Cable filling and protection compounds catalog

REPSOL

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Index


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1. Introduction

For several years now, Repsol has been immersed in a process of transformation and diversification of its businesses with the aim of leading the energand transition. Today, it is the first company in its sector to support the Kyoto Protocol, the first to issue a green bond, as well as the first to set the goal of becoming a **net zero emissions** company by 2050 with intermediate targets for reducing its Carbon Intensity Indicator in 2020, 2025, 2030 and 2040.

To achieve net zero emissions by 2050, Repsol is committed to a model that integrates all technologies for decarbonization, based on improving efficiency, renewable power generation, products with a low, neutral or even negative carbon footprint, circular economy, industrial innovation and the development of new solutions based on digitalization. .

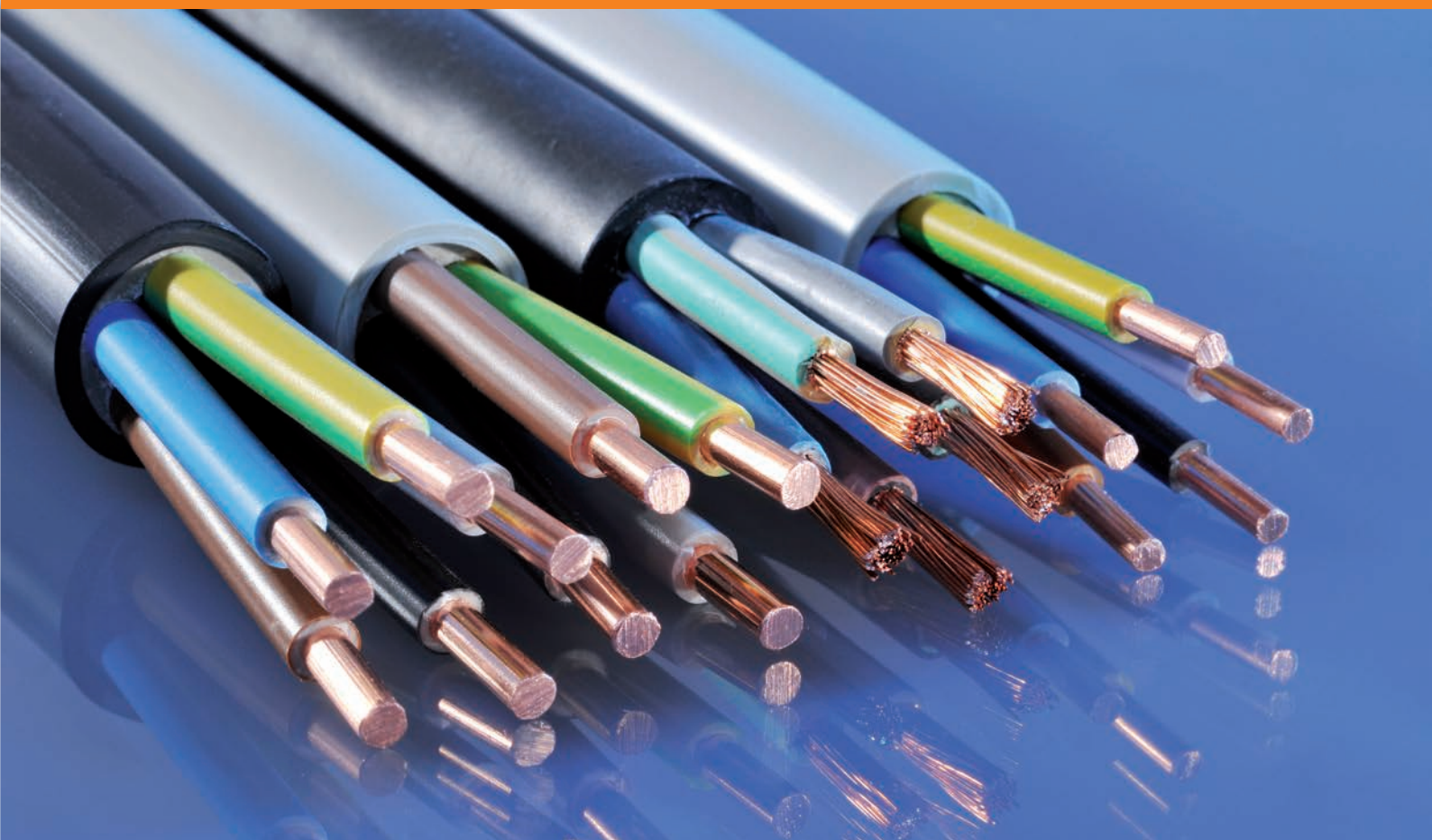
The Repsol Commitment
Net Zero Emissions
by 2050

Repsol Lubricantes and Especialidades, S.A. is the **Repsol** Group's company devoted to the research, development, production and marketing of high value-added products derived from oil.

