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TRATOS

CABLES FOR A MOVING WORLD

TRATOS
RENEWABLE ENERGY

Mar **2010**
TCn11-Rev-10

STANDARDS AND QUALITY SYSTEM

QUALITY SYSTEM

Tratos aim to work closely with customers to find better, more environmentally friendly solutions to their challenges.
We are committed to our vision and strategy to serve all our internal and external customers by providing high quality services and products. Tratos is an established industry leader in the design, manufacture and supply of cables and products and to maintain this leading position we are committed at every level to providing our customers with quality services and products at a competitive price. As a commercial enterprise we are aware of the importance of satisfying our customers and of the financial impact of which nonconformities may have on our profitability. For these reasons we are committed to complying with all customer requirements and specifications both legal and statutory requirements. Our Quality Management System has been audited and approved by two independent, Internationally recognized and accepted authorities: BSI and AENOR-IQNET (E), in accordance to BS EN ISO 9001:2015 covering the production, purchasing of raw materials design and final test including various document types. The Tratos Quality Management system is under frequent regular surveillance by inspectors working for the Certification Autorities.

ENVIRONMENTAL SYSTEM

Our Environmental Management System has been audited and approved by two independent, Internationally recognized and accepted authorities:
BSI and AENOR-IQNET (E), in accordance to BS EN ISO 14001:2015 covering the production, purchasing of raw materials design and final test including various document types. The Tratos Quality Management system is under frequent regular surveillance by inspectors working for the Certification Autorities.

ENERGY MANAGEMENT SYSTEMS

By complying with the BS EN ISO 50001:2018 Tratos follows a systematic approach in achieving continual improvement of energy performance and the Energy Management Systems (EnMS).
The BS EN ISO 50001:2018 is a standard issued by the International Standard Organization (ISO) which outlines the requirements for establishing, implementing, maintaining and improving an energy management system (EnMS).

CIRCULAR ECONOMY

The EU Eco-Management and Audit Scheme (EMAS) is a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance. EMAS is open to every type of organisation eager to improve its environmental performance. It spans all economic and service sectors and is applicable worldwide.

AWARDS

Tratos cables are made with award winning Tratos-JBA® compound. Tratos UK Ltd has won a **Queen's Award for Enterprise - Innovation** for its technologically advanced Tratos-JBA® compound.

STANDARDS AND QUALITY SYSTEM

HEALTY & SAFETY SYSTEM

Oince its decision to create a board post dedicated to furthering best practice for Health and Safety, international cable manufacturer Tratos is celebrating receipt of ISO 45001.
ISO 45001 sets out the minimum requirements for occupational health and safety management best practice and helps companies achieve the maximum return for employees, operations and customers.

REACH, WEEE & ROHS

REACH COMPLIANT

Tratos is fully compliant with the **REACH**. This is a European Union regulation concerning the **Registration, Evaluation, Authorisation and restriction of Chemicals**. It came into force on 1st June 2007 and replaced a number of European Directives and Regulations with a single system. REACH applies to substances manufactured or imported into the EU in quantities of 1 tonne or more per year. Generally, it applies to all individual chemical substances on their own, in preparations or in articles . To summarise, REACH makes the cable industry directly responsible for assessing and managing the risks posed by chemicals and providing safety information to their users.

REACH COMPLIANT

Tratos fully subscribes to The **Waste Electrical and Electronic Equipment Directive (WEEE Directive)**, introduced into UK law in January 2007 by the Waste Electronic and Electrical Equipment Regulations 2006. The WEEE Directive aims to reduce the amount of electrical and electronic equipment being produced and to encourage everyone to reuse, recycle and recover it. The WEEE Directive also aims to improve the environmental performance of businesses that manufacture, supply, use, recycle and recover electrical and electronic equipment. TRATOS has enlisted the services of the UK's leading producer compliance scheme, Valpak, whom manage our recycling obligations and also ensure our compliance to the WEEE Regulations and the Waste Batteries and Accumulators Regulations.

REACH COMPLIANT

Tratos is fully compliant with the **Restriction of Hazardous Substances (RoHS) Regulations**. These Regulations implement EU Directive 2011/65/EU which bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. Tratos fully understands the requirements of the RoHS Directive and ensures that our products, and their components, comply.

CORPORATE SOCIAL RESPONSABILITY

Tratos adoptes a Code of Ethics which adheres to the United Nations Global Compact on human rights, labour standards, protection of the environment and anti corruption measures.
Under this self regulatory code, Tratos will carry out initiatives in the environmental and social fields with special reference to environmental policies and social policies regarding child labour, compulsory labour, health and security, freedom of association and the right to collective bargaining, discrimination, disciplinary procedures, working hours and wages.

