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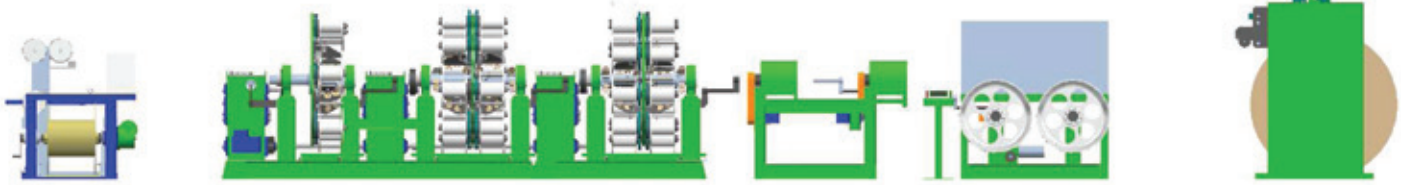

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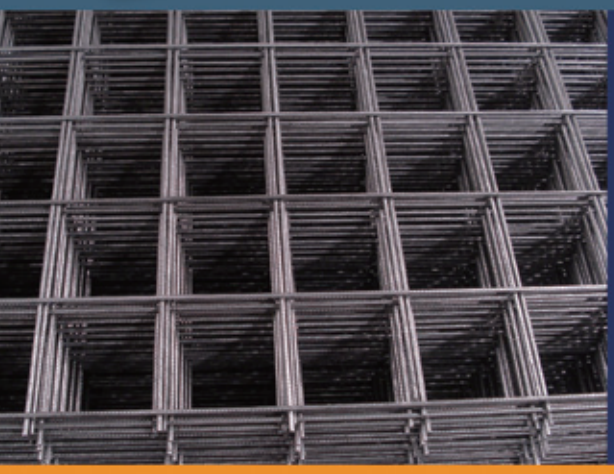
WIRE STRAIGHTENING AND CUTTING MACHINE GT5-12



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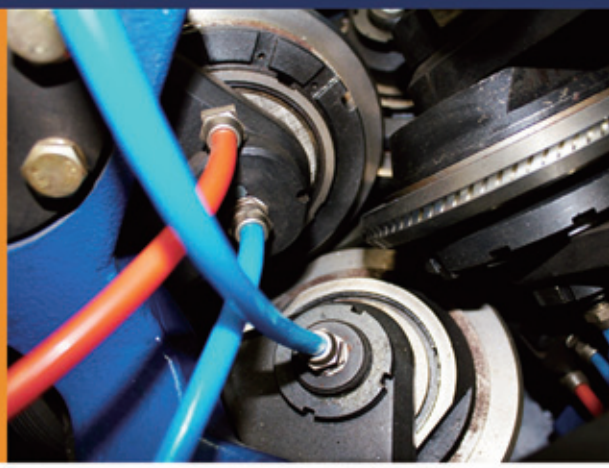

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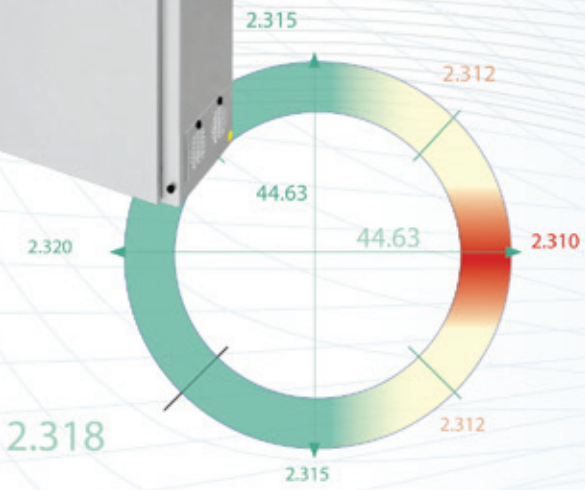

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Getting Smart in the fight against the copper criminals

There's nothing worse than travelling and finding your trip delayed.

Whether it be roadworks, delays because of foreign air traffic strikes, or more pertinently these days, train journeys interrupted by thieves stealing cables from the rail network.

It's easy to see that the thieves are after making a quick buck when copper is selling at £6,200 per tonne. (January 2011).

However, they receive only a pittance from the copper and the cost of the repairs will, inevitably, be passed on to the train user.

An example of this is that two Newark, Nottinghamshire, UK, men stole just a few metres of signalling cable from the main Edinburgh to London line. They got £44 each for their efforts – and three years in prison once they had been caught.

The other side to this was that that single theft caused delays to more than 100 trains, chaos to the travellers and landed Network Rail with a £75,000 bill to make the repairs. All that for £44!

Network Rail suggests that cable thefts from its lines has cost somewhere in the region of £35m during the last four years.

There is a spin off from this as well. It seems crooks – sometimes organised gangs of them – are targeting electricity, gas connections and telephone wires as well in their hunger for copper.

It is therefore refreshing to see the police and rail networks joining forces in a bid to beat the criminals (Stopping the cable thieves, page 9).

That clampdown has had to come. The use of SmartWater to trap the thieves finally gives the authorities the evidence they need to stop these thefts.

Let us hope the courts hand down severe enough justice to deter them even more.

David Bell
Editor

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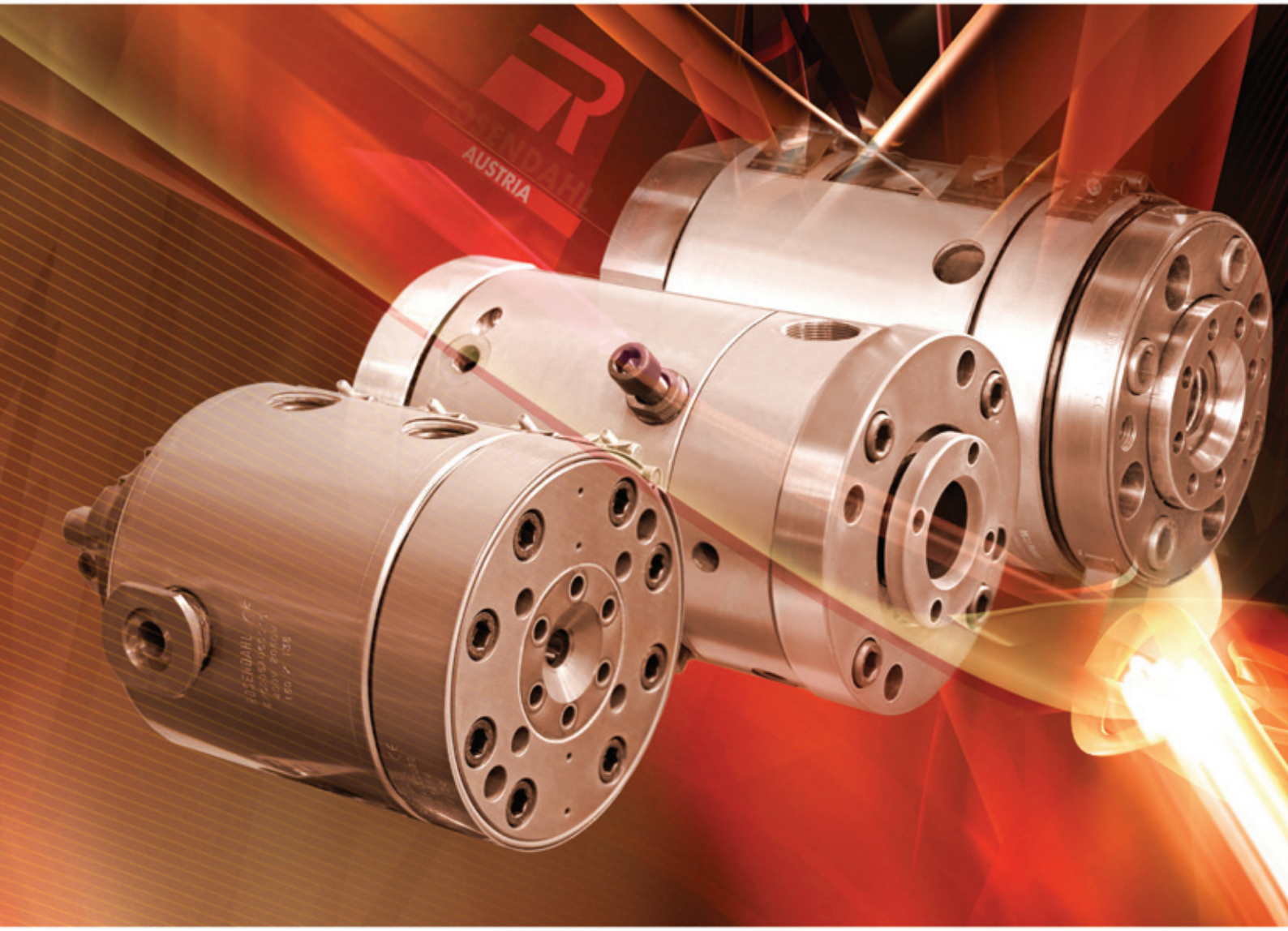

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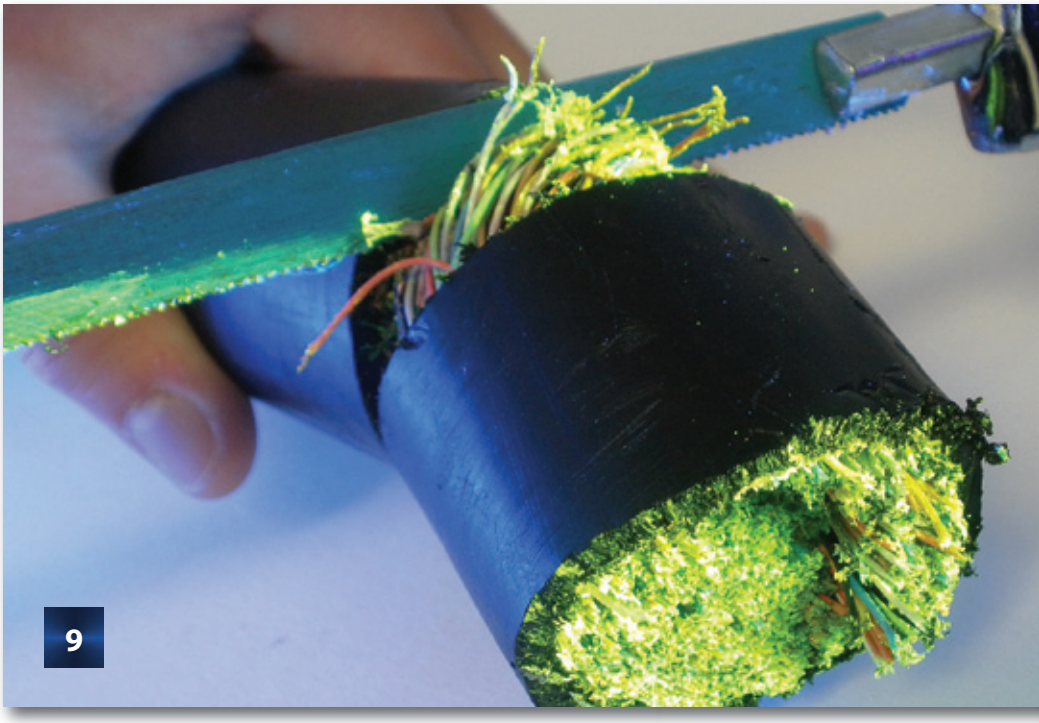

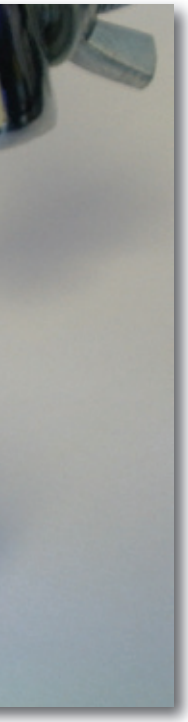

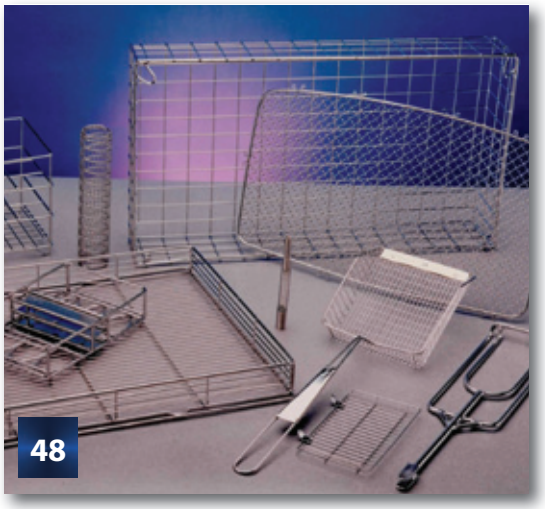

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Email: emo@vdw.de
Website: www.emo-hannover.de

2011

September 2011

13–15: **wire Southeast Asia** – trade exhibition – BITEC, Bangkok, Thailand
Organisers:
Messe Düsseldorf Asia Pte Ltd
Email: wire@mda.com.sg
Website:
www.wire-southeastasia.com

October 2011

4–6: **WiCAB 2011** – trade exhibition – Centro de Exposições Imigrantes, São Paulo, Brazil
Organisers: Grupo CIPA, Brazil
Fax: +55 11 5585 4359
Email: feira@cipanet.com.br
Website: www.cipanet.com.br

November 2011

6–9: **IWCS 2011** – conference and symposium - Charlotte Convention Center, North Carolina, USA
Organisers: IWCS
Fax: +1 732 389 0991
Email: info@iwcs.org
Website: www.iwcs.org

2012

March 2012

26–30: **wire/Tube Düsseldorf** – trade exhibition – Düsseldorf, Germany
Organisers: Messe Düsseldorf
Fax: +49 211 45 60668
Email: wire@messe-duesseldorf.de
Website: www.wire.de

September 2012

25–28: **wire/Tube China** – trade exhibition – Shanghai, China
Organisers:
Messe Düsseldorf China Ltd
Fax: + 86 216 169 8301
Email: www.shanghai@mdc.com.cn
Website: www.mdc.com.cn

October 2012

30–1 Nov: **wire and Cable India/ Tube India** – trade exhibition – Mumbai, India
Organisers: Messe Düsseldorf India
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Email: info@md-india.com
Website: www.md-india.com

Photo credit: www.bigstockphoto.com 'Neus rathaus Hannover, The New Town City Hall' Photographer: (Margarita Borodina)

Stopping the cable thieves

THE escalating issue of cable theft globally could be stopped in its tracks thanks to a breakthrough in cutting-edge technology that allows the forensic marking of individual reels – a move increasingly being demanded of manufacturers by major cable users.

With worldwide prices of metals such as copper and lead at an all-time high due to demand from the Far East, thieves have been targeting communications infrastructure and causing massive disruption as well as creating significant costs for utilities networks in repair and replacement.

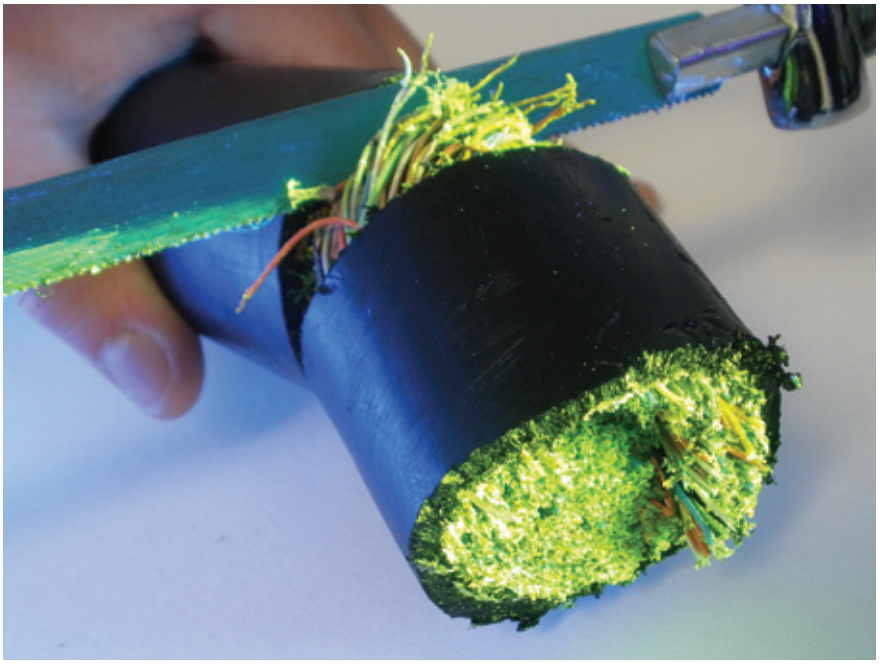
The problem is lack of traceability, as law enforcement officers, who frequently know who is either stealing or buying the stolen cable, are powerless to do anything because it's not possible to prove it is stolen.

Traceability back to a particular location is the key. Simply marking the outer insulation with the owners details has been found to be ineffective as thieves frequently strip or burn it away to achieve a high price from the scrap metal dealer.

But now, with a technological breakthrough, award-winning risk management and crime prevention innovator, SmartWater Technology Ltd, has solved the complex issue of marking cable reels with its forensically coded liquid during the manufacturing process and recording the data in a way that will give law enforcement agencies the ability to tie thieves to their crimes – or, preferably, deter them from committing those crimes.

SmartWater's patented state-of-the-art technology has already been successfully deployed in the telecoms environment, with the UK's BT Openreach recently securing its first conviction of cable thieves, and British Transport Police also securing its first conviction of a thief who stole Network Rail cable. But in each case, the solution had to be applied manually and the demand from major cable users for the application of SmartWater at the manufacturing stage has grown steadily.

SmartWater chief executive, Phil Cleary, said: "Law enforcement officers worldwide frequently know where stolen cable is being sold but, until now, haven't had the technological means to identify it as stolen and tie the criminals to their crime.



▲ *A section of BT Openreach cable, indelibly marked with SmartWater. Use of the uniquely-coded liquid recently led to the conviction of a gang of cable thieves in the UK*

▲ *A combined effort by law enforcement and industry can stop cable thieves in their track.*

"Our technological breakthrough can change all that, allowing any cable manufacturer to build the application of SmartWater into their manufacturing process and then be able to demonstrate without doubt which customer was sold each reel. We can do this across products with multiple cores, in any part of the cable. The benefits of this go further because, for the first time, the manufacturers will be able to pinpoint the place and time of production of each reel, giving them the kind of power over quality control they have never had before and the ability to reject warranty claims based on counterfeits of their products.