We produce and market a wide range of compounds that are formulated from raw materials of different types (mineral and synthetic) for the filling and protection of different types of cables.

Compounds for telecommunications cable filling (Conventional Telephone and Optical Fiber) can be differentiated from external protection compounds for electrical cables, traction cables, and special cables.

Repsol adapts to the changes and demands of the market and clients by formulating and developing special "customized" compounds to meet each client's needs.



2. Filling compounds for telecommunication cables

Cable filling compounds (filling and flooding types) by Repsol provide a perfect seal and protection against corrosion and potential dielectric problems, acting as a barrier against water, which insulates the metal conduction threads in conventional copper telephone cables (JFTC) and the Optical Fiber Cables (OFC) in the event of failure in the cable's coating or its joints.

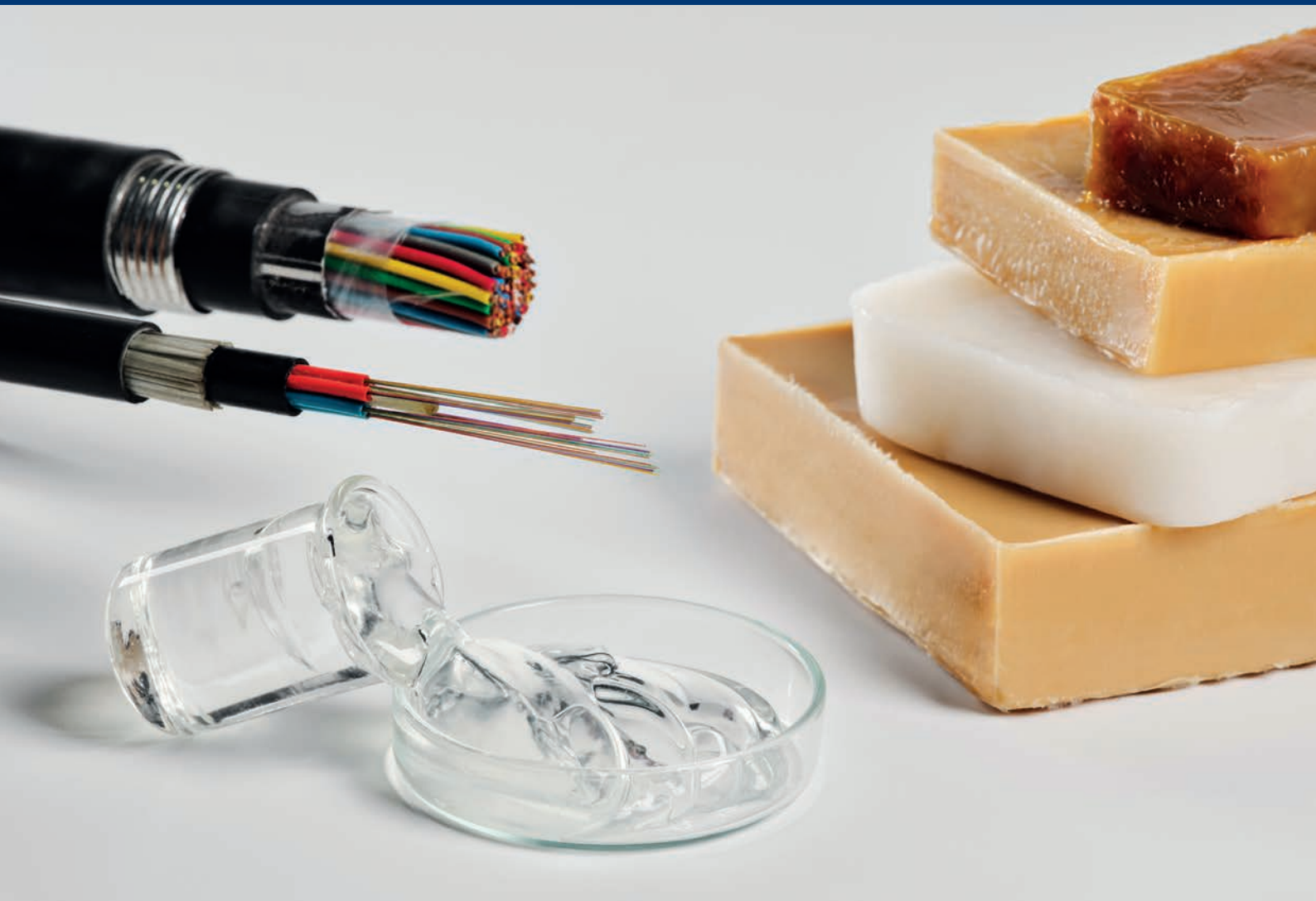
Different filling product ranges are categorized for telecommunications cables depending upon the nature of their composition:

