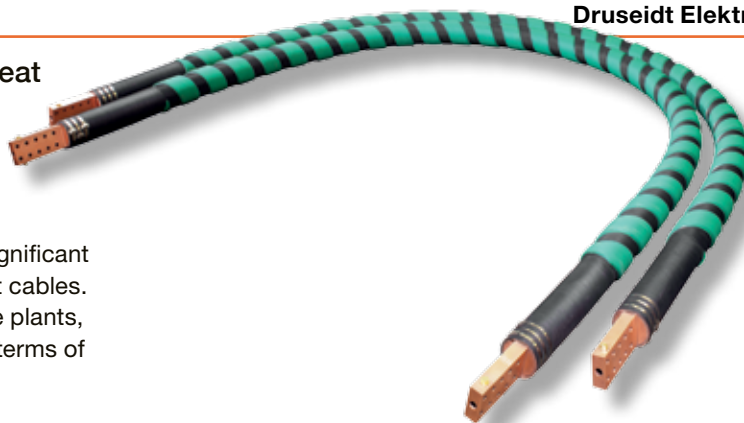
Our standard used Abrasiv-hose with traffic light effect is of high quality and has a very good abrasion resistance. However, it is often useful to take a life extension through the use of our additionally offered special hoses or activities. So we provide different kinds of solutions.

Protection against abrasion

1. druseidt Abrasiv-hose with additional spiral vulcanized abrasion protection
2. druseidt Abrasiv-hose with traffic light effect and additional winded second abrasion-hose
3. druseidt Abrasiv-hose with traffic light effect with additional mounted bumpers

Protection against radiated heat

4. druseidt Abrasiv-hose with traffic light effect and additional vulcanized heat protection
5. druseidt Abrasiv-hose with traffic light effect and additional winded heat protection made out of Therm Textile



1. druseidt Abrasiv-hose with additional spiral vulcanized abrasion protection. Extremely abrasion resistant through additional abrasion protection with a thickness of ca. 15 mm. No loosening or slipping of bumpers. No additional assembly of bumpers or winding a second abrasion-hose is necessary. Very good life time and therefore a very good value for money.



2. druseidt-Abrasiv-hose with traffic light effect and additional winded second abrasion-hose. Also the second abrasion-hose is equipped with a flame retardant, self extinguishing cover. Such abrasion-hoses are deliverable with a different wall thickness.

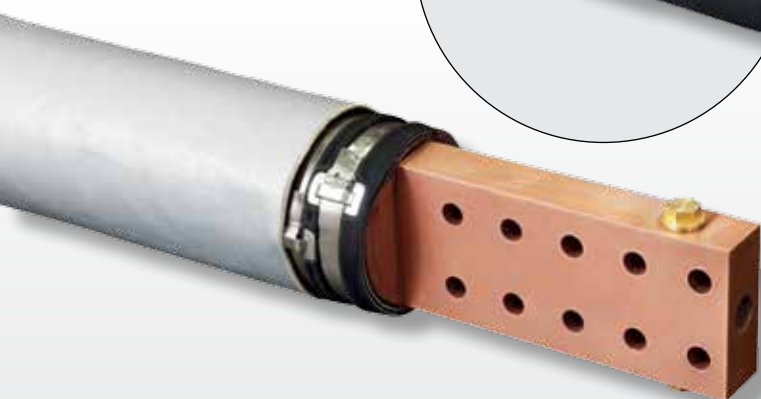


3. druseidt Abrasiv-hose with traffic light effect and additional mounted bumpers made out of flame retardant, self extinguishing rubber material. Bumper width ca. 170 mm, thickness ca. 23 mm.



4. druseidt Abrasiv-hose with traffic light effect and additional vulcanized heat protection. The length of the heat protection can be set according to the application from the customer. The inner core of the heat protection is temperature resistant up to + 700° C and has an additional external protection through to a + 300° C resistant silicone coating to achieve a beading of liquid metal splashes. Since the heat protection is vulcanized tight, a clean installation of several cables side by side is possible without any problems.