"In terms of the criminal, be it a thief or a scrap metal dealer who knowingly buys stolen cable, traceability leads to accountability.

"The sooner they realise that stealing cable is no longer the low risk enterprise they once considered it to be, the sooner our many networks, from communications to transport, will be safer and significantly less prone to the huge disruptions we are seeing today."

The challenge has been to develop a forensic 'fingerprint' that will withstand the temperature of the extrusion process and the harsh environmental conditions that some cable is exposed to. Mr Cleary added: "We tried using DNA but it just wasn't tough enough, as it was killed off by the heat or daylight."

SmartWater is able to stand up to the high temperatures required in the cable manufacturing process without degradation. In the past the road block in deploying the forensic liquid has been in the ability to capture and store the unique signatures that will be required for each reel to make the deterrent and crime-busting capabilities of the solution a reality.

SmartWater Technology – UK
Fax: +44 870 242 4561
Email: info@smartwater.com
Website: www.smartwater.com

▲ *Interwire 2011 – roaring success*

Interwire – a shot in the arm for the industry

OVER 4,000 attendees – a rise of 19 per cent – gave the industry the shot in the arm it needed at the 81st Interwire in Atlanta in May.

The increase from the last Interwire in Cleveland in 2009 rightly gave the Wire Association International something to be proud of with its flagship event.

The four-day conference at the Georgia World Congress Center, Atlanta, saw attendees from 53 different countries converge to witness three new theme days and more than 400 companies exhibiting.

"Interwire had tremendous support from the wire and cable manufacturing community. More than 750 wire and cable facilities sent representatives – many sent multiple attendees – all with action items to accomplish at Interwire," said WAI president Dominique Perroud.

Three new theme days set the tone for the week with an organisational format into which a robust offering of nearly 100 technical and operational presentations were assembled. Themes were metals and materials; manufacturing best practices; and green initiatives.

The WAI bestowed its highest honours on Dr Kazunari Yoshida, Tokai University, Japan, and Thomas E Moran, National Standard Co, winners of WAI's Mordica Memorial Award and Donnellan Memorial Award, respectively.

Southwire hosted a tour of two of its Carrollton facilities, and on the Tuesday evening more than 1,100 participants networked at WAI's annual opening reception.

The first-time Global Continuous Casting Forum for copper practitioners, which ran concurrently with Interwire, exceeded planning estimates and reached full capacity at 205 participants from 25 countries. The programme featured 34 industry-leading presenters.

Keynote speaker and astronaut Mike Mullane encouraged listeners to "Dream Big" at his presentation on the Wednesday, when he also shared experiences from living and working in space.

More than 400 companies were represented at the three-day exhibition. Production solution demonstrations, held through the hall, covered topics ranging from surface treatment technology and roll straightening to FEP foaming technology, wiredrawing lubricants, and wire breaks.

Interwire had the support of exclusive sponsors: Southwire and ExxonMobil Chemical; educational sponsors: Sonoco Products; Gem Gravure Co Inc; and Dow Wire & Cable Co; Cyber café sponsors: Chemson Inc and Sonoco Products; 5K sponsor: Leoni Wire Inc; directional sign sponsors: Sikora International Corp and Skaltek Inc; lanyard sponsor: Carris Reels Inc; hospitality suite sponsors: C H Robinson Worldwide Inc, J B Hunt, Southeastern Freight Lines, and Tenold Transportation LP.

The American Wire Producers Association (AWPA) reported more than 160 attendees at its 2011 Wire Rod Supply Chain Conference. The 33 sponsoring organisations included AWPA member companies, affiliated associations, and industry press.

Interwire will return to Atlanta, Georgia, USA, 23rd-25th April 2013.

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data M has chosen the 20th year since the launch of the World Wide Web to introduce its new website.

"Today, we are able to interact directly via internet with our clients," said data M's Albert Sedlmaier.

"This is of enormous advantage for both parties. I am thinking about our online training services. Full calendars and different locations make it difficult to send design engineers to training. This is the reason why we offer online training, so-called webinars, as of now.

"This way participants save time and expenses. A specialist of data M, who leads the seminar, and the participants meet at the 'virtual classroom'.

"All participants sit in front of their own computers and watch the demonstration on the screen. Of course, participation is interactive which means that questions can be asked at every time. This way, customer specific issues can be handled directly."

The new homepage of data M convinces at first sight and surprises at second: It gives a light and organised first impression and offers good information. The navigation is extremely easy.

However, when you take a closer look at the individual menu items the website turns out to be more elaborate. The extensive variety of technical information offers many details about the engineering services of the Bavarian software developer.

data M – Germany
Fax: +49 802 464 0300
Email: datam@datam.de
Website: www.datam.de

▲ *The home page of the new data M website*

City benefits from expertise

▲ *The city of Biberach – a significant industrial area benefitting from high performance broadband infrastructure*

DRAKA Communications has won a consulting, licensing and training contract with e.wa riss Netze, a fibre services venture jointly owned by the public utility of the city of Biberach and EnBW, an energy provider for southwest Germany.

e.wa riss Netze (networks) will benefit from Draka's FTTH expertise and application of the DrakaXSNet software suite in the evolution of its existing high speed fibre network serving the citizens of Biberach.

"We are now implementing new, cost-effective development processes to support the planning, expansion and documentation of our fibre network," said Michael Preiss, CEO of e.wa riss Netze GmbH.

"In Draka we have found an innovative partner with a wealth of knowledge."

Following research and comparison studies involving various planning software solutions, e.wa riss Netze concluded Draka XSNet to be the best, most flexible option and a valuable asset for cost efficiency when constructing FTTx networks. Draka's intelligent software allows network builders to identify an optimal solution, enabling total cost of ownership reductions during the network construction phase.

"This is a wonderful opportunity to contribute to Biberach's community fibre network development, as well as being an excellent reference for other local authority projects around Europe," said Edgar Aker, director marketing and product management, Draka Communications Telecom Solutions, EMEA.

Together with network planning company E9, e.wa riss Netze began building the fibre infrastructure for its ewacom branded fibre services in Biberach.

Services began in January 2010, and today offer business districts and residents of Biberach attractive triple play service packages with flat rate options from €39,90 to €69,90 and speeds of 50 Mb/s up to 150 Mb/s.

Located on the river Riss in south western Germany, Biberach has a population of 32,000 and is a significant industrial location within the area. The regional utility and energy companies realised that building a high performance broadband infrastructure would be an important pillar for the development of the community, ensuring a high level of universal services for businesses and citizens.

In 2009, e.wa riss Netze GmbH was set up as a 50% joint venture between the utility companies, focusing on the essential activities of a distribution network provider – managing the installation/construction, development and the marketing of power and gas grids.

The optical fibre network has now become an important division of e.wa riss Netze.

Draka Communications – Netherlands
Email: info@draka.com
Website: www.draka.com

Record new all-time sales

Leoni generated new all-time high sales and earnings in the first quarter of 2011.

The provider of cables and cable systems to the automotive sector and other industries increased its consolidated sales to the end of March 2011 by about 38 per cent year on year, to €910.7 million.

In so doing, Leoni grew in virtually all regions and exceeded expectations in both of its divisions. The unabated, heavy demand from the automotive industry was the basis for this strong performance.

Free cash flow improved to a negative figure of €8.2 million (previous year: outflow of €61.1 million), representing a significantly better outcome compared to the first quarter results in previous years. Net debt thus increased only slightly versus the end of 2010 to €458.3 million (31st December 2010: €444.6 million).

Leoni AG – Germany
Email: info@leoni.com
Fax: +49 911 202 3455
Website: www.leoni.com

IWCS sets out its goals for diamond show

THE IWCS International Cable–Connectivity Symposium – to celebrate its 60th anniversary – has launched a campaign to raise additional funding for a scholarship endowment to support budding engineers in the cable and connectivity disciplines.

The IWCS International Cable – Conne -ctivity Symposium is the industry's only international forum for the presentation of peer reviewed work in fields of wire, cable and interconnect technology for the communications, data, electronics, power, industrial, automotive and aerospace industries. This year's event is from the 6 to 9th November at the Charlotte Convention Center, Charlotte, North Carolina, USA.

A commitment to nurturing industry excellence is a key aspect that differentiates the IWCS International Cable – Connectivity Symposium from other organisations and conferences. One approach the organisation has traditionally used toward this end is providing scholarships for the next generation of engineers who will carry forth the flame of technology excellence.

To date, the IWCS has funded more than $250,000 in university scholarships.

The objective of the 60th anniversary campaign is to boost funding on the order of $60,000 for endowments at these institutions to provide a permanent, ongoing scholarship programme.

John Barteld, CEO of the IWCS, said: "The board of directors of IWCS believes that tremendous value is derived through encouraging academic study in the disciplines that the industry needs to sustain and continue technological excellence in a global market.

"It's our goal, through the anniversary endowment campaign, to solidify a meaningful scholarship programme that will nurture interest among young engineers to pursue careers in our industry."

Companies in the cable, wire and interconnect industries as well as interested individuals are invited to learn more about how to participate in the programme by contacting John Barteld, CEO/Director of the IWCS at jbarteld@iwcs.org

IWCS – USA
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▲ *60th anniversary show for the IWCS*

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Munsey takes over

▲ *Jay Munsey*

S&E Specialty Polymers LLC, a producer of speciality plastic compounds, has announced the appointment of Jay Munsey to the newly created position of national sales director.

Mr Munsey moves to S & E from AlphaGary Corporation, where he worked for 23 years, most recently as the company's new business coordinator. He held a variety of sales, marketing and customer service positions at AlphaGary.

In his new position, Mr Munsey will manage the company's sales staff, including a network of representatives, and work to generate new business opportunities for the company. He will also work to increase S & E's exposure in several different market sectors.

Modular wires in award-winning development

MODULAR Wiring Systems, a subsidiary of electrical cable manufacturer Tratos Ltd, has designed, manufactured and supplied modular power and lighting distribution systems for the award winning Ropemaker Place office development in London.

British Land's Ropemaker Place is a 603,000ft^2, 20-storey office building primarily designed for professional and financial services occupiers.

The development has won a clutch of awards, including a prestigious British Construction Industry award in the Major Project category for its high quality design, innovative construction and super energy credentials.

Modular Wiring Systems has worked with a variety of contractors on Ropemaker Place, assisting in the design of the power and lighting distribution systems as well as manufacture and supply of these prefabricated systems on a floor-by-floor basis.

The last few floors to be taken up are now in the final phase of fit out. The use of modular wiring systems is in line with Ropemaker Place's commitment to quality, innovation and sustainability.

A modular wiring system is a rapid and easily installed modular distribution system prefabricated off-site; the system is essentially the circuit lines of a traditional scheme.

Modular wiring systems are quick to install with reduced labour requirements, are very flexible and cost effective. In addition to the innovation of a modular wiring system, quality is also a key feature as the complete system is manufactured off-site in a factory controlled environment, thus eliminating the potential risks of on-site conditions.

Lastly, sustainability is also addressed by using a modular wiring system. As the system is manufactured off-site, there is no requirement for cutting and fabrication – good for the environment, good for health and safety, good for waste management and even better for the bottom line.

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Substation cables for Brazil

NEXANS has been awarded a multi-million Euros turnkey contract by Toshiba Sistemas de Trasmissão e Distribuição do Brazil Ltda to supply and install high voltage (HV) XLPE cables and accessories that will be used to interconnect the two main electrical substations at the new Comperj petrochemical complex currently under construction in Rio de Janeiro, Brazil.

Petrobras is constructing the Comperj complex to help increase Brazil's capacity to refine oil and reduce the number of petrochemical products it has to import.

It is expected to come online in 2013 and will be capable of processing 165,000 barrels of heavy crude oil per day.

The two main substations are around 3.25km apart and the Nexans cables will provide a high voltage interconnection with two circuits. Nexans is supplying a complete turnkey solution including a total of 19.5km of 345kV XLPE-insulated cables with termination, premoulded joints, an earthing system and corresponding installation services.

A key feature of the Nexans XLPE cable for Comperj is the smooth aluminium sheath (SAS) manufactured from aluminium laminate laser-welded longitudinally directly over the cable insulation.

This design ensures a 100 per cent water-tight cable that is also more robust and lighter compared to lead or copper wire sheathing.

A particular challenge for this project is that rather than being installed underground, cables will be carried by pipe racks mounted around 20m above the ground.

In view of the long lengths of cable being supplied, this method of installation will call for Nexans' specific expertise and specialised cable-pulling machinery to ensure that the cables are pulled into position with the careful handling essential to avoid excessive and potentially damaging stresses.

Installation of the cables is expected to be complete by 2012.

The cables will be manufactured at Nexans plant, based in Charleroi, Belgium, and the accessories will be provided by the Nexans facility located in Cossonay, Switzerland.

"Our track record has been a key support to demonstrate our expertise in the delivery of end-to-end cable solutions – from initial design through manufacture, supply and installation to final commissioning.

"In light of the strong market penetration Nexans has now in South America, we will continue strengthening our HV positioning in this strategic area," said Dirk Steinbrink, Nexans Executive vice president high voltage & underwater cable business group.

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▲ *Pictured, from left are administrative specialist Markus Kneip, European sales manager Louis Steffann, Eastern Europe account manager Elena Kerimov, and Western Europe account manager Ingrid Christian*

Fortek strengthens its European sales workforce

FORTEK GmbH, the European sales office of US-based Fort Wayne Wire Die, has strengthened its European sales team by recruiting Russian-speaking sales representative Elena Kerimov.

A dual Russian and German citizen who is also fluent in English, Elena gives wire drawing companies in the former Russian Federation a lingual and technical conduit to US-quality wire drawing die engineering.

She represents the latest in Fortek's efforts to expand its inside sales capabilities to bring the highest quality wire drawing die products and services to all of Europe – an initiative that is part of the company's continued growth track following the celebration of its 30th anniversary.

In addition to Elena, Fortek has also recently hired administrative specialist Markus Kneip.

His addition enhances Fortek's sales and service capabilities by allowing sales manager Louis Steffann, and Western Europe account manager Ingrid Christian, to dedicate more time to their core competencies and their customers.

"Being able to increase our internal manpower, Fortek is better prepared to deliver the kind of die engineering and applications expertise that wires drawing companies need today, through the kind of reliable, local and personalised service relationship they expect," said Louis.

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It's reel collaboration!

AXJO® America is a newly formed company, owned by AXJO in Sweden (51%) and Windak Holding (49%).

The managing director is Dan Shelander, USA, and the chairman of the board of directors is Jacob Nilsson, Sweden.

AXJO delivers spools and drums in polymer materials to all large cable works in Europe, as well as to users in Asia, Brazil and Africa.

In conjunction with the International Wire and Cable Trade Fair in Düsseldorf, Germany, many visitors from the USA have exhibited an interest in the company's products during recent years.

Windak, based in North Carolina, USA, produces reeling machines that can be found at cable works all over the world.

AXJO and Windak have collaborated on the development of systems and products for the European market for many years, and both companies now feel that the time is right to offer the market in the USA a range of modern spools and production plant equipment.

Machinery and equipment was due to be installed at Windak's premises in Hickory, North Carolina during April and May, with the first deliveries expected to occur in June and July.

The modern production facility will use robots, material management and monitoring systems, and has been developed from the Swedish production model. Swedish technicians will be present during the introduction period.

AXJO America's spools and drums are made from a recycled polymer material that ensures consideration is taken with regard to sustainability and the environment.

This proprietary material ensures that the products are resistant to cold and heat, are not sensitive to UV radiation and that they are ergonomic. Since the spools are manufactured in mono-material, and so do not need to be sorted prior to destruction, AXJO is able to offer its own recycling facility.

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eurowire facebook

You can now keep right up to date with all the latest in the wire and cable industry, simply by signing up to be our friend on Facebook. We update the site weekly, giving you the latest news of all the happenings in the industry, from the serious company buy-outs and mergers to the more light-hearted features.

▲ *Another bumper exhibition is expected for Düsseldorf next year*

Countdown starts

THE two global trade fairs – wire and Tube – will run concurrently for the 13th time in Düsseldorf from 26th to 30th March 2012. On show will be innovations from the areas of wire, cable and tube processing industries.

2010 saw a total of 2,391 exhibitors showcase the latest technologies and applications on over 96,000m² of exhibition space. 69,000 trade visitors from 100 countries travelled to Düsseldorf to gather information, make new business contacts and place orders.

At wire, the International Wire and Cable Fair, everything will revolve around wire, cable and fibreoptic machinery as well as wire and cable production and wire and cable trade. Exhibitors from these areas will be presented in Halls 9 to 12, 16 and 17.

Alongside these traditional segments, two subjects will be in particular focus: fastener technology in Hall 15 and spring making in Hall 16. Machinery and plants for making springs and fasteners will be displayed on total exhibition space of just under 11,000m². wire 2010 was attended by 1,217 exhibitors, who presented their machines and equipment on net exhibition space of 51,823m². Around 37,000 international guests attended the event.

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▲ *OML can produce reels to customer specifications*

Reels from Italy

OML, founded in 1967, designs and builds reels for copper cables, welding wire and metal cores of tyres.

Production is regulated by CAD-CAM procedures, which ensure the process and good quality parameters.

The product range is realised to DIN standards, but the company can build any reel to customer specifications.

Main products include fully machined and electronically balanced reels for speeds up to 50m/s; drum for cable, rope and strand for drum twister; reels for machines and transport for cable, strand and wire, in heavy construction; pressed steel reels with double flanges, machined and electronically balanced for speed up to 50m/s; mechanical take-apart Z2 reels with a central bolt; mechanical take-apart reel with four bolts; pneumatic or hydraulic take-apart reels with removable sectors for reels of different width; tilting units; coilers; and pallets for reel handling and stockage.

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Want news and quick? Then sign up for your Twitter account and follow us. Get short, bullet-pointed news throughout the week from the leading source of information in the wire and cable industry.

China's PM demands commodity savings

ON 14th March Chinese Congress adopted the new Five Year Plan in Beijing.

The plan aims to restructure the Chinese economy, and part of this plan is that China wants to spend less energy in order to save commodities and to protect the environment. China's prime minister, Wen Jiabao, announced that energy consumption should be reduced for every earnt Yuan by 16% until 2015.