- **CECA® range:** mineral-based.
- **CECAFLEX® and CECAGEL® ranges:** mixed or semi-synthetic-based.
- **CECAGEL-T® range:** synthetic-based.

The **CECA®** and **CECAFLEX®** ranges apply to Jelly-Filled Telephone Cables (JFTC).
The **CECAGEL®** range is for flooding and the special **CECAGEL-T®** range for filling are applicable to Optical Fiber Cables (OFC).

Packaging and Delivery

230-liter palletized steel drums.
120 drums per truck or **80 drums** per **20-foot** container for maritime transport.
CECAGEL-T® is also supplied in rigid IBCs.



2.1. Conventional Telephone Cables (JFTC)

Repsol has many ranges of products for conventional telephone cables (JFTC, or Jelly-Filled Telephone Cables):

- **CECA® range:** mineral-based.
- **CECAFLEX® range:** mixed or semi-synthetic-based.

CECA® range

The **CECA® range** by Repsol belongs to the group known as **"Petrolates"** or **"PJ, Petroleum Jelly"** and are mineral-based compounds.

The compounds in the **CECA® range** are **compatible** with high and medium-density polyethylenes used in the manufacturing of insulating tubes and coverings. They offer **excellent physical properties** that make them appropriate for use in cables with any number of pairs.

They are characterized by their high melting point, for being **water-repellent,** and for their excellent dielectric properties, which delay the process of the cable's deterioration throughout its life span of service. They are **easy to process** and are disposed of using simple physical methods.

In the catalogue, there is a wide **variety of compounds** within this range, in which the cable manufacturer can select from among high or medium **dropping point** products, depending upon the area's weather (hot or temperate); products with different **viscosity** levels which are adapted to the various application processes; and high or low-**penetration** products, which are appropriate for cold pumping (room temperature) and hot pumping (up to 120ºC) processes.

PHYSICAL PROPERTIES

	Melting point ºC	Drop point ºC (min)	Viscosity @ 120ºC cSt (max)	Penetration @ 25ºC mm/10 (min)	Oil separation @ 50ºC, 24h
	ASTM D-127	ASTM D-566	ASTM D-445	ASTM D-937	IEC-811-5-1
CECA 70	108-80	80	70	50	Pass
CECA 75	95-108	95	65	50	Pass
CECA 1590	74-78	70	20	110	Pass
CECA 1190	75 min	70	16	60	Pass
CECA F-90	90 min	85	30 typical	85	Pass

DIELECTRIC PROPERTIES

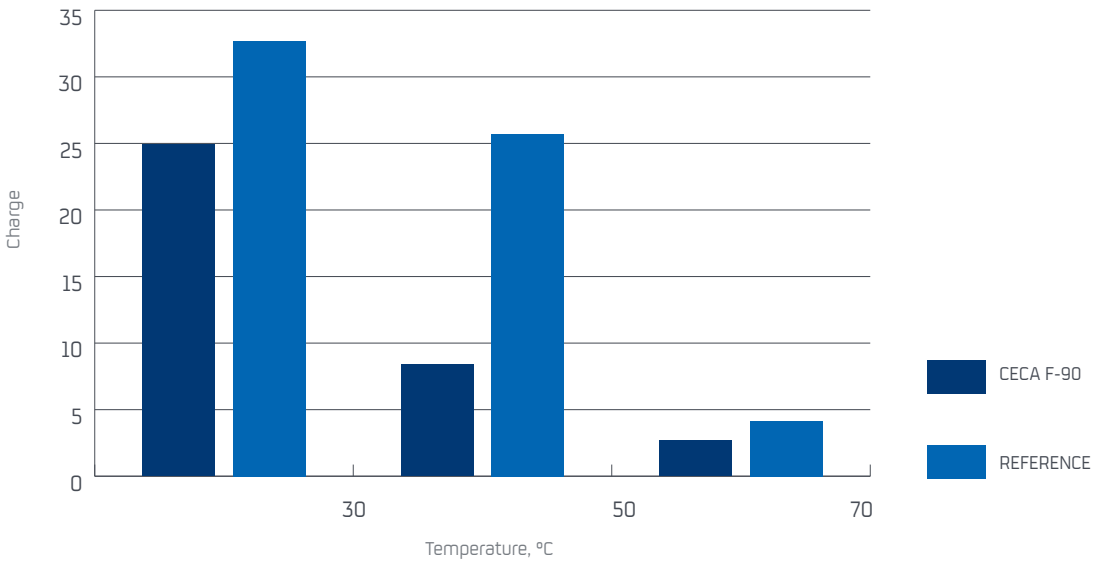
	Rel. permittivity @ 23ºC	Volumetric resistivity @ 23ºC (Ohm·cm)
	ASTM D-150	ASTM D-150
CECA 70	2,3 max.	1E+14 min.
CECA 75	2,3 max.	1E+13 min.
CECA 1590	2,3 max.	1E+13 min.
CECA 1190	2,3 max.	1E+13 min.
CECA F-90	2,3 max.	1,E+14