APPROVALS

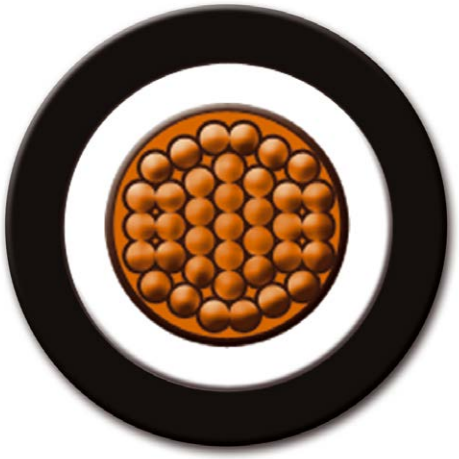
Solar Photovoltaic and Wind Power cables made by Tratos have been approved by the following Quality Organisations:

SOLAR PHOTOVOLTAICS

TRATOS DEDALUS® - from 0,9 to 1,8 kV

Tratos Dedalus cable was specially studied and designed for use in photo-voltaic installations for energy production. It can be used internally or externally, in fixed or mobile positions and also in tubes and ducts.

FEATURES AND PERFORMANCES



CONSTRUCTION

- **Conductor**: Tinned CopperCl. 5 - IEC 60228 (DIN VDE 0295) (CEI EN 60228)
- **Insulation:** InsulationHEPR type G21 (mix type EI8-CEI EN 50363)
- **Outer sheath**: EVA type M21(mix type EM4 CEI EN 50363) Insulation and sheath are completly bondedand compatible (two layers of insulation)
- **Standard colour**: black, red, blue
- **Marking**: TRATOS DEDALUS FG21M21 PV20 1xSEC IMQ

STANDARDS

- UL 4703 PV Wire
- TÜV 2 pfg 1169/08.2007 PV1-F for use in photovoltaic systems
- RoHS Compliant

Flame Test Compliances

- UL 2556 VW-1
- EN 60332-1-2 vertical flame

APPLICATIONS

System connected to the electricity supply	
• **Installation on roof**	Private: 2kW - 50kW
	Business: 10kW-1MW
• **Installation in field**	Industrial & Financial: 100kW-10MW
Isolated System	
• **Installation on Fields or Roof**	1kW-100kW

GENERAL CHARACTERISTICS

- **Resistant to corrosion from chemical agents and abrasion**
- **Direct burial**
- **Wide temperature range:** -40°C to +120°C
- **Optimal behaviour in case of fire**
  Flam propagation and emission of toxic/corrosive gas
- **Long term test:** PV20 (20.000 h)
- **Resistant to UV rays, ozone and moisture**
- **Cold impact**
- **Ease of assembly**
  - Installation possible internally and externally
  - In industrial and agricultural installations and in inflamable locations
  - Laying also possible in ducts and tubes with protection (cl.2)
- **Environmental compatibility**
  - Halogen free
  - Also in terms of ease of recycling and disposal it saves energy

TRATOS DEDALUS® - from 0,9 to 1,8 kV

Part Number TT	Nominal Cross Sectional Area mm²	Nominal conductor diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km	Minimum Bending Radious mm	Maximum Pulling Tension mm	Current Capacity at 60°C A
100545	4	2.5	5.9	75	23.6	60	55
100548	6	3	6.4	125	25.6	90	70
100554	10	4	7.6	160	30.4	150	98
100557	16	5	9.4	217	37.6	240	132
100560	25	6	10.8	346	43.2	375	176
100563	35	7.5	12.4	427	49.6	525	218
100566	50	9	14.4	602	57.6	750	276
100569	70	11	16.3	805	65.2	1,050	347

* Upon request we can produce up to 240 mm² csa

TECHNICAL INFORMATION

Long term test	**PV20**	20,000 h
	Temperature	120 °C
	% < 50 ellongation	
Eelectrical parameters	**Nominal Voltage**	0.6/1 kV (AC)
	Maximum working voltage in photovoltaic system	DC up to 2.0 kV
	Max. AC working voltage	0.7/1.2 kV
	Max. DC working voltage	0.9/1.8 kV
	Voltage test	6kV AC/10 kV DC (15 minutes)
	Current Capacity	According to DIN VDE 0298 Part 4 - IEC 60287
	Test	According to HD 22.2 - conductor resistance; voltage test in C.A. e D.C.; dielectric strength; surface resistance; spark test on the insulation; insulation resistance at 20 °C; at 90 °C in water and at 120 °C in air. CEI EN 50305 Part 6 – D.C. stability (10 days, 85 °C, salt water, 1.5 kV D.C.)
Mechanical parameters	**Normal pulling tension**	15 N/mm^2 in use, 50 N/mm^2 during installation
	Minimum bending radious	4 x D (D=cable diameter) see table
	Abrasion	According to DIN EN 53516 (on sand-paper)
	Hardness (Shore A)	85 according to CEI EN 53505
	Rodent resistance	Complete certainty can be obtained by using tubes for the protection of the cable and using special cable tipes with a metallix covering of either spiraled wires or a metallic braid
Thermal parameters	**Max. ambient temperature**	+120°C (fixed and mobile installation)
	Min. working temperature	-40°C (fixed and mobile installation)
	Max. conductor temperature	+120°C
	Max. short-circuit temperature	+ 250°C (on conductor, maximum 5 seconds)
	Low temperature resistance	Bending test at low temperature: according to CEI EN 60811-1-4. Impact resistance: conforming to CEI EN 50305
Chemical parameters	**Resistance to minaral oil**	24 h, 100 °C according to DIN VDE 0473-811-2-1, CEI EN 60811-2-1
	Resistance to atmospheric agents	Ozone resistance: according to CEI EN 50396 test typo B. HD 22.2.Resistance to UV: according to UL 1581 (Xeno-test), ISO 4892-2 (Mehtod A).Water absorption (gravimetric): according to DIN VDE 0473-811-1-3, CEI EN 60811-1-3.
	Behaviour in fire	Flame propagation: single cable according to CEI VDE 0482 Part 332-1-2,CEI EN 60332-1-2; bundle of cables according to DIN VDE 0482 Parte 266-2-5, DIN EN 50305-9.low smoke emission: according to DIN VDE 0482 Part 268-2, CEI EN 61034-2 (transmission of light > 70%). Corosivity: according to CEI EN 50267-2-2.Toxicity: according to CEI EN 50305, index (ITC) < 3.
	Enviromental compatibility	In accordance with the standards for the recycleability and the disposal in addition to saving energy durin production absence of polluting substances and halogens)