China enjoys tremendous economic growth but simultaneously faces high inflation. Commodities and producer prices are rising steadily. Another consequence of the economic upswing is the great demand for labour force, which in reverse leads to an increase of labour cost, followed by higher sales prices. Therefore, Wen Jiabao's request for dealing carefully with natural resources comes at the right time. The saving of commodities such as crude oil contributes to a reduction of manufacturing costs and strengthens China's competitive capability.

In cable production lines measuring and control technology offers an opportunity to reduce material consumption and to protect the environment. The insulation of cables is made of plastic, which in turn is made of crude oil. With the integration of measuring equipment in their lines manufacturers avoid wall thickness oversize. This means less plastic material is needed to produce the specified cable, and the technology assures quality during the complete production process. Scrap rate will be eliminated, commodities saved and productivity increased.

The following provides an idea of the amount of material and thus crude oil that can be saved in practice. From 1kg of crude oil, around 500g of polyethylene can be recovered (source: German Federal Environment Agency

▲ *The X-RAY 6120 helps cable manuf-acturers to assure quality and to reduce material consumption*

08/2010). As energy is also needed for cable production, you can calculate with the relation 2:1, so for 1kg polyethylene you need 2.5l crude oil.

Assuming that a production line runs 275 working days (6,600h/yr) with an extruder output of 600kg/h, over a year this makes up 4mn kg polyethylene. With, for example, an X-RAY 6000 (for wall thickness, eccentricity, diameter and ovality measurement), claimed material savings of at least 5% can be achieved. As a result, 200,000kg of material can be saved. If the price for 1kg of polyethylene is €1, this amounts to a saving of €200,000 per year with one X-RAY 6000.

Taking all cable manufacturers together, with the use of Sikora measuring and control technology they could achieve savings of approximately 1.5mn tons crude oil per year, solely through the reduction of material consumption. This number is equivalent to six ultra large crude carriers with a carrying capacity of over 250,000 tons.

For quality control and energy saving at insulating and jacketing lines Sikora offers the X-RAY 6000, the successor of the proven and successful X-RAY 2000 series. The new system fulfils the industrial need for an accurate measurement of wall thickness, eccentricity, diameter and ovality. In combination with the display and control device ECOCONTROL 6000, the measuring system provides information for the optimum control of the production line in automatic mode.

The X-RAY 6000 offers a variety of technical innovations that set new standards regarding precision, long operation time and efficiency. Precise measurements are achieved under all line conditions.

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New company chief

Royal DSM has appointed Atzo Nicolaï as president of DSM Netherlands after Jos Schneiders asked to retire in July.

Mr Schneiders has had a long and successful career with DSM of almost 35 years in various roles.

Mr Nicolaï is currently a member of the Dutch House of Representatives ("Tweede Kamer der Staten-Generaal"). Mr Nicolaï joined DSM on 1st June. The appointment of Mr Nicolaï, a Dutch national, as managing director in the sense of the Works Councils Act is subject to advice from the relevant Works Councils.

Atzo Nicolaï was a member of the Dutch House of Representatives from 1998 to 2002.

From 2002 to 2006 he was Minister for European Affairs and from 2006 to 2007 he was Minister for Government Reform and Kingdom Relations.

In 2007 he returned to the Dutch House of Representatives. He holds a degree in Law and Political Science from the VU University of Amsterdam.

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€33m deal for Nexans

NEXANS has been awarded a €33 million contract by Terna – Italy's electricity transmission grid operator – to manufacture, install and test approximately 250km of 150kV high-voltage (HV) aluminium underground cables and accessories for power development projects in the Lazio, Basilicata and Campania regions.

The projects form part of Terna's ten-year investment plan (2011-2021) to enhance Italy's power infrastructure.

The cables supplied will feature a 1,600mm^2 aluminium conductor cross section with anti-explosion outdoor sealing ends. Starting in April 2011, they will be installed in a two-year project to create three separate double circuits.

The Nexans cables will connect substations in Montalto di Castro with Canino (total cable length: 130km); an overhead line in Rotonda-Pisticci with a substation in Aliano (total cable length: 73km); and a substation in Avellino with a power station in Pratola Serra (total cable length: 49km).

"This contract is the latest development in the long-term relationship between Nexans and Terna to help support it with its future plans to develop Italy's power transmission infrastructure," said Giovanni Fenoglio, sales and marketing director of Nexans in Italy.

"It is yet another example of Nexans' ability to serve the market with cost effective and innovative solutions that meet local requirements, such as the aluminium cables that are now used on a large part of 150kV HV projects in Italy."

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Net sales up 25 per cent

Quaker Chemical Corporation has announced net sales of $159.9 million and earnings per diluted share of $0.91 for the first quarter of 2011, up 25 per cent and 8 per cent, respectively, compared to net sales of $128.3 million and earnings per diluted share of $0.84 for the first quarter of 2010.

Michael F Barry, chairman, chief executive officer and president, said: "We are off to a good start in 2011, despite the continuing challenge of escalating raw material costs.

"We are and will be implementing additional price increases as part of our ongoing effort to restore our margins to more acceptable levels.

"However, our profitability continues to grow due to good demand in our base markets, new business gained and the contribution from our recent acquisitions."

Mr Barry added: "Despite the uncertainties in the raw material markets and global economies, our goal for 2011 remains to build upon the profitability we achieved in 2010.

"With our leadership positions in both the emerging and mature markets, as well as our organic and external growth opportunities, I remain confident in our prospects for 2011 and beyond."

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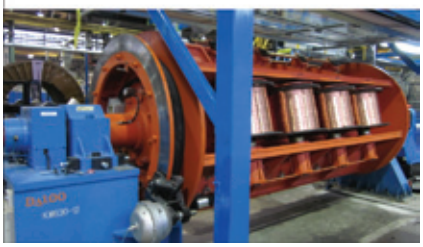


Transatlantic Cable

The environment

Luck may be about to run out for the West Coast of the US, long protected from the effects of rising sea levels

"Planners say there is no need to panic but there's no time to waste – especially along a coast where the sea has 30 years of catching up to do."

The reference, by John Upton of the Bay Citizen, a news organisation providing local coverage of the San Francisco Bay Area for the *New York Times*, is to the past three decades of Nature's favour enjoyed by America's 7,600-mile Pacific coastline. Over this period, Californians and other residents of cities and communities along its shores have been sheltered from the impact of the quickening pace at which seas around the world are rising. But suddenly sea levels are forecast to start rising along the eastern Pacific Ocean. Scientists say that not only might they catch up – they could even surpass global averages. ("A Change in Fortune for the West Coast?" 9th May)

Mr Upton, whose piece appeared on the *Times*'s "Green" blog, noted a report published the week before by the Scripps Institution of Oceanography at the University of California at San Diego. The researchers found that a dramatic shift in the directions of ocean winds is poised to reverse a tilt in the Pacific Ocean that has inundated parts of Asia but protected America's western states from rising seas since the late 1970s.

The change is traceable to the Pacific Decadel Oscillation, the less well understood cousin of El Niño (or Southern Oscillation), the mischief-making climate pattern that occurs across the tropical Pacific every five years. In studying signs of a flip from the Decadel's warm phase to its cold phase, the Scripps researchers found that its winds are starting to behave like those that dominated the Pacific until the 1970s, when sea levels were last on the rise on the West Coast. Levels had been rising since 1930, when a similar change occurred in the oscillation's phase. Now, Mr Upton wrote: "The [Scripps] report suggests that the American West will finally start to shrink as the ocean around it expands, succumbing to the same reality that is already vexing communities around the world."

- Whether or not California contains its panic, as urged by Mr Upton, the state is officially bracing for seas to rise 14" by 2050, inundating everything up to a foot above high tide. Predictions for 2100 and beyond are very bleak. Airports and houses – not to mention golf courses – could flood; coastal property holdings could vanish; and sewers could fill with corrosive saltwater. Experts consulted by the Bay Citizen suggest Californians and others could retreat safely from the advancing sea, keep it at bay using mechanical and natural water barriers, and adapt to it with new approaches to building.

- As summarised by Mr Upton, that would mean preparing in stages, taking little steps now to lay the groundwork for more ambitious projects in the future. He collected these thoughts from the San Francisco Planning + Urban Research Association:

1. Enormous water gates could protect bays from storm surges. They already work in places like the Netherlands and Britain
2. Buildings can be raised on stilts like those that are now common in tropical Australia and are required in New Orleans, or tethered to the earth and saddled to floats
3. Shorelines may need to be vacated, with buildings toppled and wetlands restored. Some shoreline will evolve and build up in height without help if they are given back to nature

- There is a bright side to all this, although not for those who live along the Pacific littoral of the United States. Steve Goldbeck, a deputy director of the Bay Conservation and Development Commission, told the Bay Citizen's Mr Upton that accelerated rates of sea level rise there will most likely correspond with a slowing in the rise elsewhere: like parts of Asia, where rates now surpass global averages.

Steel

AISI: the US steel industry is seeing the benefits of recovery in the national economy

With the American economy in recovery mode, shipments from domestic steel mills are expected to grow 14% this year. Daniel DiMicco, chairman of the American Iron and Steel Institute (AISI) and CEO of Nucor Corp, offered this projection at a media briefing during AISI's general meeting, held 1st–3rd May in Colorado Springs. In attendance were more than 400 executives from the steel industry trade group and the Metals Service Center Institute (MSCI), a group representing businesses that inventory and distribute metals for industrial customers. But Mr DiMicco cautioned that the nation's construction industry is not expected to fully recover to pre-recession peak levels until sometime in the middle of the decade. He said that this will slow job growth over the next few years.

As reported by Wayne Heilman in the *Colorado Springs Gazette* (2nd May), Mario Longhi, chairman of AISI and CEO of Gerdau Ameristeel, said that growth in the booming US energy sector has offset some of the weakness in the construction industry. Mr Longhi cited the main energy-related applications generating demand for steel: towers for high-transmission lines, towers and other components of wind turbines, pipe for the transport of natural gas, and frames for solar panels.

The Gerdau Ameristeel chief noted that AISI favours a comprehensive federal policy that promotes all sources of energy. John Surma, CEO of US Steel Corp and an AISI director, said that the group's legislative agenda also includes reducing regulatory burdens on manufacturers, increasing the nation's investment in transportation, promoting exports, and enforcing existing trade laws and rules – as well as pushing China to permit its currency to rise in value relative to the US dollar.

Mr Surma warned that the American steel industry faces a significant challenge from rising costs for commodities and raw materials. These are threats, he said, that could erode or even eliminate any cost savings realised from layoffs and other restructuring moves that the industry put in place during the recent recession.

Elsewhere in steel . . .

- Citing higher costs and a pickup in the pace of orders, AK Steel on 23rd May increased base prices by $50 per ton for its hot rolled and cold rolled carbon steel products; and by $60 per ton for its coated carbon steel products. Acting on the basis of April prices for raw materials and energy, the West Chester, Ohio, steel maker had already announced a surcharge of $435 per ton on its electrical steel products set for shipment in June. Metals prices are trading at historic highs as global economic growth boosts demand for metals and other commodities. Energy prices have followed suit, driven in part by higher demand and rising oil prices.

Automotive

Central to Volkswagen's ambition to become the world's largest auto maker by 2018 is a big new plant in the American South

At the grand opening of a $1 billion Volkswagen plant in Chattanooga, on 24th May, the German auto maker presented its new 2012 Passat as key to a greatly enhanced VW presence in the United States. The midsize sedan – bigger and cheaper than previous models, and otherwise revamped for American tastes – will be manufactured in a plant in Tennessee rather than imported from Europe. Volkswagen has clearly signalled its recommitment to the North American market, and the domestic Passat is the repository of high hopes.

But the real news to come out of the gala event, held at the factory where Passat production began in April, may be that Volkswagen is mulling a plan to build Audi luxury cars in the United States. Writing from Chattanooga, the *Wall Street Journal*'s automotive reporter Mike Ramsey said that the decision, to be reached over the next year, will depend on whether or not projected Audi volume warrants a dedicated stateside plant. Volkswagen's German rivals BMW and Daimler (Mercedes-Benz division) both have American operations, but each sells more than twice as many cars a year in the US as Audi. ("Volkswagen Considers Building US Audi Factory," 24th May)

Volkswagen hopes to dramatically increase US sales of all its products, including the highly prized Audi, over the next five years, and Mr Ramsey noted that it will be relying heavily on Chattanooga. Manufacturing locally, and buying 85% of the North American Passat's parts from nearby suppliers, the company is able to greatly reduce its costs.

Transatlantic Cable

This has made it possible for VW to drop the price of the car to roughly $20,000, making it competitive with the Honda Accord and Hyundai Sonata.

The new factory is "a key driver of our long-term success in the US," Michael Macht, VW's top manufacturing officer, said at the event to open the plant. Built at a former military base on the outskirts of Chattanooga, the complex is designed to build 150,000 Passat sedans each year and can be expanded to as many as 300,000 units, according to Mr Macht.

- Volkswagen's CEO Martin Winterkorn told the *Wall Street Journal* that VW is on track to achieve its highest global sales ever in 2011, and it has not wavered from its goal of being the top auto maker in the world in sales by 2018. If an American-built Audi figures in that projection, it will be the only luxury car from VW to originate in the United States. Asked by the *Journal*'s Mike Ramsey if Porsche SE (controlled by Volkswagen, which also owns the Bentley, Bugatti and Lamborghini marques) might build any vehicles there, Mr Winterkorn said no. Meanwhile the new-version VW Passat, with a sticker price some $7,000 below that on current models built in Germany, is set to arrive at American dealerships in the third quarter of this year.

- Nick Bunkley of the *International Herald Tribune* (24th May) recalled that, in February, Volkswagen drew attention to its new Passat with a Super Bowl commercial featuring a pint-sized Darth Vader. At the Chattanooga plant on opening day the youngster reprised his role of the power-mad fiend of the "Star Wars" saga and, flanked by an army of storm troopers, used the Force to raise a wall and expose the plant floor to the audience.

  Taken together with the commercial (streamed more than 15 million times on YouTube), this performance strongly suggests that Volkswagen has embraced its inner aggressor. But in the view of Jack R Nerad, executive market analyst for the vehicle information provider Kelley Blue Book, the Passat initiative in the US is "a very daunting effort." Mr Nerad told the *Tribune*: "If they're going to grow to the level that they want to, they're going to have to take it out of somebody else's hide. That's a tough task, because there are no weak sisters in this market."

Elsewhere in automotive . . .

- Ford Motor Co said on 18th May that it had reached an agreement to sell its Milan, Michigan, plant and blow-moulded fuel tank operations and equipment to French auto supplier Inergy Automotive Systems, a subsidiary of Compagnie Plastic Omnium. The business acquired by Inergy, from 1st June, was producing 1.3 million fuel systems annually.

  The plant, which employs about 500, was part of Visteon when Ford spun off its parts division in 2000. The facility was one of 23 plants that Ford in 2005 agreed to take back under a business named Automotive Components Holdings. As reported by *Detroit Free Press* business writer Brent Snavely, since then Ford has been trying to either sell or close those plants. A tentative deal to sell the Milan plant to Flex-N-Gate (Urbana, Illinois) fell through in 2009.

- Also in the *Free Press*, auto editor Mark Phelan reported that, in marked contrast to that point in 2010, in late spring of this year compact cars were "flying out" of US dealerships. He noted that a new vehicle can be expected to spend about 60 days on the lot before selling. Quick sales (fewer "days to turn," in industry jargon) generally mean a model is selling well: at a good price, and without much outlay for incentives and promotions.

  From data supplied by AutoObserver.com, Mr Phelan identified a few days-to-turn champs: Ford Focus, selling in 54 days; Volkswagen Jetta, 40 days; Chevy Cruze, 32 days; and the Hyundai Elantra, which "barely has time to get dusty in its average 12 days at the dealership." According to the data those compacts are not only selling faster than the industry average; they all sold in less time in April than they did in March. The average wait for all compacts was 51 days, down from 63 in March. Compacts as a class and most individual models sold faster this year than in 2010. "The numbers are very telling," AutoObserver analyst and senior editor Bill Visnic told the *Free Press* (22nd May). "The shift to smaller cars is real."

- The top-selling compact cars in the US – Corolla and Matrix hatchbacks – are made by Toyota, which has recalled more than 14 million vehicles across the world in the past year and a half, mainly in response to complaints about acceleration and braking problems. In February, the US National Highway Traffic Safety Administration began examining 2009 and 2010 model Corollas after receiving about 80 complaints, many of them mentioning a perception, or sensation, that the cars were drifting off-course. On 20th May, the federal agency declared that any such problems with the Corolla are not attributable to parts failure but to individual driver preferences as to the "feel" of a steering wheel. The Japanese auto maker offers a repair to any of its customers who are dissatisfied with the electronic power steering on the Corolla.

Technology

In 'a paradigm shift in metallurgy,' scientists find an inexpensive way to make formable metallic glass

Stronger than steel or titanium – and just as tough – metallic glass (an "amorphous metal" with a non-crystalline structure) is very nearly the ideal material for everything from cellphone cases to aircraft parts. But it presents formidable challenges in processing. Now, researchers at the California Institute of Technology at Pasadena have developed a technique for producing metallic glass parts by means of the same inexpensive processes used to produce plastic parts. The method reportedly enables them to heat a piece of metallic glass at a rate of a million degrees per second and then, in just a few milliseconds, mould it into any shape.

"We've redefined how you process metals," said William Johnson, leader of the team of researchers who published

their findings in the 13th May issue of the journal *Science*. Claiming "a paradigm shift in metallurgy," Dr Johnson summarised the accomplishment as taking the economics of plastics manufacturing and applied it to a metal with superior engineering properties. The method leads to mass production of metal-glass products that were previously made of plastic and holds enormous promise for metal forming applications. ("Beating Crystallisation in Glass-Forming Metals by Millisecond Heating and Processing")

In its announcement of the breakthrough, Caltech (where metallic glasses were discovered in 1960) described the strategy employed by the Johnson team to master the rapid crystallisation of these materials, the chief impediment to their use in making parts. To heat the metallic glasses uniformly and rapidly enough, the researchers employed the technique known as ohmic heating. They fired a short and intense pulse of electrical current to deliver an energy surpassing 1,000 joules in about one millisecond (about one megawatt of power) to heat a small rod of the metallic glass. The pulse of current heats the entire rod at least a thousand times faster than anyone has before, according to Prof Johnson. Taking only about half a millisecond to reach the right temperature, the now-softened glass could be injected into a mould and cooled immediately. To demonstrate the new method, the researchers heated a metallic glass rod to about 550ºC and then shaped it into a toroid in less than 40 milliseconds. Despite being formed in open air, the moulded doughnut-shaped object was found to be free of flow defects and oxidation.