APPLICATION

	Type of injection	Climate
CECA 70	Hot	Warm
CECA 75	Hot	Warm
CECA 1590	Moderate temp.	Temperate
CECA 1190	Moderate temp.	Temperate
CECA F-90	Ambient temp. (cold pumping)	Temperate

The values indicated in the tables should not be considered as product specifications but as typical values.

Pumping test.
Cold injection characteristics of CECA® F-90



CECAFLEX® range

The **CECAFLEX® range** by Repsol belongs to the group known as **Flex Gel** or **ETPR** (Extended Thermal Plastic Rubber) and the products are of a **semi-synthetic nature,** produced using petroleum-based **waxes,** mineral **oils,** and hydrogenated thermal plastic **polymers.**

This range of compounds was designed for those cable manufacturers that require **white non-unctuous** products with a compact, easy-to-clean appearance, which are those most appropriate when seeking to reduce the installation time for cables in works using clean products. They are compliant with the **REA Standard** and are specially designed for the American market. They are characterized by excellent **flexibility at low temperatures** and a **low thermal contraction.**

CHARACTERISTIC	UNIT	METHOD	CECAFLEX® V
Nature	-	-	MIXED
Color	-	Visual	White
Melting point .	ºC	ASTM D-127	90 min
Brookfield viscosity @ 120ºC (SPDL21; 100 rpm)	cP	IT-LAB-138	20-30
Penetration @ 25ºC	mm/10	ASTM D-937	140
Fluidity/Oil separation @ 65ºC, 24h	-	IEC-811-5-1	Pass
Rel. permittivity @ 23ºC	-	IT.LAB.104 (ASTM D-150)	2,3 max
Volumetric resistivity @ 23ºC	Ohm.cm	IT.LAB.105 (ASTM D-257)	1E+13 min
Electrical dissipation factor, Tg Delta, @ 23ºC (1MHz-100KHz)	-	IT.LAB.104 (ASTM D-150)	0,005 max

The values indicated in the tables should not be considered as product specifications but as typical values.

2.2. Optical fiber cables (OFC)

Repsol has many ranges of products for the **filling and flooding** of optical fiber cables (OFC, "Optical Fiber Cable"):

- **CECAGEL-T® range:** synthetic-based, for FILLING.
- **CECAGEL® range:** mineral and mixed (or semi-synthetic) based, for FLOODING.

CECAGEL-T® range filling for optical fiber cables

The compounds of the **CECAGEL-T® range** are filling gels for optical fiber cables (OFC). They are transparent and non-Newtonian **(thixotropic)** (see Gr. 1).

The **CECAGEL-T® range** by Repsol represents the most state-of-the-art technology in filling products.