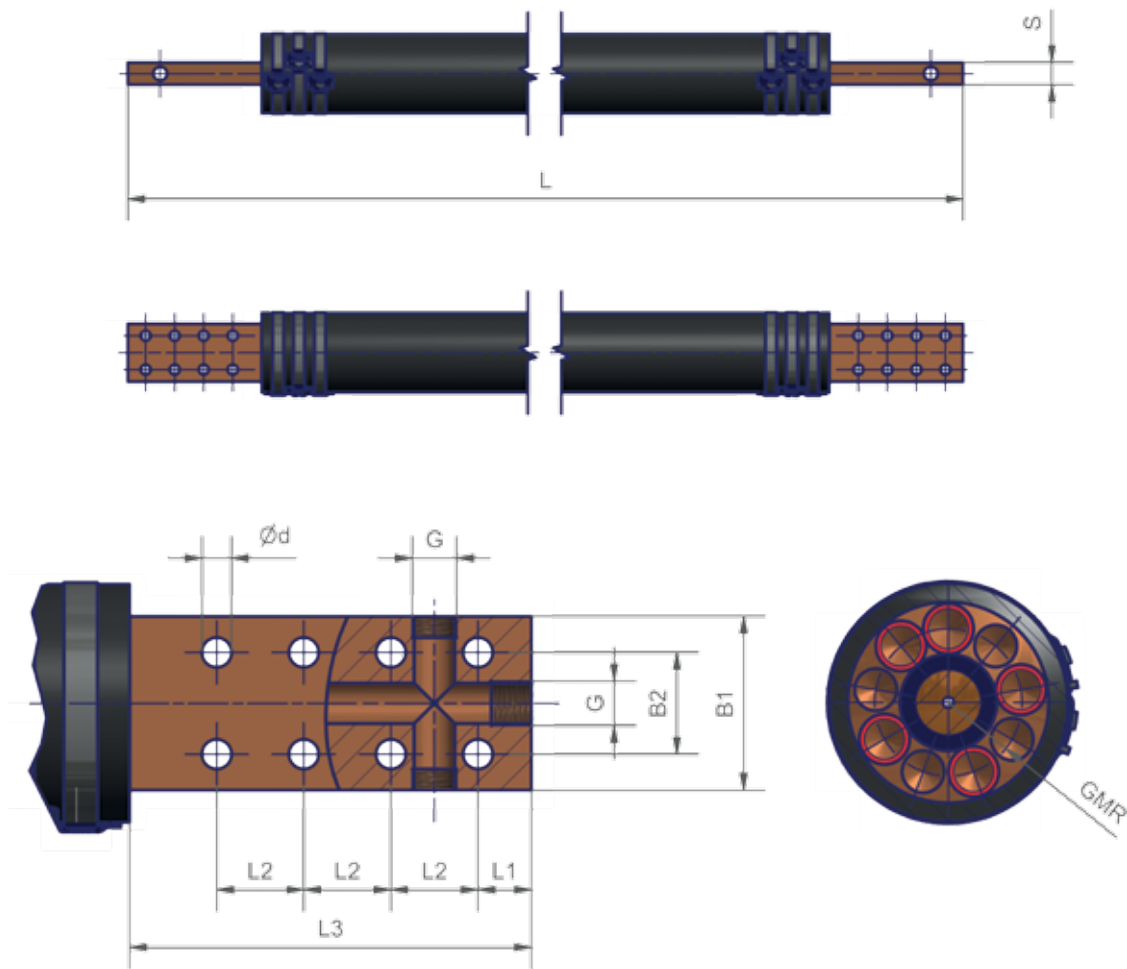
5. druseidt Abrasiv-hose with traffic light effect and additional winded heat protection made out of Therm Textile (different possibilities). Inner core temperature resistant up to + 700° C. Outer core made out of silicone temperature resistant up to + 300°C. Deliverable in sewn design or with Velcro fastener. Disadvantage compared with a vulcanized design is that the material is not tight against the tube and tears in use or decomposes. Therefore the life time is often not long enough. But such designs of heat protection can be replaced when worn as far as the hose underneath is undamaged.



Water cooled high current cables
with solderless pressed cable heads
preferably for electric arc- and ladle furnaces

Manufactured out of several flexible stranded copper ropes with a **cross-section range of 400 mm²** wrapped around a supporting tube. In standard design equipped with our Abrasiv-hose with traffic light effect. Other hoses or equipped with a rotating joint on one side on request.