- The procedure, called rapid discharge forming, has been patented and is being developed for commercialisation, Dr Johnson says. In 2010, he and his colleagues started a company, Glassimetal Technology, to commercialise novel metallic-glass alloys using this kind of plastic-forming technology.

- The name Benjamin Braddock is not associated with metallurgical marvels. But Alex Knapp, writing in *Forbes*, was moved by the news from Pasadena to recall the Dustin Hoffman character in "The Graduate." While Mrs Robinson inspired the 1967 film's famous theme song, Mr McGuire was responsible for its most memorable piece of dialogue: "Just one word. Plastics." Mr Knapp, whose speciality is futurism and cutting-edge technology, said: "Mr McGuire's advice to Benjamin may turn out to be obsolete." ("Caltech Researchers Develop Cheap Process for Metallic Glass," 15th May)

Telecom

Nobody owns the Internet – but that does not deter either side in a US congressional standoff over 'Net neutrality'

So-called Net-neutrality rules that would prevent telecom service providers from intentionally slowing or blocking Internet traffic have become the subject of bitter contention between the two main political parties in the US Congress. The Republican-controlled House of Representatives voted 240 to 179 to block enforcement of a Federal Communications Commission (FCC) Net-neutrality order issued in December 2010. But the resolution faces uncertain prospects in the Senate, in which Democrats have a narrow majority, and President Barack Obama has said he will veto it. Some Internet activists and businesses claim that Net-neutrality regulations are needed to prevent Internet service providers like Verizon Communications, AT&T and Comcast from blocking or slowing down Internet traffic generated by competing firms – or suppressing politically controversial content. But, as noted by technology writer Hiawatha Bray of the *Boston Globe*, critics of Net-neutrality rules – many of whom oppose federal regulation of the Internet on principle – argue that free market competition would prevent such abuses. ("House Tells FCC to Drop 'Net Neutrality,'" 9th April)

The FCC board of commissioners voted 3 to 2 to impose Net-neutrality rules on Internet companies that use telephone or cable wires to deliver broadband service, but granted wider latitude to companies offering wireless broadband access. The board reasoned that, because wireless systems have less data-carrying capacity than wired broadband systems, wireless companies may need to block activity that threatens to overload their networks. The FCC order immediately came under fire from critics who argued that the agency lacks legal authority to regulate the Internet. Verizon filed suit in January to block the order, but in early April a federal judge threw it out on a technicality: it had been filed before the Net-neutrality rules were published in the Federal Register. Verizon planned to re-file the suit after the FCC order is officially published. Mr Bray reported that Representative Marsha Blackburn, a Tennessee Republican, is sponsoring legislation that would permanently block the FCC from regulating the Internet. She told the *Globe*: "We look forward to forever prohibiting the overreach of the Federal Communications Commission."

Elsewhere in telecom . . .

- According to the chief operating officer of New York-based Verizon Communications Inc, a shortage of airwaves in the US renders the planned buyout of the Deutsche Telekom unit T-Mobile USA Inc by AT&T Inc "inevitable." Lowell McAdam told a JPMorgan Chase & Co conference in Boston on 18th May that smaller wireless carriers will probably also combine. The larger companies will work to use capital more efficiently, he said.

  Carriers like Verizon, which co-owns its wireless business with Britain's Vodafone Group, are pushing for access to more spectrum for their US mobile networks, to accommodate more users and space-eating applications. But merger activity inevitably generates concerns in Washington about stifled competition, and in the week before the Boston conference executives of T-Mobile and AT&T were summoned before the Senate Subcommittee on Antitrust, Competition Policy and Consumer Rights to defend their proposed $39 billion deal. "Everybody's worried about the [AT&T/T-Mobile] merger," said Mr McAdam, who is in line to assume the CEO position at Verizon later this year. "To me, that was inevitable. That was kind of like gravity. The spectrum in the US is not in the hands of carriers that can do something with it."

Dorothy Fabian – USA Editor

Atlanta debut for Beta LaserMike's LayScan

BETA LaserMike debuted its new LayScan measurement system at the Interwire 2011 Trade Exposition in Atlanta, Georgia.

The LayScan system (patent pending) accurately and consistently measures the lay length of twisted pairs used in telecommunication cables.

The system uses optical, non-contact measurement technology to perform on-line, high-speed lay length measurements with the highest precision to within 1mm.

Providing high-data rate capabilities, LayScan precisely determines the variations in lay length within each lay. Systematic lay variations that are typically caused by twinning and cabling operations can be readily observed and measured.

A data acquisition system effectively collects and processes the lay length data, and reports the measurement results.

Beta LaserMike's LayScan measurement system delivers many benefits to cable manufacturers:

▲ *The new LayScan from Beta LaserMike*

Improves product performance by better controlling lay lengths and delivering a higher level of cross-talk performance.

Minimises product cost and scrap by optimising the lay set and provides the ability to consistently control lay lengths over time.

Reduces the product development cycle through precise measurements of lay length values during design trials and experiments.

Allows standardised pair lays across various twinning systems and reduces the need to limit production scheduling to qualified equipment.

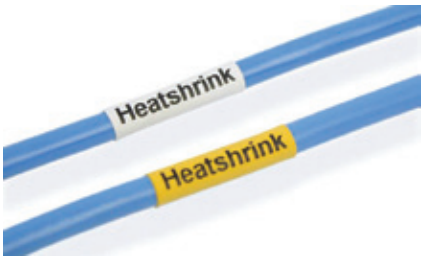
Beta LaserMike – USA
Fax: +1 937 233 7284
Email: sales@betalasermike.com
Website: www.betalasermike.com

Giving up smoking…

Silver Fox, the labelling solutions manufacturer, has added Zero Halogen Low Smoke Heatshrink to its product range for marking ferrules and cables.

Low Smoke Zero Halogen (LS0H) Heatshrink is flattened, printable polyolefin heat shrinkable tubing with zero halogens, excellent flame resistance and produces very little smoke.

It meets London Underground Limited Eng. Standard 1-085 A1 so is suitable for LUL projects as well as other applications where LS0H is specified.



▲ *Low smoke heatshrink has been added to the Silver Fox range*

All Silver Fox Heatshrink and non-shrink tubing are supplied in rolls and can be easily printed using Plug'N'Play thermal printer and utilising the labelling software Labacus Innovator. What is more this new heatshrink can also be printed on both sides using a patented double-sided ferrule marking system; two rolls of tubing can be run through the printer at same time and there is no limit to number of characters printed per marker.

Silver Fox Ltd – UK
Fax: +44 1707 372 193
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Website: www.silfox.com

WOOD CABLE REELS

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SPAIN | Calaf,Barcelona
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State-of-the-art acquisition, processing and display

THE USYS 20 from Zumbach is a state-of-the-art processor and is an ideal and economic solution for one diameter or capacitance measuring point.

The system features real-time, multi-tasking data processing and control. USYS 20 accepts measurements from a broad line of laser diameter gauges of the ODAC® series, covering a diameter or width range from 0.012 to 550mm with a selectable resolution of up to 0.0001 mm.

The processor also accepts capacitance measurements from Zumbach's CAPAC® systems instead of the diameter gauges.

Key features include:

- Complete system for one measuring point
- Simultaneous display of three measured values
- Industrial, rugged design
- Table top or 19" rack versions
- User friendly control panel with easy menu navigation
- Direct access function keys
- High-contrast LCD monochrome screen (240 x 128 pixels)
- Alarm displays
- Real-time data collection
- Reel and session reports
- DDC – Direct Dynamic Control system
- SRD – Static Regulating Device

▲ *USYS 20, table top version*

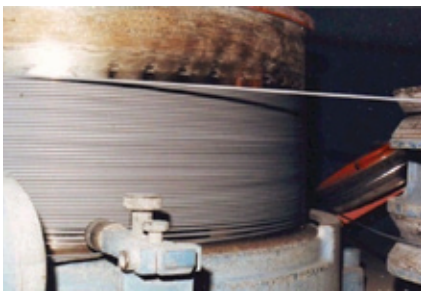
Zumbach Electronic AG – Switzerland
Fax: +41 323 560 430
Email: sales@zumbach.com
Website: www.zumbach.com

Wire lubrication, high-melting lubricants

Advertorial on behalf of Decalub

Formulation of high melting lubricants is improving at a frantic development pace, enabling demanding wire qualities to be drawn in a more economical way, replacing conventional rod wet preparation including chemical cleaning/rinsing/wet pre-coating and drying by a new totally dry coating process that presents a unique combination of simplicity and effectiveness. The main reason behind this achievement has been the cost, wire quality and environment factors.

When used in conjunction with Decalub DCCD rod dry preparation process in H/C and L/C wire drawing applications from bare rod (including 0.83–0.90% C rod), high-melting lubricants, melting at temperature rage of 195°C-240°C/374°F-464°F for H/C applications, are thermally activated and instantaneously converted from solid into viscous liquid state, upon ultra-high-pressure of 350 bars/5,000 psi, at zero energy consumption, and are deposited in-line on mechanically descaled bare rod surface in 5 microseconds, eliminating the need for wet pre-coating chemicals, generating an exceptional thermal stability at highest drawing speeds, performing a hard high-density strongly adherent anti-wear coat, automatically weight adjustable up to 10g/m^2, resisting oxidation.



▲ *Anti-wear high-melting coat on 0.85% C descaled wire*

Some advanced products are formulated in multi-melt point version so their viscosity and thermal stability are automatically controlled enabling H/C bare rod to be drawn directly in 11-13 drafts at virtually unlimited drawing speed, limited mainly by rod pay-off and wire take-up modes.

The process users report the high-performance rod dry coating used with high-melting lubricants is performed in-line at zero energy consumption, at zero consumables cost and at zero maintenance cost, in the manufacture of quality H/C and L/C wires, making the new coating/lubrication process one of the most outstanding ever obtained in mechanically descaled wire lubrication.

Decalub – France
Fax: +33 1 60 20 20 21
Email: info@decalub.com
Website: www.decalub.com

▲ *The ConQuest conduit design*

Making it easy for multiple cables

COMMSCOPE has introduced a new ConQuest® conduit design capable of simplifying installation and management of multiple cables in a single duct.

The new ConQuest® Detectable SubDuct conduit, with its innovative design, targets underground cable networks having current and future cable capacity requirements. As a simple and cost-effective solution, it allows end-users to install a single-duct solution today that provides additional capacity for future cable installations.

This forward planning eliminates the need to place additional dedicated conduit later as the network expands. Each separate pathway is capable of carrying individual cables while protecting against natural or construction-related damage.

"CommScope's SubDuct conduit establishes a throughway for end-users to place multiple cables independently during a single installation," said Douglas Wells, director, Broadband, Hybrid Fiber Coax, CommScope.

"With the company's proven track record for designing award-winning conduit solutions for our customers, we believe this design provides them additional options when installing today's rapidly changing and expanding networks."

ConQuest® Detectable SubDuct's unique design allows it to be customised with various amounts of three-quarter inch chambers within a single jacket, providing easy installation and allowing the use of industry-standard couplers to match any end-user's requirements.

Made from high-density polyethylene, the Standard Dimension Ratio (SDR) 11-rated inner chambers provide ample protection for all cables and are ideally sized for the installation of standard all-dielectric fibre cables up to 144-count. The robust design of ConQuest® Detectable SubDucts permits the use of standard fibre-optic cables construction rather than micro cables.

The design can also be supplied with an optional integrated 18-gauge copper clad steel tone wire, allowing for the easy locating of all-dielectric fibre-optic cables. The outer jacket can be easily removed providing access to the inner ducts, allowing for easy installation and bending in confined areas such as underground pedestals. The conduit meets or exceeds the standards in ASTM D 3350-05 for Type III, Class PE 334480E (colours with UV stabiliser) or Class C (black), high-density polyethylene.

Commscope Inc – USA
Fax: +1 828 328 3400
Email: info@commscope.com
Website: www.commscope.com

Off-line ultrasonic measurement

LaserLinc has added ultrasonics to its BenchLinc™ benchtop inspection systems.

The fixture is based on LaserLinc's UltraGauge+ ultrasonic wall measurement system and for operator ease-of-use, measurements can be triggered based on a push-button or a foot pedal.

LaserLinc, Inc – USA
Fax: +1 937 318 2445
Email: info@laserlinc.com
Website: www.laserlinc.com

Quality assurance during energy cable production

THERE were more wind power plants built in European seas in 2010 than ever before. More than 300 plants with a total power of more than 880 megawatts were added.

According to the European Wind Energy Association (EWEA), there will be strong investment in the future on the construction of new wind turbines at sea.

Power transmission from offshore wind parks to the mainland is currently being funnelled by undersea cables. These cables have to provide different requirements as well as environment conditions.

Thus, the cable design complies with national and international standards. In order to fulfil these requirements cable manufacturers use measuring and control technology in their production lines. Sikora offers a range of measuring technology for use in CV-, VCV- or MDCV-lines.

In a CV-line, for example, a CSS 2 (cleanliness scanning system) is installed for real time monitoring and detection of impurities of the polymer melt. The flow channel between main extruder and the cross head is equipped with sight glasses and an optical CCD camera system, which transilluminates the insulation material. The system ensures that only pure PE material is used for the cable production and, as a result, a higher electric strength of cable can be achieved.

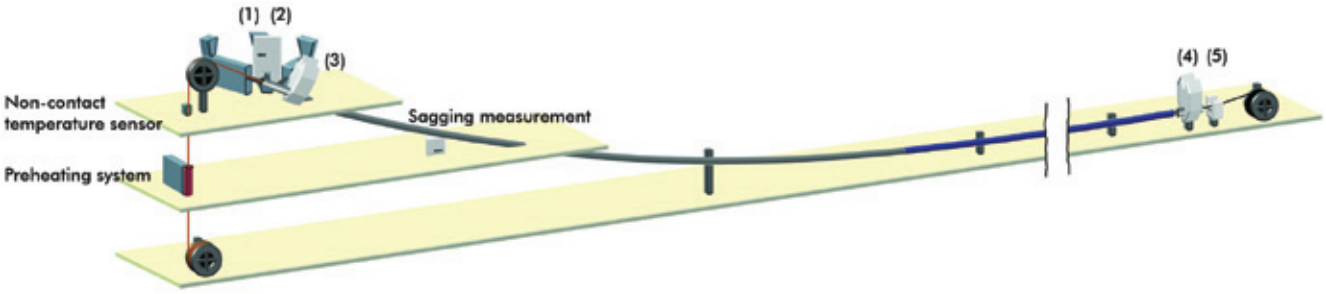
Sikora's product range for energy cables also includes the Ultratemp 6000, which measures the temperature of the PE melt during extrusion on a non-contact basis between the extruder screw and the cross head.

Besides temperature determination, the Ultratemp 6000 detects inhomogeneities in the melt. Early cross-linking after screens which may lead to ambers or scorches in the material do not occur, and the device optimises the output of a planned production time.

The X-ray measuring system X-Ray 8000 NXT is installed in the moving part of the telescopic tube directly after the crosshead for precise hot measurement of the wall thickness of all three layers (concentricity, diameter and ovality). Measuring values for centring and control are therefore available immediately after starting up the line. The system is used in catenary and vertical lines.

While the X-Ray 8000 NXT provides information for a fast centring and direct control, the X-Ray 8700 NXT supplies precise quality data about the final product. The X-Ray 8700 NXT measures the diameter, wall thickness and eccentricity, and is suitable for all cable types with solid, stranded or Milliken conductor and with single, double or triple layer insulation. With the use of the X-Ray 8000 NXT at the beginning of the line for collection of the hot measuring values and the X-Ray 8700 NXT at the end of the line for measuring the cold values, three shrinking values are analysed for every insulation layer of the cable, ensuring an optimum process.

Sikora AG – Germany
Fax: +49 421 48900 90
Email: sales@sikora.net
Website: www.sikora.net



▲ *CV-line (catenary line) with measuring equipment for quality assurance during production of energy cables*

Award-winning machines

U GEAR Automatic Machinery's UG-800 ultra precise fibre optics automatic coiling machine has already landed two awards – the 2010 17th Taiwan National Innovation Award and the 2010 Industrial Innovation Achievement Award.

The key advancements for this machine include:

Upgrading traditional industries into high-tech industries; the product was catered to traditional wire and cable industry initially and an upgrade to the fibre optics industry is proposed; upgrading the original manual operation into automatic control system with neat and tidy arrangement of fibre optics, without damaging them.

Three patents have already been awarded:
- The improvement of Coiling Machine (Patent No. M343671)
- The Fibre Optics Removal Device, applied on the Coiling Machine (Patent No. M343672)
- The Tension Control Device, applied on the Coiling Machine (Patent No. M343897)

U Gear Automatic Machinery Co Ltd – Taiwan
Fax: +886 222 405 083
Email: ugear999@gmail.com
Website: www.a1a1a.com

◀ *The UG-800 ultra precise fibre optics automatic coiling machine*

Infrared thermometers

Sitel produces infrared thermometers for the production of nerved steel reinforcement bars, cement annealed during lamination (Thermex or Tempcore processes).

A unique feature of these thermometers is the use of a linear array as sensor (16 elements). This array measures a thermal profile composed of 16 targets (1.6mm as standard) with a total length of 25mm (other dimensions on request). The instruments are installed in the input/output zones of the tunnel in a way that the material to be measured passes inside the thermal profile line, which is vertically orientated and defined by two laser pointers. In this way, oscillations of the material do not influence the measurement, because the output of the thermometer always gives the maximum value found in the thermal profile, composed by the 16 spots of the array.

This application is also extended to the input of the cooling plate to measure the self-reannealing temperature of the material. The measurement ranges of the instruments are optimised for the different stages of the production process and are: 800-1,300°C for the input of the tunnel, 400-900°C for the output of the tunnel, and 450-950°C for the input of the plate.

The thermometers are provided with an analogue output of 4 to 20mA, linear on the measurement range, useful for the regulation and recording of the treatment temperatures, and with an Ethernet or RS 485 interface for connection to multipoint acquisition systems such as PC networks.