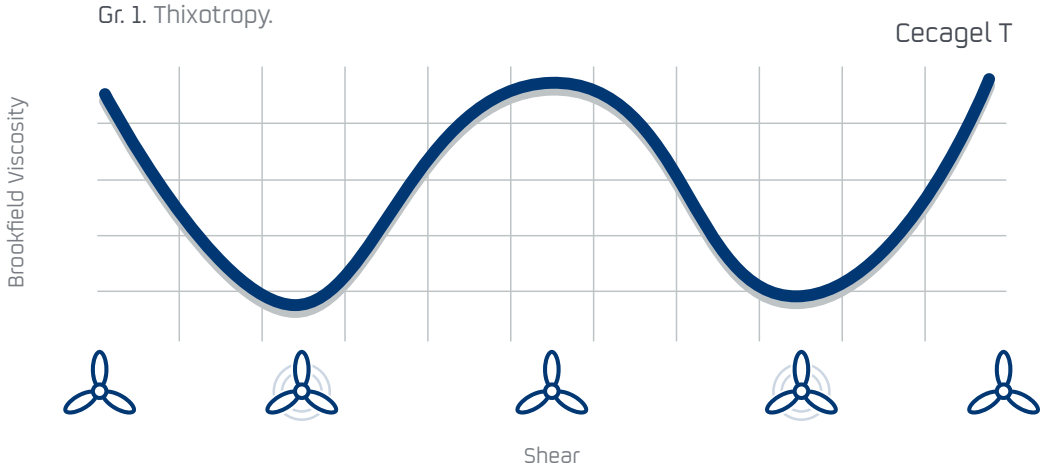
They are entirely formulated using high-purity **synthetic bases** which provide a **gel structure** of a **highly water-repellent** nature that possesses the proper transparency and **thermal stability** properties for Optical Fiber cables.

Thanks to their special characteristics, **they may be applied at room temperature** (25ºC) by simple pumping, in such a way that when the filling lies at rest inside of the cable, it turns into a gel, thereby forming an effective protection barrier.

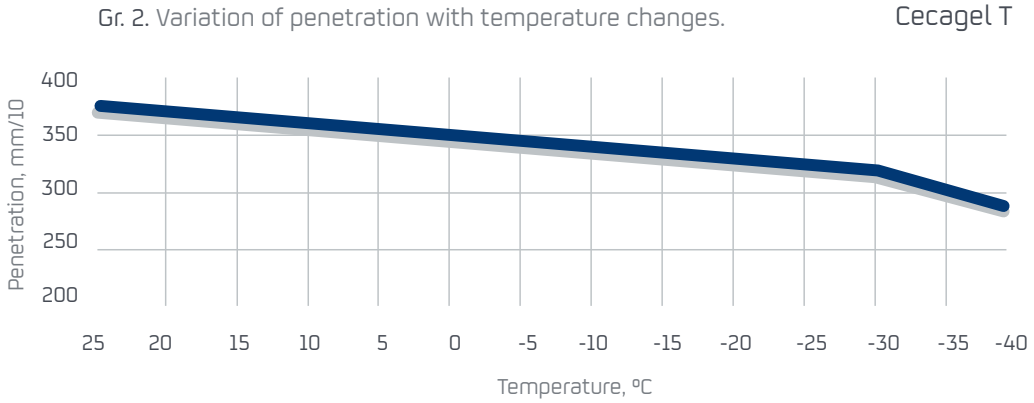
These compounds also display excellent behavior at low temperatures, with their **penetration** remaining practically invariable (see Gr. 2) and with enough **fluidity** to measure their viscosity, in such a way that they facilitate the proper positioning of small optical fibers, avoiding dangerous micro-folds.

The **CECAGEL-T®** compounds are **compatible** with the primary and secondary coverings normally used to cover optical fiber cables, such as PVC, nylon, and polyethylene, as well as others.

Gr. 1. Thixotropy.



Gr. 2. Variation of penetration with temperature changes.



FILLING

CHARACTERISTICS		UNIT	METHOD	CECAGEL T®-400
Nature		-	-	SYNTHETIC
Drop point		ºC	ASTM D-566	> 200
Density @ 25ºC		g/ml	ASTM D-1475	0,84
Penetration	@ -40ºC	mm/10	ASTM D-937	> 230
	@ -30ºC			> 320
	@ 25ºC			> 370
Brookfield viscosity (SP29/10rpm)	@ 70ºC	cP	IT-LAB-138	16.000
	@ 30ºC			27.000
Viscosity 50 s-1	@ 25ºC		parallel plates	4.500±500
Oil separation	@ 100ºC, 24h	%p	FTM-791	0
	@ 150ºC, 24h			< 8
Volatiles @ 100ºC, 24h		%	IT-LAB-178	< 1
Oxidation Induction time, OIT @ 190ºC		minutes	IT-LAB-142	> 30
Application temperature		ºC	-	-40 @ 100
Flash point		ºC	ASTM D-92	> 220

The values indicated in the tables should not be considered as product specifications but as typical values.