Operating pressure: max. 6 bar
Testing pressure: 10 bar
Current load: As approximate value we recommend ca. 4,5 A/mm²



Part-No.	Technical data														
	cable constr. n x mm²	cross-section mm²	outer hose I Ø x ca. Wth.	dimensions mm											
				L	L1	L2	L3	B1	B2	d	G	S	GMR		
30510	5 x 400	2000	100 x 13	according to customers requirements	30	50	175	90	50	6 x 18	3/4"	35	34,5		
30511	6 x 400	2400	100 x 13		20	60	200	90	60	6 x 18	3/4"	40	34,5		
30512	7 x 400	2800	115 x 13,5		25	50	210	100	60	6 x 18	3/4"	50	42		
30513	8 x 400	3200	120 x 13,5		20	50	210	108	60	8 x 18	3/4"	50	44,5		
30514	9 x 400	3600	133 x 14		25	50	210	120	65	8 x 18	3/4"	50	51		
30515	10 x 400	4000	150 x 14		40	63,5	300	140	75	8 x 18	1"	50	59,5		
30516	11 x 400	4400	150 x 14		40	63,5	300	140	75	8 x 18	1"	50	59,5		
30517	12 x 400	4800	160 x 14		40	63,5	300	140	75	8 x 22	1"	60	64,5		
30518	13 x 400	5200	170 x 14		40	63,5	300	155	75	8 x 22	1"	60	69,5		
30519	14 x 400	5600	180 x 14		40	63,5	300	169	75	8 x 22	1"	60	73,5		
30520	15 x 400	6000	190 x 14		40	63,5	300	170	75	8 x 22	1"	60	78,5		

Water cooled high current cables with solderless pressed cable heads preferably for electric arc- and ladle furnaces

Manufactured out of several flexible stranded copper ropes with a **cross-section range of 500 mm²**, wrapped around a supporting tube. In standard design equipped with our Abrasiv-hose with traffic light effect. Other hoses or equipped with a rotating joint on one side on request.

Operating pressure:

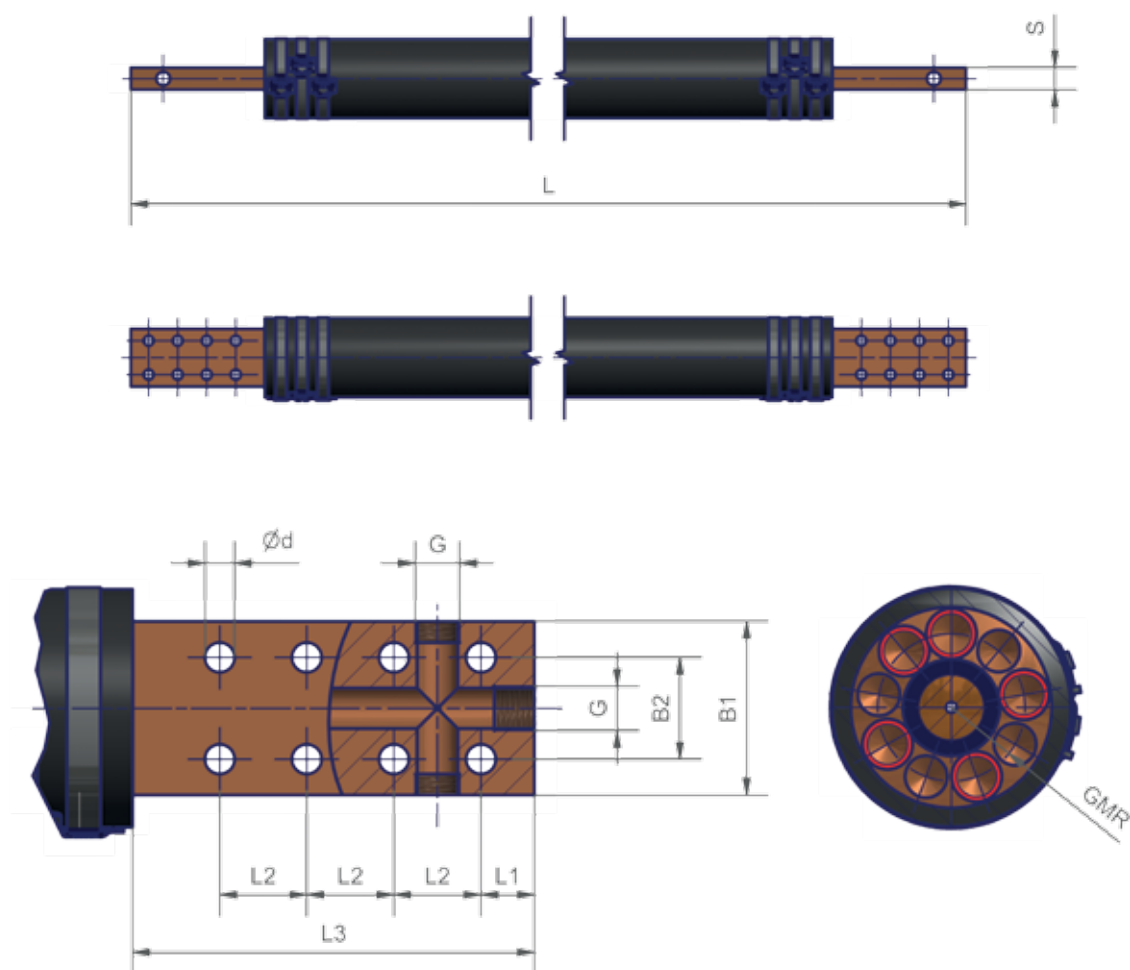
max. 6 bar

Testing pressure:

10 bar

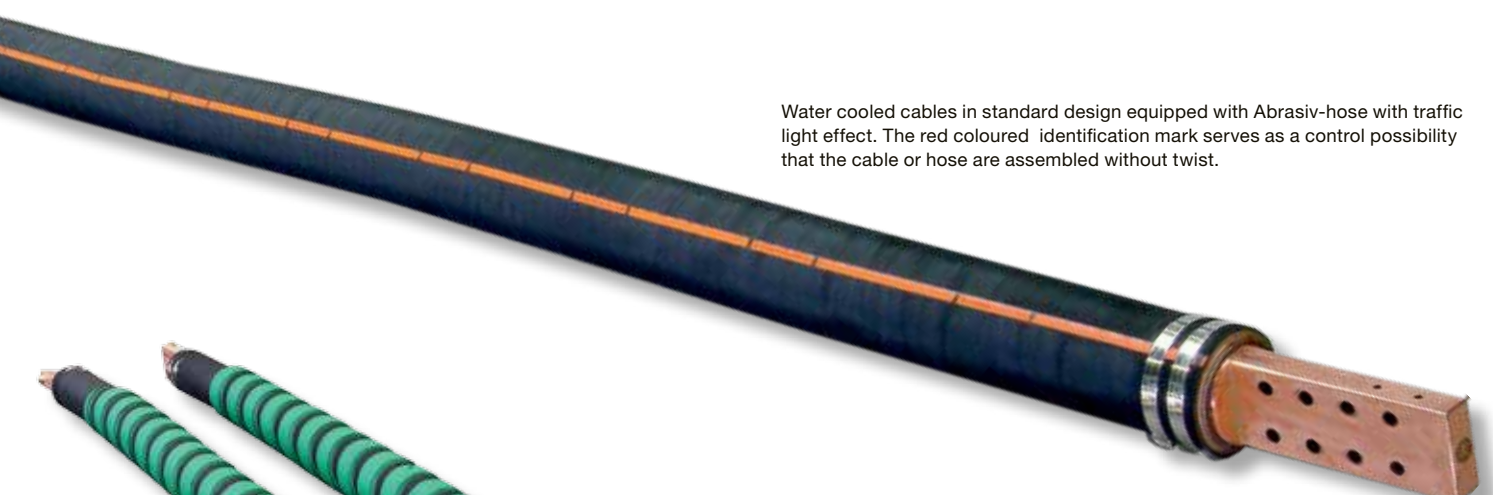
Current load:

As approximate value we recommend ca. 4,5 A/mm²




Part-No.	Technical data													
	cable constr. n x mm ²	cross-section mm ²	outer hose I Ø x ca. Wth.	L L1 L2 L3 B1 B2 d G S GMR	dimensions mm									
30525	4 x 500	2000	100 x 13		L	L1	L2	L3	B1	B2	d	G	S	GMR
30526	5 x 500	2500	100 x 13		30	50	210	80	50	8 x 18	3/4"	40	32,5	
30527	6 x 500	3000	110 x 13,5		20	60	230	85	55	8 x 18	1"	50	32,5	
30528	7 x 500	3500	120 x 13,5		30	60	250	95	60	8 x 18	1"	50	37	
30529	8 x 500	4000	133 x 14		30	60	250	105	60	8 x 18	1"	50	42	
30530	9 x 500	4500	150 x 14		40	65	300	120	76	8 x 22	1"	50	48,5	
30531	10 x 500	5000	160 x 14		40	65	300	130	76	8 x 22	1"	50	57	
30532	11 x 500	5500	170 x 14		40	65	300	140	76	8 x 22	1"	50	62	
30533	12 x 500	6000	180 x 14		40	65	300	160	76	8 x 22	1"	50	67	
30534	13 x 500	6500	190 x 14	40	65	300	160	89	8 x 22	1"	60	72		
	13 x 500	6500	190 x 14	30	72	360	160	89	10 x 22	1"	60	77		

Water cooled cables made by druseidt high quality „made in Germany“



Water cooled cables in standard design equipped with Abrasiv-hose with traffic light effect. The red coloured identification mark serves as a control possibility that the cable or hose are assembled without twist.