Sitel Control Srl – Italy
Fax: +39 02 910 1082
Email: sales@sitelcontrol.it
Website: www.sitelcontrol.it

Cable aimed at industrial Europe

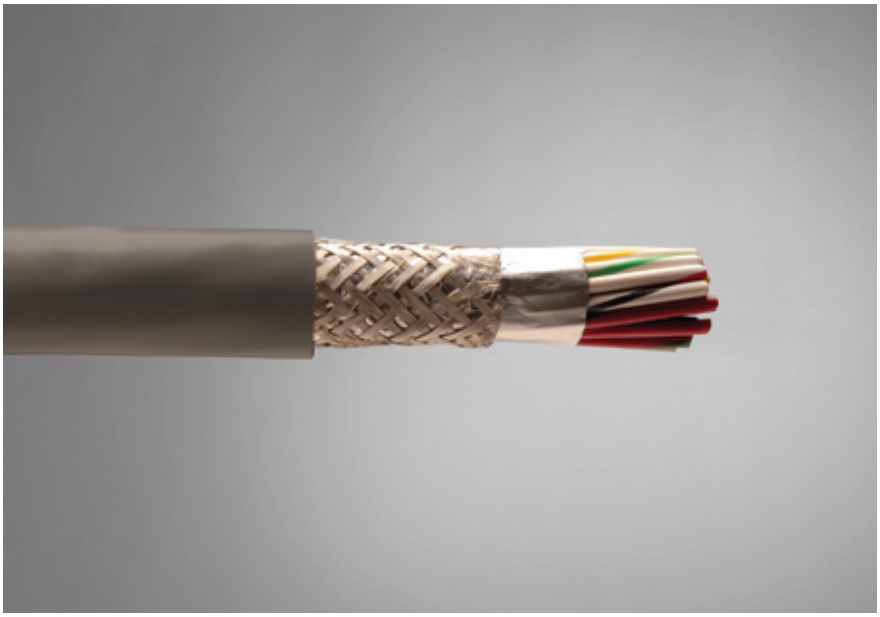
ALPHAWIRE has launched a new cable line, Pro-Tekt™, specifically designed for the needs of the industrial European marketplace.

With a host of features customised specifically for the European customer, Pro-Tekt is ideal for applications ranging from industrial process controls and machine tools to medical electronics and motor supplies.

The high-performing cable line leverages Alpha's 80 plus years' experience and reputation for quality and reliability to ensure that Pro-Tekt cables are up to the challenging demands of industrial applications where cable failure is simply not an option.

Pro-Tekt is offered in the following constructions to suit the needs of various applications:

- Pro-Tekt Cable: UL 2464 and UL VW-1 for rugged, reliable performance in demanding applications. It features a unique, premium-grade PVC insulation and jacket for easy routing in small, tight spaces and is temperature rated from -30° to +105°C
- Pro-Tekt Plus Cable: UL 20668 and UL VW-1 approvals make it ideal for industrial applications where abrasion and mechanical abuse is common. Features include a specially formulated polyurethane jacket offering three times the tear and abrasion resistance of PVC. Pro-Tekt Plus is rated from -30° to +90°C



▲ *The new cable from AlphaWire*

- Pro-Tekt Flex Cable: UL 2661 specified for excellent performance in C-track and continuous high-flex applications. Its rounded geometry enables easy, liquid-tight installation per IP67 or NEMA 6. It is rated from -10° to +105°C (static) and +5° to +105°C (dynamic)

Pro-Tekt is available in conductor sizes from 0.09mm^2 to 1.32mm^2 and up to 80 conductors or 77 pairs. All Pro-Tekt products are sunlight resistant with RoHS and REACH certifications, CE LVD 73/23/EEC, and EN 60332-1 and -2, in addition to the aforementioned specifications.

The line is available unshielded or with a foil, braid, or foil/braid shield for environments with potential EMI/RFI interference.

Colour codes are also set to the European RAL matching system. Pro-Tekt is in stock and available in bulk and in put-ups of 50, 100, 500 and 1,000m for convenience.

AlphaWire – UK
Fax: +44 1932 772 433
Email: europe@alphawire.com
Website: www.alphawire.com

CAQ process chain integrated into cable solution

In close cooperation with leading cable and wire manufacturers, Advaris has expanded its industry solution for cable design and production by adding an efficient CAQ module.

From the drawing up of inspection plans that accompany the design stage to measured value acquisition in production and the issue of test certificates, the quality assurance processes at a cable and wire manufacturing plant can be fully supported.

The cable design module generates inspection plans based on design data. Alterations to the design automatically lead to adaptation of the test requirements. This ensures that inspection plans are always consistent and up to date. By means of an innovative interface solution for the flexible integration of measuring equipment, the capturing of measured values is largely carried out automatically, which reduces the amount of work for the inspectors, avoids input errors and permits immediate evaluation of the measured results by the software.

The MES alarm monitor checks the measurement results and reports critical values automatically to the person responsible in such an event, as specified in the escalation management plan, which can be individually defined for the company. The ease with which quality data can be linked with other order, machine and process data, which is stored in the Advaris Cable MES (Manufacturing Execution System) for the purpose of traceability of production lengths and material batches, allows instant access to significant key figures, statistics and reports.

Advaris Informationssysteme GmbH – Germany
Fax: +49 7251 98176 29
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Bend-insensitive technology for multimode fibre cabling solutions

DRAKA Communications is upgrading its entire range of UC-branded fibre cabling solutions with OM3 and OM4 multimode technology to bend-insensitive fibre technology, giving greater value for the same price. For cable shipments beginning April onwards, MaxCap-BB-OM3/4 technology will be included as a standard feature of the cabling solution, as well as bend-friendly replacements for OM2 assembly and distribution cables.

"Bend-insensitive technology represents a huge boost in functionality and solution quality for IT managers and thanks to our strong production base, we are taking this leadership position to raise the standard of all LAN and data centre cabling," commented Carsten Fehr, EMEA marketing manager, Draka Communications. "Our decision delivers real value for end users as well as installers looking to future-proof cabling infrastructures. This is effectively a free bend-insensitive upgrade for our customers. It will eventually result in end-users enjoying higher reliability data centres, lower downtime and maintenance and savings in racks and housings thanks to higher cabling density."

Bend-insensitive fibre technology provides benefits in LAN and data centre cabling, such as increased spare system margin that improves 10G and higher network reliability. It also stimulates the possibility of new, reduced-size cable designs that are lighter in weight, improve cooling efficiency and offer reduced environmental footprints – supporting the evolution to greener data centres.

Fibre deployment is growing exponentially in data infrastructures with storage, server and edge devices moving in the direction of 10Gb/s speeds and beyond, and a core network now needs to support much higher data traffic speeds.

This has led to the development of 40GbE and 100GbE standards, designed to address short reach transmission, through parallel transmission over multimode optical fibre cabling, with cost advantages over LAN WDM when compared with the use of single-mode optical fibre.

In parallel to the continued evolution of OM4 multimode fibre standards, bend-insensitive fibres have been developed to enable more compact cable cabinets. Smaller diameter flexible cables also increase cabling density, alleviating the pressure that massive optical cabling puts on installation practices by eliminating bending as a critical factor for data signal loss.

Draka introduced the first versions of BendBright in 2002 and has since expanded the product family to five versions of bend-insensitive fibre, spanning both single-mode and multimode types.

The latest developments in BendBright technology leverage the versatility of Draka's PCVD manufacturing deposition process, using a simple, robust all-solid Single-Trench-Assisted Fibre profile.

In 2009, Draka introduced MaxCap-BendBright-OM3/4, the multimode version of bend-insensitive fibre featuring high-end bending performance with full backward compatibility to standard multimode fibres.

Draka Communications – Netherlands
Email: info@draka.com
Fax: +31 20 56 89 899
Website: www.draka.com

Winding resistance meter with one-time connection system

THE Tettex 2293 is the result of extensive research and years of experience testing transformers.

It incorporates a fast and highly advanced procedure to measure winding resistance. A simple one-time-connection system together with the simultaneous winding magnetisation method reduces measuring time.

The simultaneous winding magnetisation (SWM) method ensures fast and reliable measurements even on large power transformers with delta windings on the low voltage side, where stable measurements can seldom be reached using traditional winding resistance measurement instruments.

In addition, the new demagnetisation function eliminates the magnetic remanence in the core after the application of a DC voltage.

The full graphical interface with a 7" touch screen guides the operator through the test procedure. The unit visualises each test cycle and displays the results graphically or in list format.

▲ *Haefely's water-filled cable test terminations and water processing unit*

Haefely has also introduced new cable test terminations and a water processing unit. Cable test termination systems are used for high voltage testing of power cables.

Before high voltage (AC or impulse) can be applied, the power cable needs to be pre-pared and terminated in a special way in order to control the electrical field distribution along the ends.

The Haefely water-filled Cable Test Terminations CTT and Water Processing Unit WPU offer a suitable connection for these tasks. The new generation of CTTs are optimised for AC routine testing and completed by a modern, easy to use water processing unit.

▲ *Tettex 2293*

The CTT range covers rated AC voltages from 100kV to 800kV, for diameters of maximum 115, 130 or 165mm across outer semiconducting layer.

Advantages include short tubes for easy handling and less cable waste; rugged design; hydraulic jacking system (manual or automatic); service friendly design; pneumatic valves that ensure partial discharge free operation; and a modern, user-friendly touch screen interface.

Haefely Test AG – Switzerland **Fax**: +41 61 373 49 12 **Website**: www.haefely.com

Eddy current technique

MAGNETIC Analysis Corporation has made two recent deliveries of combined eddy current and leakage flux systems for in-line NDT (non-destructive testing) of copper rod on the rolling portion of a mill.

The installations are located after the continuous casting section where the temperature of the product is still somewhat elevated and rolling speeds can reach 2,500m/minute.

The systems used a MultiMac eddy current instrument with an additional flux leakage MID (Magnetic Inclusion Detector) card.

The eddy current technique is used to detect surface defects, while the flux leakage technique, which only responds to steel inclusions, detects and separates sub-surface and surface steel inclusions from the surface defects found by the eddy current technology.

By setting up multiple test thresholds, these systems provide valuable data on the type and relative severity of the surface cracks and inclusions.

This information is then processed according to the number of occurrences in the finished coil or rod, or used to classify the product by size or defect type into three or four zones.

The final report on a particular coil grades its suitability for various options of further processing. In addition, there is the added real time benefit for production personnel of receiving early warning of a bad roll.

Data that is derived from the test instrument and exported to a computer can then be analysed to provide customised information that is helpful to a particular customer. This NDT system can also be applied in aluminium rod mills.

Magnetic Analysis Corp – USA
Email: info@mac-ndt.com
Fax: +1 914 703 3790
Website: www.mac-ndt.com

Cross-linked ethylene-tetrafluoroethylene compound

After substantial testing in the field, Inhol BV/PTL has introduced the new XL-ETFE compound type PTL-RDX 42759 to the market.

RDX 42759 is a high performance compound that combines high-temperature and fluid resistance properties. The compound is made to meet stringent specifications like MIL-W-22759 (SAE AS22759), VG 95218 Part 20, 21, 22 and 23 and other specifications throughout the industry. Applications include commercial wiring in avionics, satellites, aircraft, helicopter, ships, trains, offshore platforms and high performance military and motorsport electronics.

The compound shows a low temperature resistance down to -65°C and is resistant to many chemicals and fluids, including IRM 902 oil, diesel fuels, lubricating oils, brake fluids, synthetic hydraulic fluids, damping fluids, seawater, greases, cleaning compounds and solvents. It will withstand temperatures of 300°C for seven hours, and provides good performance in flammability tests. It features excellent corona resistance, and resistance to heat, cold, oil, abrasion, ozone and weathering, and can handle a continuous operating temperature from -65°C to +200°C.

XL-ETFE compounds offer improved strengths in comparison to standard ETFE. After e-beam cross-linking the material will show more resistance to cold flow, improved abrasion resistance, and more resistance to radiation influences than standard ethylene-tetrafluoroethylene. Dual wall constructions of the wire will reduce the cracking risks significantly.

Inhol BV – Netherlands
Email: office@inhol.com
Fax: +31 3560 33 235
Website: www.inhol.com

www.altana.com

Our business is

Future

Shaping the future means having the courage to branch out in new directions. This is precisely the principle that guides all our thinking and actions at ALTANA.

Specialty chemicals are our business. A business we pursue with passion and dedication in more than 100 countries. Four specialized divisions work together to ensure that ALTANA's unrivalled competence and service excellence continue to improve and expand. With a clear vision of what our customers expect of us, it is our ambition at all times to develop solutions that turn opportunities into future reality.

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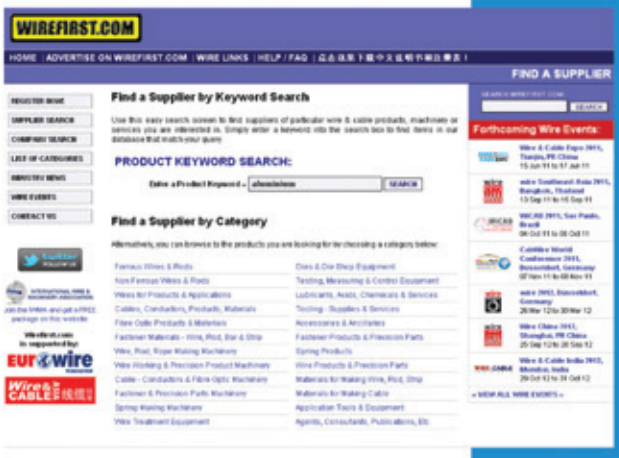

Testing, measuring, monitoring & control

Photo courtesy of Mecmesin Ltd

When specialities are considered together, as here, the group portrait can have a certain reductive effect. Do these highly developed procedures not warrant individual treatment? They do, indeed, as any of the entries in this section of EuroWire will demonstrate. But regarding them as a group can serve as a valuable reminder of their reciprocal function.

A perfect production run of wire satisfies many requisites. It is flawless, dimensionally accurate, equal to its purpose, and reliable over the full span of its rated life in service. In other words, it has been responsibly and repeatably tested, measured, monitored and controlled – by experts in their distinct but complementary fields.

Take the bus… by rail!

Techna International has introduced the KS4400 Series of DIN-rail mounting enclosures, providing a distinctive design with a choice of cutting-edge terminal technology, and PCB space utilisation.

One of eight enclosure ranges, the KS4400 has been developed for applications requiring a large PCB area, generous front-face and multiple poles, such as for converters and repeaters in industrial communications and speed monitors/reversing contactors in machine safety, and will be of particular interest to manufacturers of many types of monitoring relays, timers, motor and pump monitoring and controls, soft start/stop, current, voltage, load, resistance and temperature monitoring, as well as many other applications.

Available in modular widths of 12.5, 17.5, 22.5, 45, 67.5 and 90mm as standard, with 12, 18, 24 (30 on request), 48, 72 and 96 terminals respectively, on up to three tiers, the range offers flexibility and functionality.

From 12 to 96 x 2, 3 or 4-pole screw-clamp plug-in or integral printed-circuit type terminals are available, suitable for all soldering/reflow-compatible processes, making them ideal for cost-saving automated assembly, all in a simple 'snap-together' construction.

The range offers customisation, with accessories and options such as terminal covers, trimmers, lightning conductors, push-buttons, LEDs, front plates and transparent hinged front covers, spring-clamp terminals, high current terminal solutions, closure of terminal slots, completely closed housings without terminals (allowing even larger PCBs), terminal blanking-plugs, printing/laser etching, apertures, slots, logos, circuit diagrams, various colours (large volume), variable I/O pole configurations, data sockets, operator, communications and visual display components (such as programmable interfaces).

Full connectivity is achieved through RJ45 and EIB sockets and USB ports, with conventional wiring or mounting on optional 'In-Rail-Bus System' providing quick and reliable data and energy transfer connectivity between modules, without the need for time-consuming wiring and providing five PCB channels housed in 7.5mm or 15mm deep DIN-rail, each carrying up to 5A (25A maximum total).

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'Ancillary Equipment'
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If your company is involved in the above industry sectors, we invite you to participate in these special features by sending in editorial about your machinery or products, for FREE publication in the September 2011 edition.

Partial discharge detection in offshore wind farms

Partial Discharge (PD) is a pre-breakdown phenomenon that occurs in cables and switchgear. IPEC has pioneered PD monitoring technology as a tool for use in asset management over the last eight years, largely in collaboration with EDF Energy on its London and South East based distribution network.

As the technology has developed and markets evolved, it has become apparent that the most compelling business case for installation of permanent monitoring is on high criticality circuits where a failure would pose safety concerns or have a high financial impact.

As a result, IPEC's strongest sales have been in the industrial sector and in particular process. In order to do this, the company has developed sophisticated data acquisition and analysis algorithms that can detect the small PD signals in very high background noise. Much of IPEC's business has been overseas into regions investing in manufacturing.

▲ *Monitoring technology from IPEC*

With the high and rapidly increasing investment in offshore wind farms around the UK, IPEC has identified an opportunity to bring the benefits of PD monitoring to offshore asset management. The working environment of the high voltage network connecting wind turbines is harsh, increasing the likelihood of defects and failure. In addition, the cost of repairing a failed component and the consequential damages are very high.

By permanently monitoring the network of subsea cables and switchgear that interconnect the turbines, the asset operators will be able to identify and very accurately locate defects before a failure occurs. In many cases this will allow preventative maintenance to be carried out, avoiding failure altogether.

Offshore wind farms generally have a 20-year design lifetime and it is estimated that the cost of this monitoring technology would be offset by avoiding just two failures over this period.

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‘Made to measure’ tester for the production floor

Mecmesin’s new touch-screen controlled tension and compression tester, the MultiTest-xt, brings quality control measurement straight to the point of manufacture. The MultiTest-xt has been designed to cut costs by improving production line efficiency and reducing wastage.

The machine’s simple set-up means manufacturers can quickly run tensile and compression tests on a wide variety of materials and components, with just two clicks of the touch screen interface.

Tests include measuring the tactile feedback of keypads on mobile phones and tablet computers and testing the pull-off force of crimped, welded or soldered electrical products.

Utilising colour-coded results, the large, clear touch screen display enables easy identification of pass/fail sample conformance.

The MultiTest-xt is designed to make routine measurements quick, whilst still providing users with detailed results data as well as reporting capabilities, if required.

Users have the choice of viewing a graphical ‘live’ display of the test for observational purposes, or multiple test results in tabulated form to begin making comparisons and, subsequently, to evaluate them in more depth with a choice of calculations.

The data collected can then be easily exported to statistical process control software.

Up to five frequently used tests can be stored for quick access and initiation by different users, without the need for a high level of technical or test application knowledge.