CECAGEL® range flooding for optical fiber cables

The **CECAGEL® range** compounds for optical fiber cable (OFC) **flooding** have mineral or mixed (synthetic and mineral) bases.

This type of flooding provides high adherence to the cable's covering and has a high drop point.

FLOODING

CHARACTERISTIC		UNIT	METHOD	CECAGEL® F-200	CECAGEL® RT3
Nature		-	-	MIXED	MINERAL
Congealing point		ºC	ASTM D-938	89	-
Melting point		ºC	ASTM D-127	-	85 min. (90 tip)
Drop point		ºC	ASTM D-566	90 min. (100 tip)	-
Penetration @ 25ºC		mm/10	ASTM D-937	125	65
Brookfield viscosity @ 100ºC		cP	IT.LAB.138	-	20 min. (35 tip)
Viscosity	@ 100ºC	cSt	ASTM D-445	-	30 min. (38 tip)
	@ 110ºC			230	-
	@ 120ºC			230	-
	@ 130ºC			230	-
Flash point .		ºC	ASTM D-792	240 min.	240 min.
Rel. permittivity @ 23ºC		-	IT.LAB.104 (ASTM D-150)	-	2,3 max.
Volumetric resistivity	@ 23ºC	Ohm.cm	IT.LAB.105 (ASTM D-150)	2E+13 tip	>10E+17
	@ 100ºC			2E+12 tip	5E+13 tip
Fluidity/Oil separation @ 50ºC, 24hx5		-	IT.LAB.119	-	Pass
Color		-	ASTM D-1500	5,5	5,6

The values indicated in the tables should not be considered as product specifications but as typical values.

3. Protection compounds for cables

Repsol has a range of different types of compounds, designed for the external protection of cables.

- **CELEC® range:** for the protection of electrical (or power) cables.
- **CEVA® and CECAGEL® 20 ranges:** for the protection of traction and special cables.

The CELEC® and CEVA® ranges are mineral-based compounds (PJ, Petroleum Jellies), while the special compound CECAGEL® 20 is synthetic and is formulated with a base of polybutenes.

Presentation
180 kg palletized steel drums.
120 drums per truck or 80 drums per 20-foot container for maritime transport.

3.1. Electric cables

CELEC® range

The compounds in the **CELEC® range** are used for the protection of **low, medium, and high-voltage electric cables.** They very effectively delay the **effects of atmospheric agents** suffered by cables exposed to outdoor conditions, thereby avoiding losses of electricity.

These compounds are complex mixtures of products which are **"Petrolates" or "PJ" (Petroleum Jelly)**, -based, and are modified with different **additives** that provide them with excellent **anchoring characteristics** to metallic surfaces and **electrical insulation** properties. The special additives provide these products with excellent **metal protection outdoors,** even in extreme conditions, which along with their **durability,** ensures the correct protection of power transmission cables during long periods of time.

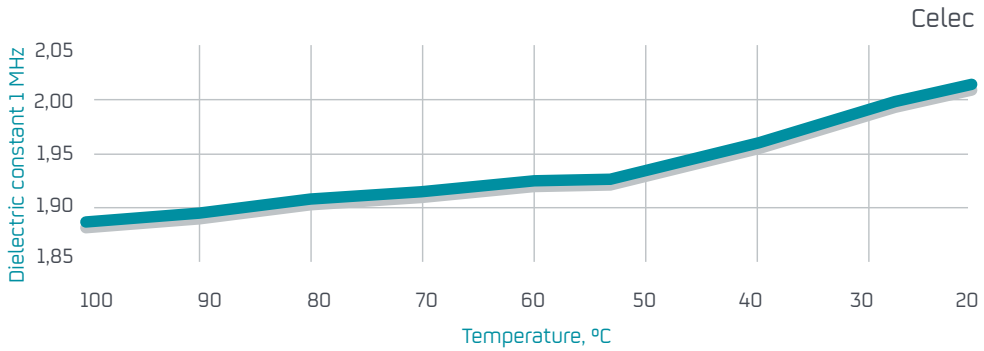
The **CELEC® range** of greases act as **electrical, anti-corrosion, and anti-wear protection** on the metallic conductors that are exposed to the outdoors, which is why they undergo different climatic tests in the laboratory, following the strictest international regulations with the goal of controlling their ability as anti-corrosion agents under different conditions, such as saline and acidic environments and under different degrees of temperature and humidity.