Water cooled standard cables but with Abrasiv-hose with additional spiral vulcanized abrasion protection. The ideal solution for abrasion problems.

Water cooled cables in special design

On request we can produce also water cooled high current cables with individual designed cable heads according to your drawings or samples or in non-standard cable constructions within a short time. Additionally to the cables for electric-arc furnaces we also manufacture smaller designs in a cross-section range between 120-2000 mm² for induction-, reduction-, vacuum- or graphitizing furnaces.

If you are interested, we would be happy to send you our special catalogue about these items.

Cable repairs

We undertake cable repairs in a short time and economically priced, both for our cables as well as those of other manufacturers.

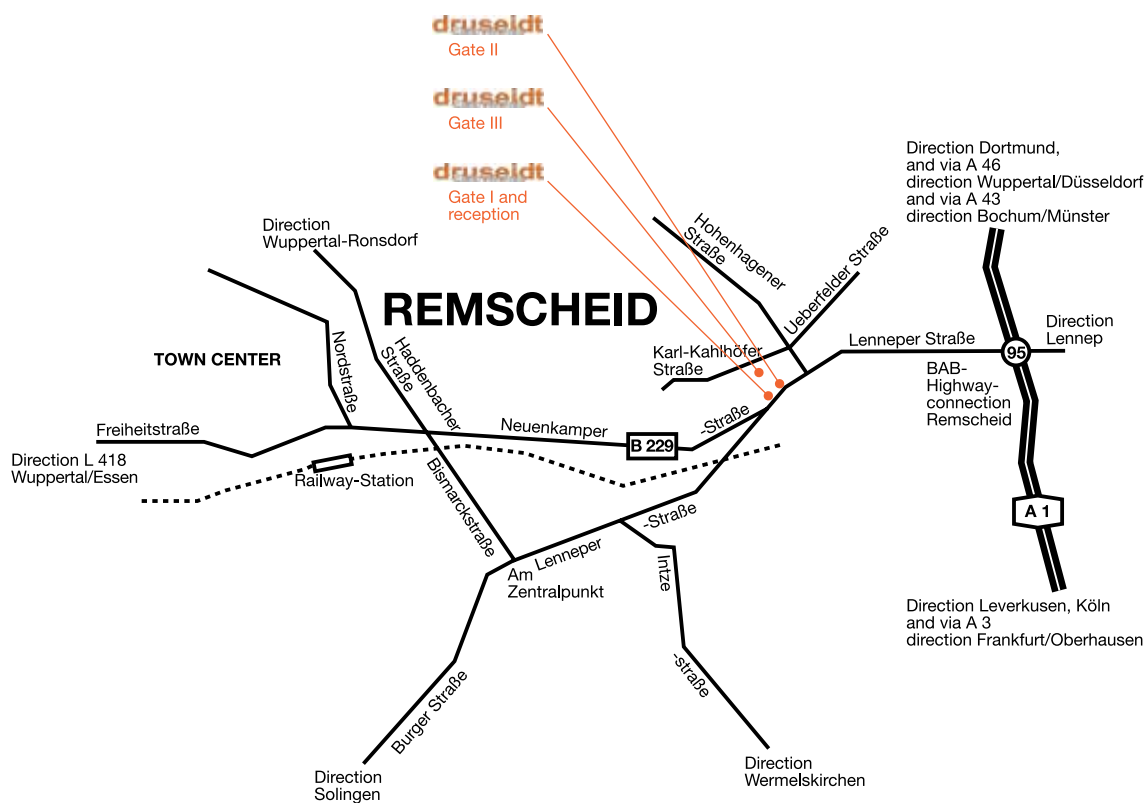
The following services are included in the standard repair.

- Demounting the cable
- Inspection and cleaning of the cable heads
- Inspection and cleaning of the inner conductors
- If available, removing, inspection and cleaning of the rotating joint as well as replacement of the sealing gaskets and slide rings
- Replacement of the coolant water hose
- Tightening with a tension band
- Pressure test with 10 bar
- Resistant measurement
- Disposal of the old hoses



General advice

The measurements and technical information written in this catalogue have been determined with greatest care and are updated continuously in our documentation. We reserve us the right to alter technical information as well as changes of measurements, colours or formats after print. **Our information, especially the values for possible current-loads are not binding, they are only approximate values under optimized conditions. The relation between conductor cross-section and current-load fixed in national or international regulations are not cancelled through our information.** Only the values in our written confirmations are binding for us.



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