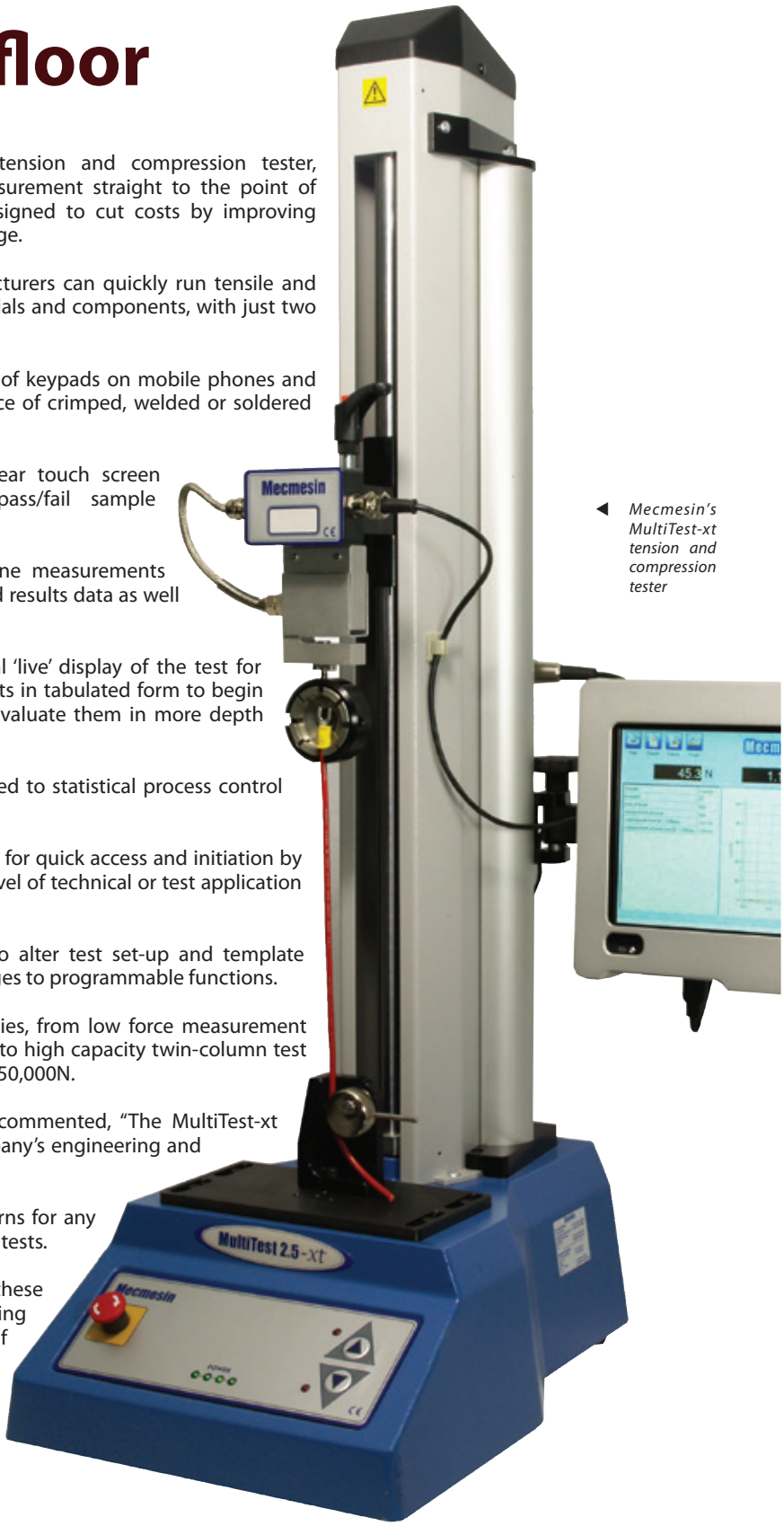
Password protection allows administrators to alter test set-up and template design, thereby avoiding any accidental changes to programmable functions.

The MultiTest-xt is available in seven capacities, from low force measurement ranges including 1,000N, 2,500N and 5,000N, to high capacity twin-column test systems, which include 10,000N, 25,000N and 50,000N.

John Page, Mecmesin’s managing director, commented, “The MultiTest-xt represents a major step forward for the company’s engineering and future test capabilities.

“Usability and longevity are important concerns for any company undertaking QC force measurement tests.

“Therefore, we have knowingly addressed these issues to create a reliable and hard working dedicated shop floor tester, capable of consistently providing accurate results right at the point of production.”



◀ *Mecmesin’s MultiTest-xt tension and compression tester*

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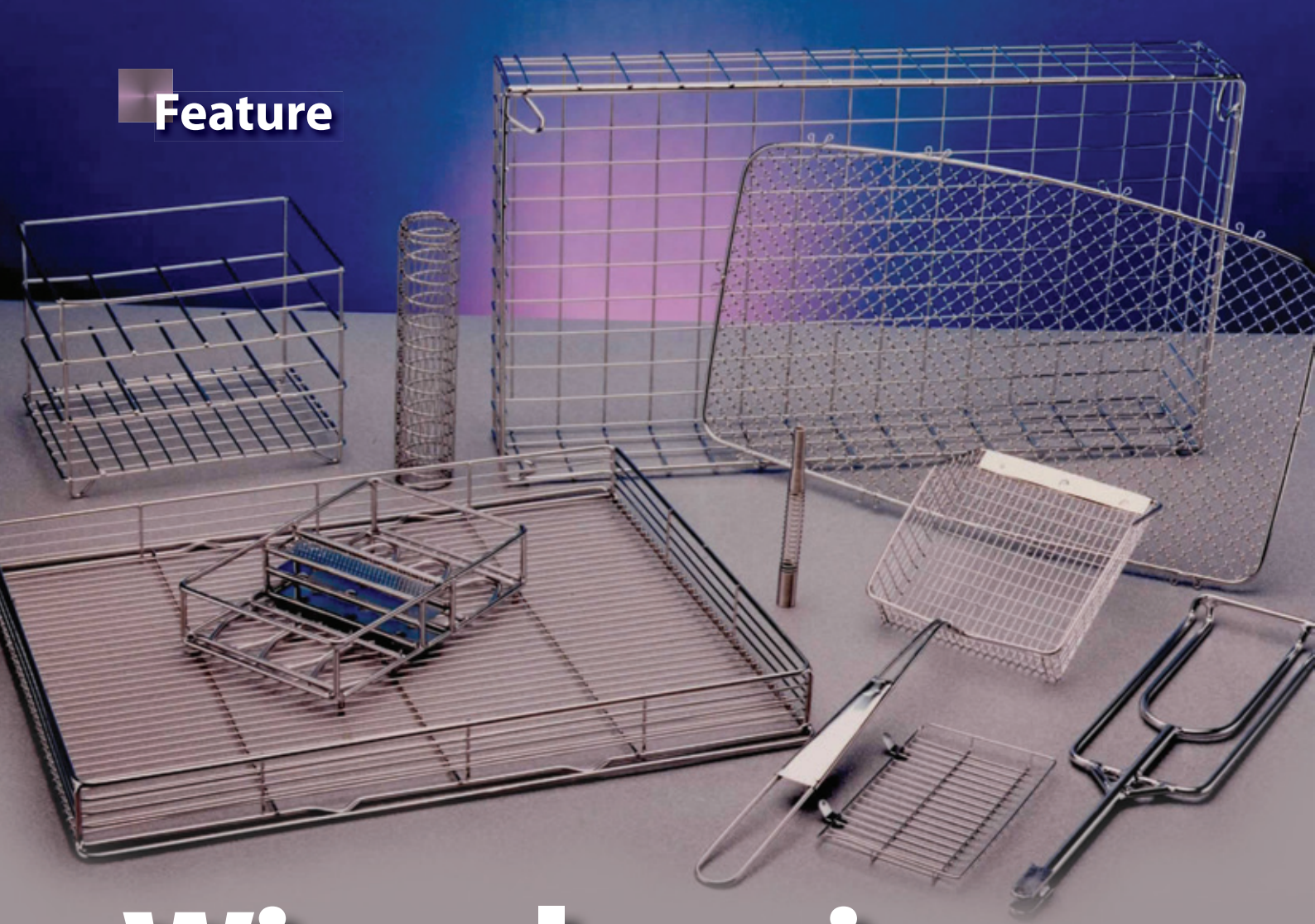

Wire cleaning, treatments, & finishes

Manufactured for exceptional strength and durability, wire from a state-of-the-art mill comes off the production line in an advanced state of readiness. But for what?

Cleaning, treatment and finishing conform this superb product to its purposes and enhance its value in an applications-driven marketplace.

Any miscalculation in the metal trades carries a penalty; but a slab offers a margin for error that a strand of wire does not. With responsibilities out of all proportion to its size, weight and surface area, wire presents a challenge even in the handling. The practitioners of the exacting specialities under review here have met and mastered greater challenges still.

Photo courtesy of Anopol Limited

Graphite applying machine

CF Machinery, Italy, has launched the new DFG1 graphite applying machine for the production of CO_2 copper free welding steel wires.

Continuous application of graphite is made by up-to-date technology with no ecological impact.

The device was designed, developed and tested in an Italian and foreign company drawing firm.

The objectives of the design were to improve the welding process and final product quality; avoid coppering system during the wire drawing process; increase sliding speed in the welding device sheaths; increase welding speed; and avoid sediments or deposits in the device sheaths. Benefits include a reduction in waste disposal (a claimed 30%), and the avoidance of sulphuric acid use and coppering tank smoke.

▲ *The DFG 1 graphite applying machine*

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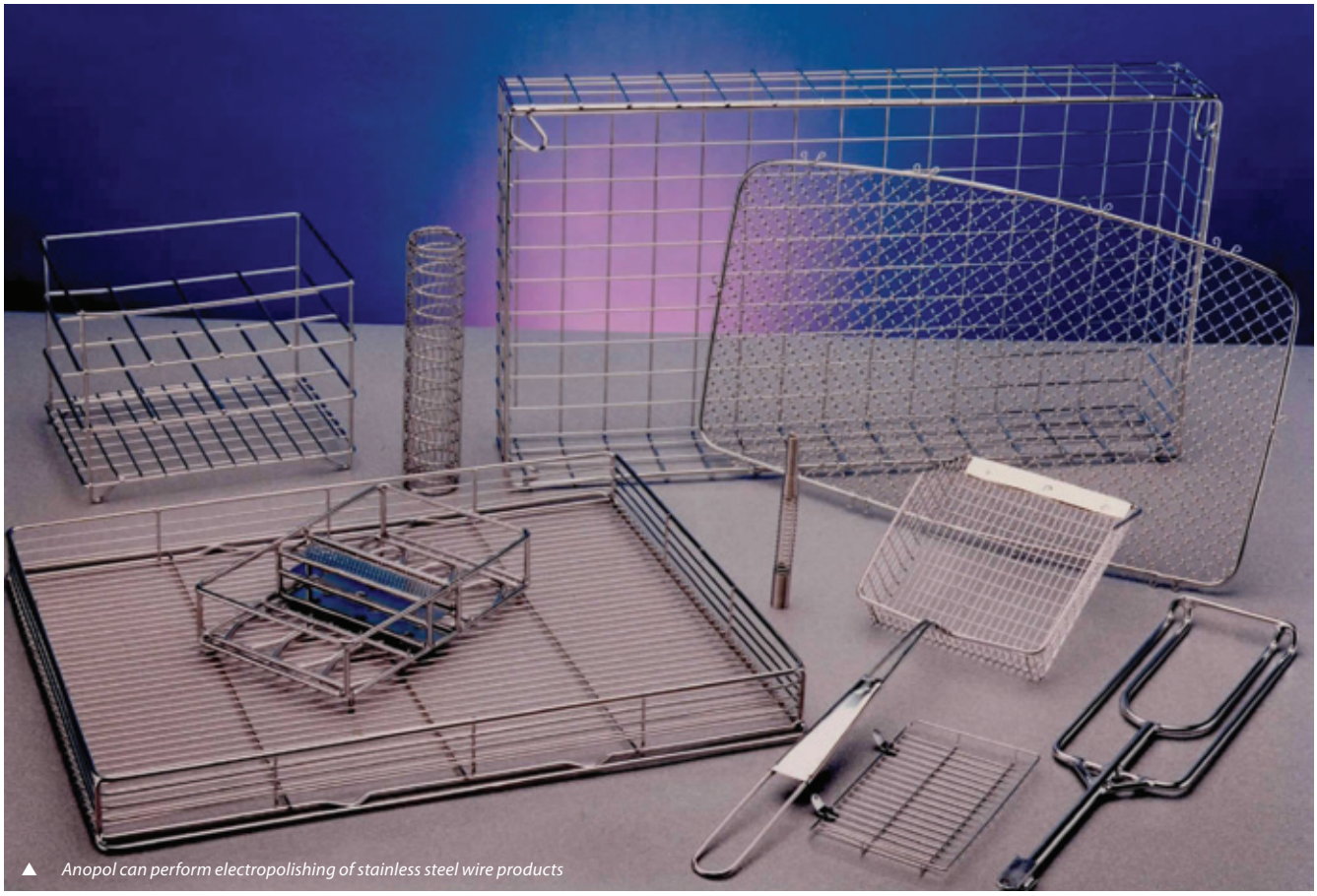

▲ *Anopol can perform electropolishing of stainless steel wire products*

Polished stainless steel wirework

Stainless steel wire is invaluable for use in a wide range of fabricated wirework applications. A growing number of these applications require the wire to be brightly polished for decorative or aesthetic reasons.

Equally important is the requirement that wire items show no signs of corroding, even if subjected to repeated washing or sterilising in potentially harsh and corrosive fluids.

Welded stainless steel wire products, such as trays and baskets, are not suitable for conventional metal polishing, traditionally using mops and brushes.

Electropolishing has proved successful for achieving a highly polished finish with high corrosion resistance.

Electropolishing is the opposite of electroplating. Rather than depositing a metal layer, electropolishing removes a fine surface layer. The resulting wire finish is bright, micro-smooth and free from surface contamination, and this is achieved without any thermal distortion to the finished item.

Anopol, UK, offers sub-contract services for carrying out electropolishing of customers' free-issue stainless steel items. The company is also able to supply electropolishing plant, the chemistry and the necessary know-how.

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Continuous electrolytic processes for perfect wire surface

Germany-based Staku-Anlagenbau GmbH has grown over 30 years in the field of surface treatment for wire, strip and profiles into a specialist in developing galvanic processes for pre-treatment and refinement of metallic semi-finished products. Specialist staff in the company's own laboratory work permanently on the improvement of existing processes as well as the development of new processes for optimal solutions, which are realised in the engineering department. Finally, in its workshops Staku builds complete production devices. The company has now introduced esystems – continuous electrolytic processes for the perfect wire surface.

One of the processes Staku has developed is eclean. A precondition for coating and further treatment of ferrous and non-ferrous metals is a clean surface. Conventional degreasing and pickling methods require relatively long treatment periods. In contrast, the eclean continuous process only needs a fraction of the usual treatment time, and Staku claims the cleaning results are better.

Another process developed by Staku is ephos. This technology is a patented continuous electrolytic zinc-calcium phosphating process used for the coating of cold heading and steel wire material. In-line production enables the user to perform the de-scaling and phosphating process in one pass. Optimum cold-forming and drawing results are obtained by the 100% coverage of wire surface. The fine crystalline structure of the electrolytically deposited zinc-calcium-phosphate layer quickly dries and provides, due to the zinc proportion, very good corrosion protection.

Advantages of cleaning and coating wire surfaces with esystems include short treatment periods, lower consumption of chemicals, lower bath temperature, avoidance of waste water to neutralise, and no creation of bath pollution.

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Automatic wire cleaning plant

ITF Group is a supplier of integrated solutions for surface finishing systems, including cleaning, degreasing, de-burring, and dry and wet-blasting. The know-how and experience gained in 30 years of activity allow the company to provide customers with a wide range of personal solutions across customised machines.

One of ITF's special solutions is represented by the automatic plant for metal wire cleaning and degreasing. This kind of plant is studied and projected for automatic washing of up to 24 wires running continuously, contaminated by draw residuals. Standard machines are designed and manufactured from a single passage line. The line is composed of more passages during which the wire is invested by mechanical and chemical actions.

The cleaning cycle can be composed of: spraying washing, ultrasound cleaning, spraying rinsing and final drying phases with blown forced air. In the loading and unloading area, located on the opposite site of the plant, are realised plates for wires complete with ceramic bushes.

Distinctive features of this flexible wire washing plant include: large cavitation power of ultrasound, assisted by microprocessor; ultrasound tank equipped with pump for continuous level reintegration connected to the pad tank; and ceramic bushes with high strength in order to let the wire run as smooth as possible.

The compact machines are designed to lie on the floor without the need for ground foundation. Internal parts are constructed from AISI 316L stainless steel, and external parts such as faring and structure (which are not in contact with the liquids) are made from AISI 304 stainless steel.

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Reaction to fire performance of cables

By Terence Journeaux, Prysmian Cables & Systems Limited, UK

Abstract

This paper covers the European Commission decision of October 2006 implementing Council Directive 89/106/EEC with regard to the classification of the reaction to fire performance of construction products and the steps being taken toward implementation.

It reviews progress on various necessary standards for test methods, classification, products, and rules for extended application (EXAP); initial output from the Europacable-funded CEMAC II project to provide technical background for implementation; and the challenges of product development.

Introduction

The objective of this paper is to give an overview of the current status and possible future direction in the way that regulators, specifiers and cable manufacturers address reaction to fire performance when cables burn. Specifically, it addresses the situation in the European Union. It is not intended to provide a detailed description of the test methods used or a discussion as to their validity.

The cable industry has had a long history in the development of test methods and products designed to lessen the hazards resulting from burning cables, going back to the 1960s. The industry was one of the first in the electrotechnical sector to develop tests for the assessment of the reaction to fire performance of its products and has continued to refine and improve these methods over the years.

Standards covering flame spread, heat release, opacity, corrosivity and toxicity of fire effluent are today in use and the industry continues to sponsor research into the improvement of the fire performance of its products and the definition of appropriate test methods.

In the fire area, there has been a longstanding commitment to International standards through the IEC (International Electrotechnical Commission) and many national and regional standards eg EN (European Standard) are based upon the IEC publications. Within this international framework there are, of course, differences from region to region and country to country in the way that the hazards of combustion of cables are approached and the applications for which the established test methods are referenced.