These greases are applied on the bare metal conductors of overhead power lines manufactured from **aluminum** threads, aluminum alloys, **steel** threads, or a combination of these threads **(ACSR).** According to the UNE EN 50326 standard, CELEC 100 and CELEC P100 are type B greases for hot application and comply with the - 20B105 designation.

In these compounds, the increase in the **relative permittivity** with the temperature is moderate, though in no case does it surpass a value of 2,3 at 23ºC (see Gr. 3).

CELEC 100 is available in bulk in 180 kg drums and CELEC P100 in 5 kg slab format (in 25 kg crates).

Gr. 3. Variation of the dielectric constant



CELEC® RANGE

CHARACTERISTIC	UNIT	METHOD	CELEC® P100	CELEC® 100
Melting point	ºC	ASTM D-127	105-115	100-115
Drop point	ºC	ASTM D-566 / ISO 2176 EN 50326 (6.5)	≥ 105	≥ 105
Penetration @ 25ºC	mm/10	ASTM D-937 / ISO 2137 EN 50326 (6.5)	20-45**	50
Viscosity @ 120ºC	cSt	ASTM D-445	≤ 25	≤ 90
Dielectric cst. @ 23ºC	-	ASTM D-150	≤ 2.3	≤ 2.3
Volumetric resistivity @ 23ºC	Ohm cm	ASTM D-257	1,00E+14	1,00E+14
Flexibility and bending @ -20ºC	-	IT.LAB.103 EN 50326 (6.12.2)	Pass	Pass
Fluidity and separation @ 50ºC, 24h	-	IEC-811-5-1	Pass	Pass
Aging/Corrosion	-	EN 50326 (6.12.2)	Pass	Pass
ASTM color	-	ASTM D-1500	L5,5	L5,5
Acidity index	mg KOH/gr	IT.LAB.185 EN 50326 (6.10.3)	≤ 0.5	≤ 1.5
Flash point	ºC	ASTM D-92	≥ 280	≥ 250
Presentation	-	-	5 kg slabs (in 25 kg crates)	Bulk (230 L drums)

** The penetrability test does not meet the criteria established in the aforementioned standard (120-180 dmm), as the product is in slab format. If you require these criteria to be met, please see the alternative product CELEC 100.

The values indicated in the tables should not be considered as product specifications but as typical values.

3.2. Traction and special cables

Repsol's traction and special cables compounds have been designed to protect and lubricate traction cables used in elevators, cable cars, and cranes, avoiding **corrosion** and **wear,** as well as in other fields of mechanics and engineering.

They are designed to achieve high performance in the most adverse conditions, for which reason they are subjected to tests under severe corrosion conditions in climate chambers, complying with international regulations.

Repsol offers various groups of products according to the origin of the raw materials, its formulas, and their intended purpose.

CEVA® range

The **CEVA® range** includes **"Petrolates"** or **PJ ("Petroleum Jelly"), mineral-based** compounds that protect the cables from corrosion, lubricate their interior, and provide a certain degree of plasticity.

Their adequate formulation allows them to maintain their qualities of **flexibility** and **adherence** at very low temperatures in all types of metal cables.

CEVA® RANGE

CHARACTERISTIC		UNIT	METHOD	CEVA® 27
Color		-	VISUAL	Brown
Melting point		ºC	ASTM D-127	56-62
Drop point		ºC	ASTM D-566	50
Viscosity @ 100ºC		cSt	ASTM D-445	15-21
Cone penetration	@ 25ºC	mm/10	ASTM D-937	60-80
	@ -20ºC			28
Density @ 15ºC		g/cc	ASTM D-1298	0,90-0,92
Aniline point		ºC	ASTM D-611	105 min
Open-cup flashpoint		ºC	ASTM D-92	260
Specific heat @ 100ºC		J/gK	-	2,2
Bending		-	CM-35	-20, Pass

The values indicated in the tables should not be considered as product specifications but as typical values.

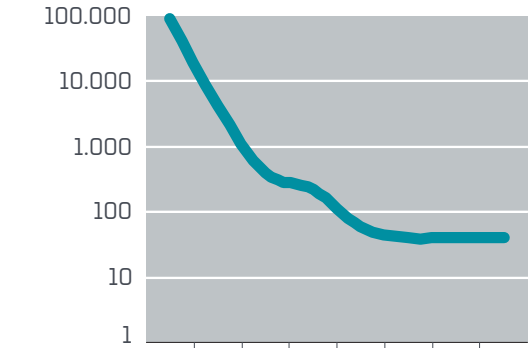
CECAGEL 20® range

CECAGEL 20® from Repsol is a traction cable compound which is applied both for the **external protection against corrosion and fatigue** and for the lubrication of metallic cables used in lifts, cable railways, cranes and other areas of mechanics and engineering.