WIND POWER

TRATOS WIND® (N)TSCGEHXOEU - Single Core - from 18/30 kV to 20/35 kV

These cables are intented for use in wind turbines with high mechanical effort in a temperature range from 40°C to +90°C.
They can be installed free moveable, free hanging or fixed. For free hanging operation the cables are twistable.
Tratos Wind is used for economical transmission of large energy rates with medium voltage. In other respects DIN VDE 0250 applies.

FEATURES AND PERFORMANCES

CONSTRUCTION

- **Conductor**: Electrolytic copper, tinned, finely stranded, Class 5 according to DIN VDE 0295 / IEC 60228
- **Insulation:** Halogenfree, heat resistant insulation based on EPR
- **Electrical field control**: Inner and outer layer of semiconductive, halogenfree rubber
- **Screen**: Tinned copper wire serving, design acc. to DIN VDE 0250 part 1
- **Outer sheath**: Halogenfree special rubber compound. Resistant to heat, cold, UV, Ozone and mineral oil
- **Standard colour**: black
- **Core identification:** Natural colouring with black semiconductive rubber
- **Marking**: TRATOS WIND (N)TSCGEHXOEU (number of cores) x (crosssection) (voltage) + VDE

STANDARDS

- Based on IEC 60228

TRATOS WIND - (N)TSCGEHXOEU - Single Core

Nominal Cross Section mm²	Rated Voltage Uo/U (Um)	Screen section mm²	Minimum Outer Diameter mm	Maximum Outer Diameter mm
50	18 / 30 (36) kV	16	30.0	33.0
70	18 / 30 (36) kV	16	32.0	35.0
95	18 / 30 (36) kV	16	33.0	36.0
150	18 / 30 (36) kV	25	36.0	39.0
240	18 / 30 (36) kV	25	40.0	43.0
50	20 / 35 kV	25	32.0	35.0
70	20 / 35 kV	16	33.0	36.0
95	20 / 35 kV	16	34.0	37.0
150	20 / 35 kV	25	39.0	42.0
240	20 / 35 kV	25	42.0	45.0

TECHNICAL INFORMATION

Electrical parameters	**Rated voltage**	Uo/U = 18/30 kV to 20/35 kV
	Max. permissible operating voltage in AC systems	Uo/U = 20.3/36 kV to 24.3/42 kV
	Max. permissible operating voltage in DC systems	Uo/U = 27/45 kV to 31.5/63 kV
	AC test voltage	17 kV to 50 kV over 5 min., according to DIN VDE 0250, Part 813
	Current carrying capacity	The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30°C ambient temperature. (In other respects DIN VDE 0295, Part 4 applies)
Thermal parameters	**Maximum permissible operating temperature of the conductor**	permanent 90°C
	Ambient temperature	when in motion: 40°C when stationary: 40°C
	Short circuit temperature of the conductor	200°C
Mechanical parameters	**Tensile load**	Up to 20 N/mm^2 copper cross-section
	Torsional stresses	+/100°/m
	Minimum bending radius	See \"Selection data\"
Chemical parameters	**Resistance to mineral oil**	acc. to DIN EN 6081121 VDE 0473 Part 81121)
	Resistance to Ozone	acc. to DIN VDE 0282 Part 2, HD22.2 Test type B
	UV-resistance	acc. to ISO 49822 Method A
	Behaviour in case of fire	
	Flame propagation, single cable	acc. to DIN EN 6033221
	Smoke emission, light transmittance	acc. to DIN EN 502682
	Test for corrosive and acid gas emission	acc. to DIN EN 5026723

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