The cable industry therefore provides products with a wide range of reaction to fire performance to reflect the varying end user requirements.

Historical Development

Much of the early work relating to improvements in the fire performance of electric cables was carried out in the 1970s and 1980s[1,2,3]. A four stage approach was taken at the time:

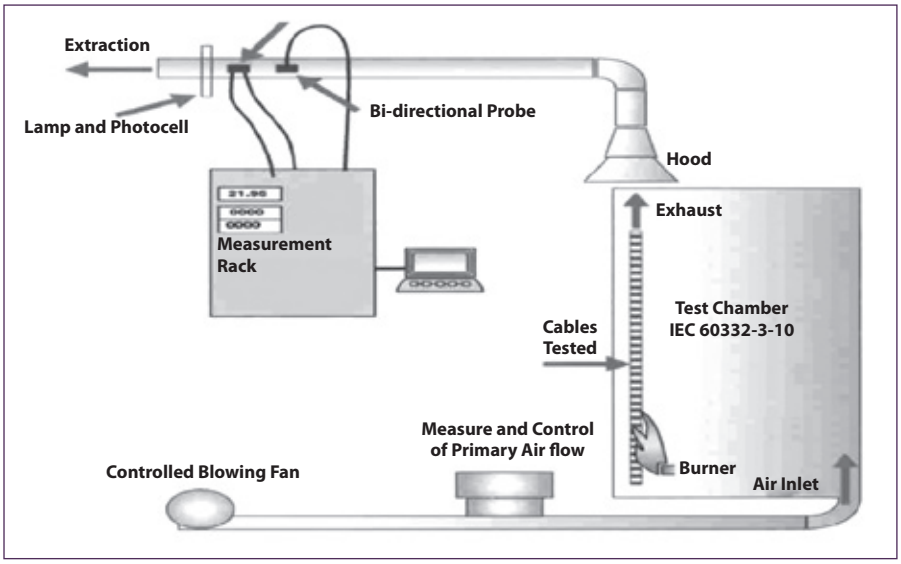
- minimise the hazard by restricting the amount of burning and reducing the propagation of fire along cable runs
- minimise the emission of smoke leading to obscuration of exits and prevention of escape
- minimise the emission of acid gas leading to corrosion of equipment
- minimise the emission of harmful fumes leading to incapacity or irritation and prevention of escape by people

It was recognised that these factors would assume varying levels of importance according to the particular market sector and typical installation condition considered[4].

The cable industry also was aware that it would need to develop its own tests to properly assess the performance of its products. Although this early development led to a series of tests that could be said to lack integration, the approach when taken as a whole still sits well with current thinking.

Another important consideration was that large scale tests should be developed wherever relevant so as to assess performance of the total product in something approaching an "as installed" condition. The international work concentrated on the development of test methods so that these could be adopted as an "add on" to product standards such that the widest possible levels of fire performance could be achieved across the full range of product types.

▼ **Figure 1**: *Schematic of prEN50399 test apparatus*



Current Situation

The relevant IEC test standards have remained largely unchanged over recent years but have been subject to ongoing refinement[5,6,7,8]. For example, IEC 332-3 has developed into a multipart standard with each part covering a different installation condition or time of exposure to the fire source.

The principles established in the early development of these standards still serve cable manufacturers and users well and the IEC standards are adopted in many countries. Based on the use of these tests, one can find in the market various types of cables. Reduced flame propagation (RP) cables which when installed in vertical bunches in accordance with the recommended procedures do not propagate fire more than a limited distance from the source. Such cables have been well established in the market since the 1970s for cabling in areas where, because of installation conditions eg vertically mounted bunched cables, the risk of propagation of fire is high. They are tested to the various parts of IEC60332-3.

Low smoke cables which have limits on smoke evolution when assessed in the 3m cube smoke chamber with performance limits chosen to give visibility over 10m distance.

They were introduced because cables containing conventional sheathing materials based on PVC were seen to give off large amounts of dense smoke when affected by fire.

Such cables have been manufactured since the 1970s, but it was not until advances were made in cable making material technology in the 1980s that cost effective designs became widely available on the market. They are tested to IEC61034-2.

Generally cables of this type also combine the properties of low corrosive gas emission and are manufactured using "halogen free" materials.

Low corrosive gas emission cables which have limits on acid and corrosive gas emission when assessed by burning samples of materials in a bench tube furnace. They were first introduced when users began to raise concern over the large amounts of acid gas emissions from burning reduced propagation PVC cables.

This corrosive and irritant gas had been seen to have devastating effects on electrical panels and instrumentation exposed to cable fire effluent[9,10].

The acid gas emission test of IEC60754-1 and/or the indirect corrosivity test of IEC60754-2 may be used.

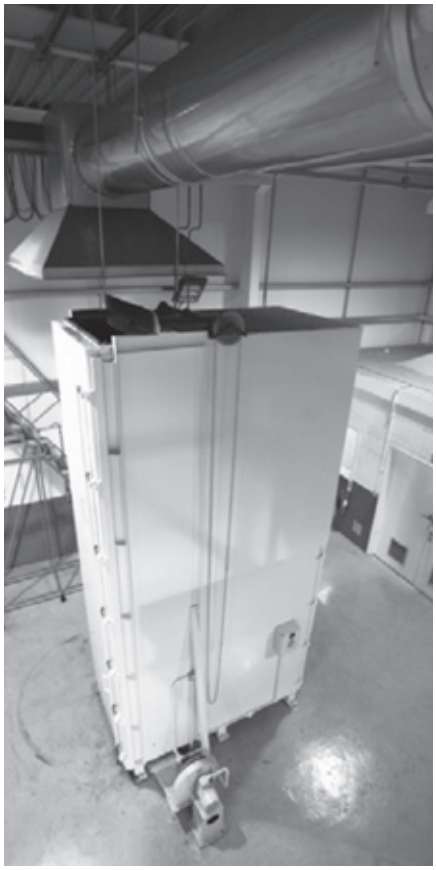
Products meeting the requirement of less than 0.5% acid gas emission when tested to IEC60754-1 are often referred to as "halogen free". In some product standards, an additional test for fluorine content (IEC60684-2) is required.

Cables having low emission of toxic gases are generally restricted to specific applications where end users have imposed such a requirement. Such cables are particularly found in the rail sector. Users have their own "toxic emission" standards ranging from a simple restriction on certain elemental groups to indices derived from an analysis of the gases evolved and weighted according to the known mammalian toxicity factors of the gases present.

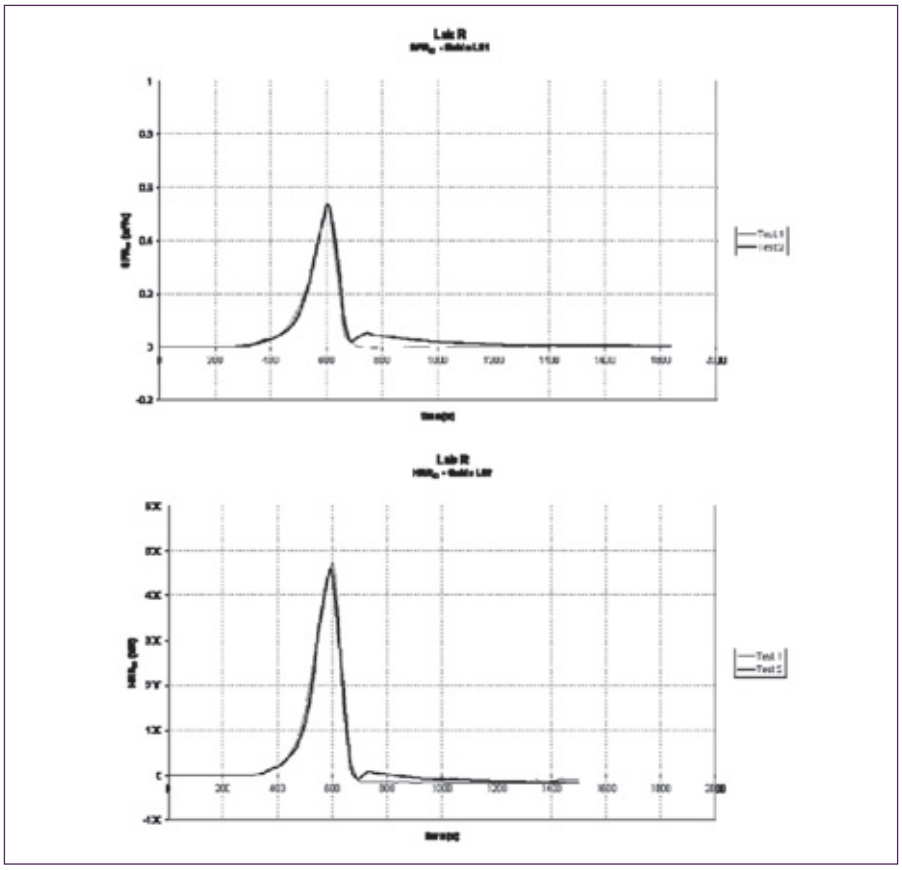
The lack of general use of toxicity testing for cables may be explained by early work carried out in the UK which concluded that "From this brief excursion into consequences it appears that the acidic gas concentrations likely to cause harm to people and plant are similar"[11,12].

Current work[13] continues to demonstrate the large contribution of HCl to the fire hazard. Some interesting new work studying the effect of important irritant gases on animal lungs[14] has also found that HCl and PVC smoke inhalation caused an acute effect with a rapid decline in the lung physiology parameters.

▼ **Figure 2**: *prEN50399 apparatus*



▼ **Figure 3**: *Typical SPR and HHR curves*



This work would appear to support a cable industry position to offer for particular applications products not releasing important irritant gases (ie HCl from PVC compounds) due to the ability of such gases to hinder escape and damage lungs and reinforce the position of "acidity" as an "indicator" for important irritant toxic effects.

The generic description Low Fire Hazard has recently been adopted by European cable manufacturers to describe cables incorporating the performance characteristics of reduced flame propagation and low emission of smoke and harmful gases.

Although the existing suite of IEC TC20 standards allows a basic overall approach to fire safety when combining the various elements (it is common for product standards to call up IEC60332-3, IEC61034, IEC60754-1 and/or IEC60754-2), recent developments have been towards a more integrated approach with test standards that have the potential to measure flame spread, heat release, smoke obscuration and combustion gas release.

European Reaction to Fire Classification for Cables Under the CPD

Of particular importance to the European market is the development of prEN50399[15,16] which is a test standard based upon the apparatus of IEC60332-3-10 with the addition of an exhaust duct equipped to measure heat release rate and smoke production rate.

prEN50399 has been developed to support the classification "Classes of reaction-to-fire for electric cables" given in Commission Decision of 27th October 2006 amending Decision 2000/147/EC implementing Council Directive 89/106/EC as regards the classification of the reaction-to-fire performance of construction products. It defines the test methods "FIPEC$_{20}$ Scen 2" and "FIPEC$_{20}$ Scen 1" given in the Commission Decision.

The essential requirements of the Commission Decision are given in *Figure 4*.

Although the prEN50399 test equipment is based upon the pre-existing IEC60332-3 series, results from the two procedures are not comparable because the prEN50399 procedure is based upon a standardised "worse case" cable mounting as adopted in the Decision, whereas the IEC procedure is based upon an "as installed" cable mounting. Smoke production is measured in the dynamic prEN50399 test but the resolution is such that the test is not capable of measuring the low levels of smoke associated with state-of-the-art low smoke cables for metro applications and the like. The IEC(EN)61034-2 method is therefore included to assess the highest class. Acidity is assessed using the existing EN50267-2-3 method which is technically equivalent to IEC60754-2.

With the publication of the Commission Decision, the question as to the availability of classified cables becomes relevant. Although all the test methods required are available, at least in draft form, there can be no cables CE marked under the CPD for their reaction to fire performance on the market until all the standards required to support such marking are available.

In order to enable Notified Bodies to issue certification of product conformity, it is necessary to prepare European Harmonised Product Standards (ENs) and other supporting standards under Mandate of the European Commission.

CENELEC has to develop and publish these standards and until the time of publication of these Mandated standards, it is not possible to officially issue any Certification for CE Marking under the CPD for reaction to fire performance of cables.

The Mandate (M/443)[17] for cables concerning standardisation work for harmonised standards was given to CEN/CENELEC in June 2009 with a scope covering power, control and communication, and optical fibre cables for use in buildings and other civil engineering works subject to regulation (all voltages included).

Class	Test method(s)	Classification criteria	Additional classification
A_{ca}	EN ISO 1716	PCS ≤ 2,0 MJ/kg (1)	
$B1_{ca}$	FIPEC$_{20}$ Scen 2 (5) *and*	FS ≤ 1.75 m *and* THR$_{1200s}$ ≤ 10 MJ; *and* *Peak HRR* ≤ 20 kW; *and* *and* FIGRA ≤ 120 Ws^{-1}	Smoke production (2, 6) and Flaming droplets/particles (3) and Acidity (4, 8)
	EN 60332-1-2	H ≤ 425mm	
$B2_{ca}$	FIPEC$_{20}$ Scen 1 (5) *and*	FS ≤ 1.5 m; *and* THR$_{1200s}$ ≤ 15 MJ; *and* *Peak HRR* ≤ 30 k W; *and* FIGRA ≤ 150m Ws^{-1}	Smoke production (2, 7) and Flaming droplets/particles (3) and Acidity (4, 8)
	EN 60332-1-2	H ≤ 425mm	
C_{ca}	FIPEC$_{20}$ Scen 1 (5) *and*	FS ≤ 2.0 m; and THR$_{1200s}$ ≤ 30 MJ; *and* Peak HRR ≤ 60 k W; *and* FIGRA ≤ 300 Ws^{-1}	Smoke production (2, 7) and Flaming droplets/particles (3) and Acidity (4, 8)
	EN 60332-1-2	H ≤ 425mm	
D_{ca}	FIPEC$_{20}$ Scen 1 (5) *and*	THR$_{1200s}$ ≤ 70MJ; *and* Peak HHR ≤ 400 k W; *and* FIGRA ≤ 1300 Ws^{-1}	Smoke production (2, 7) and Flaming droplets/particles (3) and Acidity (4, 8)
	EN60332-1-2	H ≤ 425mm	
E_{ca}	EN 60332-1-2	H ≤ 425mm	
F_{ca}	No performance		

(1) For the product as a whole, excluding metallic materials, and for any external component (ie sheath) of the product
(2) s1 = TSP1200 ≤ 50 m^2 and Peak SPR ≤ 0.25 m^2/s
s1a = s1 and transmittance in accordance with EN 61034-2 ≥ 80%
s1b = s1 and transmittance in accordance with EN 61034-2 ≥ 60% < 80%
s2 = TSP1200 ≤ 400 m^2 and Peak SPR ≤ 1.5 m^2/s
s3 = not s1 or s2
(3) For FIPEC$_{20}$ Scenarios 1 and 2: d0 = No flaming droplets/particles within 1200 s; d1 = No flaming droplets/ particles persisting longer than 10 s within 1200 s; d2 = not d0 or d1
(4) EN 50267-2-3: a1 = conductivity < 2.5 µS/mm and pH > 4.3; a2 = conductivity < 10 µSmm and pH>4.3; a3 = not a1 or a2. No declaration = No Performance Determined.
(5) Air flow into chamber shall be set to 8000 ± 800 l/min
FIPEC$_{20}$ Scenario 1 = prEN 50399-2-1 with mounting and fixing as below
FIPEC$_{20}$ Scenario 2 = prEN 50399-2-2 with mounting and fixing as below
(6) The smoke class declared for class B1ca cables must originate from the FIPEC$_{20}$ Scen 2 test
(7) The smoke class declared for class B2ca, Cca, Dca cables must originate from the FIPEC$_{20}$ Scen 1 test
(8) Measuring the hazardous properties of gases developed in the event of fire, which compromise the ability of the persons exposed to them to take effective action to accomplish escape, and not describing the toxicity of these gases

▲ **Figure 4**: *Classes or reaction-to-fire performance of electric cables*

For performance characteristics, the scope covers reaction to fire, resistance to fire and dangerous substances. CENELEC had accepted the Mandate in principle and was expected to submit a detailed response with a work programme within 2009. The first phase of the work was focused on those documents needed to support marking for reaction to fire, but it is unlikely that these will be completed before late 2011.

The Harmonised Product standard is the key to CE marking under the CPD but development of such a standard presents a difficult problem as there being many diverse cable types and the CPD only applies to their reaction to fire, resistance to fire and dangerous substances, with other safety parameters are covered under the LVD. A solution of a performance based standard that can be applied to any cable type and specifically covering aspects under the CPD is under consideration.

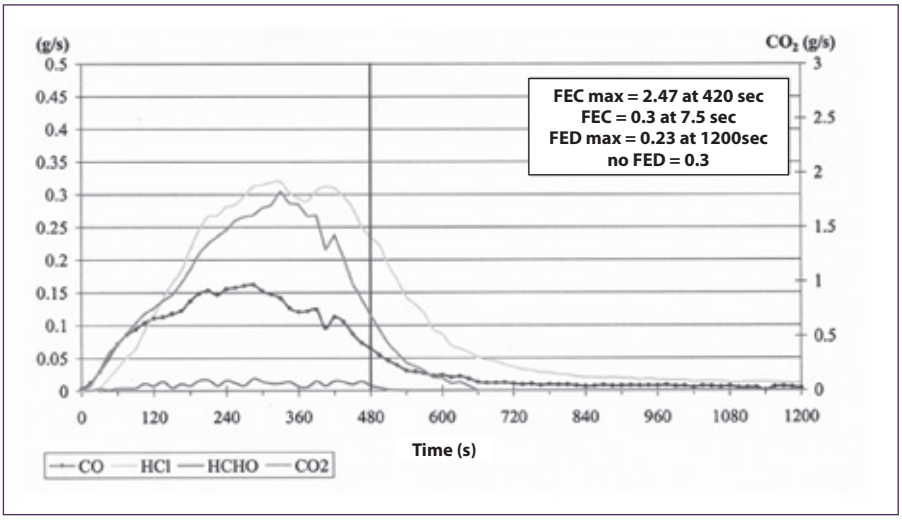
The classification standard is an important administrative document that links test results to a classification and includes information on the tests to be carried out, the number of tests for classification, the assessment of results and the classification criteria.

It has been agreed in principle by CEN and CENELEC that cables will be included as an amendment to the existing EN 13501-1 so that all products under the CPD are included in one document.