It is based in mixtures of synthetic polyethylene waxes, polybutylenes, and additives (as antioxidants).

CECAGEL 20® is supplied in **220 liter drums.** It must be stored at 25ºC in the darkness, hermetically sealed and removed from humidity.

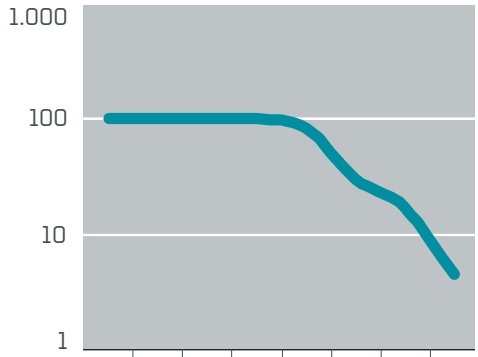
Viscosity (mp)



	80	90	100	110	120	130	140	150
CECAGEL 20	90.000	4.200	400	220	60	40	40	40

Temperature, ºC

Load (kg)



	30	40	50	60	70	80	90	100
CECAGEL 20	100	100	100	100	83	30	17	4,5

Temperature, ºC

CECAGEL 20® RANGE

CHARACTERISTIC	UNIT	METHOD	CECAGEL 20®
Melting point	ºC	ASTM D-127	111 tip
Cone penetration @ 25ºC	mm/10	ASTM D-937	17 tip
Brookfield viscosity @ 149ºC (SPDL 21, 100 rpm)	cP	ASTM D-3236	30-80 (45 tip)
Flash point	ºC	ASTM D-92	250 tip
Benzo(a)pyrene (BaP) level	mg/kg	Grimmer / GCMS (SIM)	0,03 max
Polycyclic aromatic hydrocarbons (PAHs) level	mg/kg	Grimmer / GCMS (SIM)	1.000 max
Drip test @ 70ºC	% w	FTMS-791	0
Fluidity and separation @ 50ºC, 24h	mm	IEC-811-5-1	0

The values indicated in the tables should not be considered as product specifications but as typical values.

4. Technical support and development

The Especialidades area of Repsol is fully oriented towards its clients, making available all of its human and material capacities for innovation: the Technical Support and Development team and the Repsol Technology Lab research center, which are equipped with the most advanced means to carry out their purpose.

The functions of the Technical Support and Development team include:

- Providing technical advice to clients.
- Developing new products conjointly with clients on notable projects.
- Promoting consistent quality and competitiveness of products.
- Constantly establishing and updating technical specifications.
- Detecting the market's demands and needs.
- Giving training courses to both staff and clients.
- Taking part in and cooperating with national, international, public and private entities and institutions related with its field of activity.

The Technical Assistance and Development team of Repsol cooperates with the clients to search for solutions which have specific requirements.

This commitment to development and innovation through cooperation is translated into a competitive advantage for both parties.

5. Customer service and Specialized Products commercial network

Our extensive network of experts in Specialized Products is at your disposal at our headquarters at Calle Méndez Álvaro 44, Madrid, so that you can place your orders as comfortable and easily as possible. You can contact us by email:

especialidades@repsol.com

901 111 999

6. Quality, safety, environment and energy efficiency

Quality

We are advancing progressively towards Excellence, following the quality model appropriate to the different geographic environments in our activities, through periodical self-assessments, identification of improvement areas, establishment of programs based on teamwork, and participation of the entire organization."

We apply the quality management principles in line with the current ISO 9001 and IATF 16949 Norms.

Safety

Our goal is to carry out all our activities by considering the health and safety of people as essential values.

In our commitment to people, we are advancing progressively towards excellence, carrying out systematic improvement actions, in line with the challenges and objectives of each business/area according to the criteria of the current ISO 45001 norm

Environment and Energy Efficiency

- All our complexes and subsidiaries carry out their activities according to the Environmental and Energy Efficiency Management System criteria of the current ISO 14001 and ISO 50001 Norms.
- We are committed to energy efficiency to achieve our greenhouse gas emissions, energy intensity, and carbon intensity reduction plans and objectives.
- We are carrying out soil and underground water control actions that serve as preventive measures against subsoil contamination.
- In the complexes and subsidiaries, we carry out control, treatment, and operational monitoring actions.


REPSOL

Let's invent the future

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