The test method standard (EN 50399) has to ensure that the data necessary for classification can be obtained. The final draft standard is ready for formal vote in CENELEC.

As part of the development of the test method, more than 20 laboratories have taken part in a proving round robin and repeatability and reproducibility were found to be comparable with other large scale tests such as the SBI. Considerable experience (more than 200 tests on cables representing generic constructions widely used in Europe) has also been obtained with the test method during the CEMAC II project which has brought together cable manufacturers, research and testing laboratories and research establishments in the implementation process in order to create the technical background.

A specific objective of the CEMAC II project was to develop rules and procedures for extended application of test results (EXAP) that define which constructions should be tested in order to obtain classification for a defined family of cable constructions. The final report was expected before the end of 2009.



▲ **Figure 5**: *Typical output of toxic gas production in an EN50399 test*

Definitive documented rules for extended application (EXAP) are necessary in order to prevent a situation where every individual cable design has to be tested for classification.

It is necessary to establish which cables need to be tested to gain approval for a product range through rules which enable tests on defined products within a family to be extrapolated to other similar constructions within the family.

The EXAP rules have been developed through the CEMAC II research project and will be published by CENELEC.

Possible Future Developments

It is clear that the European cable industry will be heavily involved with the new integrated reaction to fire test approach of EN50399 and this, together with the other test requirements of the European classification, will require considerable effort in the development of products to meet the various Euroclasses.

It is likely that EN50399 will be considered by IEC at the next major review of spread of flame test methods which is due to be conducted 2012 – 2015.

Although at present there is an absence of any strong regulatory of user driven impetus, the industry is beginning to give consideration as to suitable product tests that could be used to measure effluent and provide data that could be used in fire safety engineering studies such as escape modelling. The integrated EN50399 test could provide a good basis if further equipped to measure effluent quantity and quality.

The development of real time FTIR techniques for measuring effluent has led to some preliminary work being carried out to determine if it is possible to measure effluent quality during the EN50399 test.

Papers presented at the Europacable Seminar "Safety during fire" in May 2009[18,19,20] suggested that it was feasible to measure effluent from the EN50399 test using FTIR techniques, to use such techniques to investigate the smoke effluents and to use the input in a simulation of critical evacuation conditions in order to compare the use of different cable types. Determination of a FED and FEC index according to ISO TS13571 during the test could provide a useful measure.

Using such techniques, it was concluded from the simulation study that whereas critical conditions for some of the occupancies were achieved for the design fire when considering standard (PVC sheathed) cables due to the production of irritant gases (HCl, acreolin, formaldehydes) and smoke (reduction of visibility below 10m), critical conditions were not achieved for any occupancy when considering Low Fire Hazard cables.

Conclusions

By reacting to the requirements of its customers with regards to the reaction to fire performance, the cable industry continues to offer a range of products with different levels of performance consistent with user's needs for particular applications and installation conditions.

The principles established more than 20 years ago of control the burning, control the smoke emission and control

the emission of the most important corrosive and irritant gases still remain valid today although refinement and improvement in methodologies have been achieved in the intervening years. The advent of new requirements based on integrated tests involving heat release has been, and will continue to be, a major challenge particularly in Europe. The effects of the new European regulatory framework for the classification of a cable's reaction to fire performance will be a major change from the existing voluntary position.

Just how the European classification and CE Marking of fire performance under the CPD will affect the cable market is difficult to predict. Implementation is strictly a National matter and whilst it is known that some countries that do not now regulate for the reaction to fire performance of cables have no intention of regulating in the future, other countries have indicated an intention to use the classification in regulation. However, which Euroclass is specified for any particular application is again a national matter.

At a European level, it is likely that the cable industry will continue to be required to supply many different levels of performance, although in time we may expect to see users moving towards the higher classes as cost effective cable designs become available. Comparison of prEN50399 tests with results from existing IEC tests is difficult due to the different conditions selected for the tests and the multi-criteria approach of the classification.

Experience gained from the CEMAC II project has shown that prEN50399 results are in general greatly influenced by cable size – the smaller the cable, the more onerous the test. Results for larger power cables (conductor sizes greater than 35mm^2) can generally be predicted from IEC60332-3-24 (Category C) test results as the mounting in each test is similar but no such relationship exists for smaller cables due mainly to the totally different mounting in each test.

Recent work has demonstrated that real time measurement of effluent in a large scale fire test (such as prEN50399) is possible and that such results can be used as input into modelling studies. However, it is clear that further work would be necessary before any standardisation could take place.

Through its ongoing and demonstrated ability to invest in research, the cable industry will be in a good position to meet the challenges resulting from any new regulatory or end user demands on the fire performance of its products. ■

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Modulare Kabel in preisgekrönter Entwicklung

Modular Wiring Systems, eine Tochtergesellschaft des Kabelherstellers Tratos Ltd., hat modulare Strom- und Beleuchtung-Distributionssysteme für die preisgekrönte Büroentwicklung des "Ropemaker Place" in London entworfen, hergestellt und geliefert.

Das von British Land gebaute Ropemaker Place ist ein 603.000 Quadratfuß großes und 20 Stockwerke hohes Bürogebäude, das vorwiegend für die Fach- und Finanzwelt entworfen wurde.

Diese Entwicklung hat eine Menge Auszeichnungen erhalten, einschließlich des Preises der renommierten British Construction Industry in der Kategorie Großprojekt für deren hochwertiges Design, den innovativen Bau und den Super-Energieausweis.

Modular Wiring Systems hat mit mehreren Bauunternehmen am Ropemaker Place zusammengearbeitet und hat dabei im Design der Strom- und Beleuchtungs-Distributionssysteme sowie bei der Fertigung und Lieferung dieser vorgefertigten Systeme auf einer geschossweisen Grundlage, seinen Beitrag geleistet.

Die letzten Geschosse, die noch fertiggestellt werden müssen, sind nun in der Endphase der Ausstattung. Der Einsatz modularer Bordnetz-Systeme entspricht dem Engagement von Ropemaker Place hinsichtlich der Qualität, Innovation und Nachhaltigkeit.

Ein modulares Bordnetz-System ist ein schnell und leicht installiertes, modulares, extern vorgefertigtes Distributionssystem; dieses System besteht im Wesentlichen aus den Stromleitungen eines traditionellen Schemas.

Modulare Bordnetze-Systeme können schnell mit reduzierten Arbeitskraftbedürfnissen installiert werden und sind darüber hinaus sehr flexibel und kostengünstig. Neben der Innovation eines modularen Bordnetz-Systems, stellt auch die Qualität ein Schlüsselmerkmal dar, da das ganze System extern in einer kontrollierten Werksumgebung hergestellt wird, was wiederum die mögliche Gefahren durch Bedingungen vor Ort ausschaltet.

▲ *Die renommierte Entwicklung vom Ropemaker Place in London*

Schließlich wird durch den Einsatz eines modularen Bordnetz-Systems auch die Nachhaltigkeit angesprochen. Da das System extern hergestellt wird, besteht keine Anforderung zum Schneiden und Fertigen. Das ist gut für die Umwelt, gut für die Gesundheit und die Sicherheit, gut für die Abfallbeseitigung und noch besser für den Nettoprofit.

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Klar, übersichtlich und informativ - neue Webseite von data M

Nie war Kommunikation leichter als heute. Will man etwas über ein Unternehmen, seine Produkte und Dienstleistungen erfahren, genügen nur wenige Tastendrücke auf dem Computer. Ein weiterer Klick und man ist mit dem Unternehmen verbunden und kann gezielt Kontakt aufnehmen. data M hat das 20ig-jährige Jubiläum seit der Einführung seiner Worldwideweb gewählt, um seine neue Webseite vorzustellen.

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Kabelclips mit 2D-Barcode vereinfachen das Netzwerk-Management

In komplexen Netzen, insbesondere in Rechenzentren, ist die Erfassung und klare Identifikation aller Netzwerkkomponenten Voraussetzung sowohl für eine saubere, normgerechte Dokumentation als auch für das Management derselben - inklusive Lagerverwaltung, Bestellwesen und Wartung.

Die von Dätwyler angebotenen Patchkabelclips mit 2D-Barcode bieten die Möglichkeit, nun auch die Patchkabel mittels Scanner klar zu identifizieren und zu erfassen und das Management der gesamten Infrastruktur zu vereinfachen.

Um Zeit und Kosten zu sparen, sollten sich die Dokumentation und das Management aller Kabel und Komponenten mit Barcodes, Scannern und einer geeigneten Software maschinell, also ohne aufwändige Eingaben per Hand, lösen lassen.

Dätwyler bietet deshalb ab sofort alle Patchkabel mit Kabelclips und 2D-Barcode an. Diese ermöglichen eine einfache, fehlerfreie Erfassung. Die Vorteile der Kabelclips kommen vor allem in Serverräumen und Rechenzentren mit über 500 Schnüren zum Tragen, in denen die Dokumentation durch die EN50174-1:2009-09 vorgeschrieben ist.

Die aufgedruckten, optional kundenspezifischen Artikel- und Seriennummern kennzeichnen das jeweilige Patchkabel beidseitig und eindeutig. Die 2D-Barcode-Nummer beinhaltet zudem viele Informationen wie Qualität oder Kategorie, Länge und Farbe.

▲ *Das neue Barcode-System von Daetwyler*

Um das Scannen zu vereinfachen, kann jeder Kabelclip - anders als Laminieretiketten - in eine gut lesbare Position verschoben werden, ohne dabei "abzurutschen", wie das mit Fähnchen häufig passiert.

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Eine Stadt profitiert von Fachkenntnis

Draka Communications hat einen Auftrag für die Beratung, Lizenzvergabe und Schulung mit e.wa riss Netze erhalten, ein in der Lieferung von Faserdiensten spezialisiertes Joint Venture im gemeinsamen Besitz der Stadtwerke von Biberach und EnBW, einem Energieversorger für den südwestlichen Teil Deutschlands.

e.wa riss Netze GmbH (Netzwerke) profitiert von der Draka FTTH-Fachkenntnis sowie von der Applikation des DrakaXSNet Software-Pakets bei der Entwicklung seines bestehenden Hochgeschwindigkeits-Glasfasernetzes, das die Einwohner von Biberach beliefert.

In Zusammenarbeit mit der Netzplanungsgesellschaft E9, hat e.wa riss Netze den Bau der Glasfaserinfrastruktur für deren Faser-Services mit Marke ewacom in Biberach begonnen.

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Brandverhalten von Kabeln

Von Terence Journeaux, Prysmian Cables & Systems Limited, UK

Übersicht

Dieser Artikel befaßt sich mit der Entscheidung der Europäischen Kommission von Oktober 2006, die die Richtlinie 89/106/EWG des Rats im Hinblick auf die Klassifizierung des Brandverhaltens von Bauprodukten durchführt und die Schritte, die in Richtung Durchführung unternommen wurden.

Überblickt werden dabei der Fortschritt verschiedener erforderlicher Normen für Testmethoden, die Klassifizierung, die Produkte und die Regeln zum erweiterten Anwendungsbereich (EXAP); die Ausgangsleistung vom CEMAC II Projekt, das von Europacable fundiert wurde, um ein technisches Hintergrundwissen für die Durchführung zu bieten; sowie für die Herausforderungen der Produktentwicklung.

Einleitung

Das Ziel dieses Artikels ist es eine Übersicht über den aktuellen Zustand zu geben sowie über die möglichen zukunftsorientierten Zielsetzungen hinsichtlich der Weise, in der die Aufsichtsbehörde, Spezifizierer und Kabelhersteller das Brandverhalten von Kabeln ansprechen, wenn letztere brennen. Angesprochen wird speziell die Lage in der Europäischen Union. Es wird nicht beabsichtigt, eine detaillierte Beschreibung der benutzten Testmethoden weder noch eine Diskussion hinsichtlich deren Gültigkeit zu liefern.

Die Kabelindustrie hat eine lange Geschichte in der Entwicklung von Testmethoden und Produkten, die zur Verringerung von den Gefahren entworfen wurden, die sich aus brennenden Kabeln ergeben, und bis in den 60iger Jahre zurückreichen. Die Kabelindustrie war eine der ersten im elektrotechnischen Bereich, die Tests für die Abschätzung des Brandverhaltens ihrer Produkte entwickelte und diese Methoden im Laufe der Jahren weiterhin verfeinerte und verbesserte.

Normen, die die Flammausbreitung, Wärmefreisetzung, Undurchsichtigkeit, Korrosivität und Toxizität von Brandgasen decken, sind heute im Einsatz und die Industrie sponsert weiterhin die Forschung zur Verbesserung des Brandverhaltens dieser Produkte sowie die Definition geeigneter Testmethoden.

Im Brandbereich gibt es ein seit langem bestehendes Engagement für internationale Normen durch die Internationale Elektrotechnische Kommission (IEC - International Electrotechnical Commission) und viele nationale und regionale Standards wie z. B. EN (European Standard) basierend auf den IEC-Veröffentlichungen. In diesem internationalen Rahmen gibt es natürlich Unterschiede von einer Region zur anderen sowie von einem Land zum anderen, was die Art betrifft, in der man die Gefahr der Kabelverbrennung anspricht sowie hinsichtlich der Anwendungen, für die man auf die festgelegten Testmethoden verweist.

Demzufolge bietet die Kabelindustrie Produkte mit einer großen Auswahl an Brandverhalten, um die unterschiedlichen Anforderungen der Endnutzer widerzuspiegeln.

Historische Entwicklung

Der Großteil der Vorstudien über die Verbesserungen im Brandverhalten elektrischer Kabel wurde in den 70iger und 80iger Jahre durchgeführt[1,2,3]. Zu jener Zeit gab es eine vierstufige Vorgehensweise:

- minimieren der Gefahr durch Begrenzung des Verbrennungsausmaßes und Begrenzung der Brandausbreitung entlang der Kabeltrassen
- minimieren der Rauchemission, die dazu führt die Ausgänge zu vernebeln und die Flucht zu behindern
- minimieren der Säuregasemission, die zur Korrosion der Ausrüstungen führt
- minimieren der schädlichen Rauchemission, das zur Handlungsunfähigkeit oder Reizung führt und die Flucht von Menschen behindert

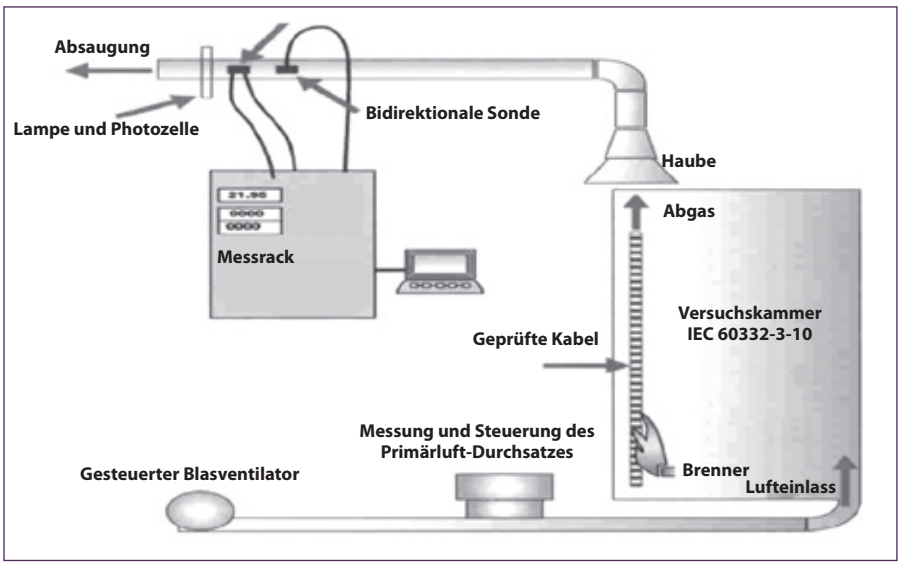
Es wurde anerkannt, daß diese Faktoren verschiedene Bedeutungsebenen übernehmen, je nach dem besonderen Marktbereich und den typisch betrachteten Installationsbedingungen[4].

Die Kabelindustrie war sich zudem bewusst, ihre eigene Prüfungen entwickeln zu müssen, um die Leistungen ihrer eigenen Produkte richtig einschätzen zu können.

Obwohl diese erste Entwicklung eine Reihe von Prüfungen mit sich brachte, von denen man meinen könnte sie seien in Bezug auf die Integration mangelhaft, passt sich diese Vorgehensweise der aktuellen Ansicht immer noch gut an, wenn man sie gesamtheitlich betrachtet.

Eine weitere wichtige Erwägung war, daß umfangreiche Prüfungen, soweit betreffend, derart entwickelt werden sollten, daß

▼ **Bild 1**: *Schema des Prüfgeräts prEN50399*



die Leistung des Gesamtprodukts, in der etwas abgeschätzt wird, sich einer „wie installierten" Bedingung nähert.

Internationale Studien konzentrierten sich auf die Entwicklung von Prüfmethoden, so daß diese als „Zusatz"" zu den Produktnormen aufgenommen werden können und die weitesten möglichen Level des Brandverhaltens durch die ganze Auswahl an Produkttypen erzielt werden können.

Gängige Situation

Die einschlägigen IEC-Testnormen blieben in den letzten Jahren im hohen Maße unverändert, unterlagen aber einer ständigen Verfeinerung[5,6,7,8].

Zum Beispiel hat sich IEC 332-3 in eine mehrteilige Norm weiter entwickelt, wobei jeder Teil eine unterschiedliche Installationsbedingung oder die Aussetzzeit der Flammenquellen, deckt.

Die in der früheren Entwicklung dieser Normen festgelegten Grundsätze leisten den Kabelherstellern und -benutzern immer noch gute Dienste und die IEC-Normen werden in vielen Ländern angenommen. Basierend auf dem Einsatz dieser Tests, sind verschiedene Kabel marktüblich.

RP-Kabel (reduzierte Flammenfortpflanzung), bei denen, wenn sie in vertikalen Bündeln gemäß den empfohlenen Verfahren installiert werden, das Feuer sich nicht über eine eingeschränkte Distanz zur Quelle ausbreitet.

Seit den 70iger Jahren haben sich derartige Kabel im Markt für die Verkabelung in den Bereichen gut etabliert, wo wegen den Installationsbedingungen, d. h. in vertikalen Bündeln aufgestellte Kabel, die Gefahr einer Feuerausbreitung hoch ist. Sie werden in verschiedenen Teile nach IEC60332-3 geprüft.

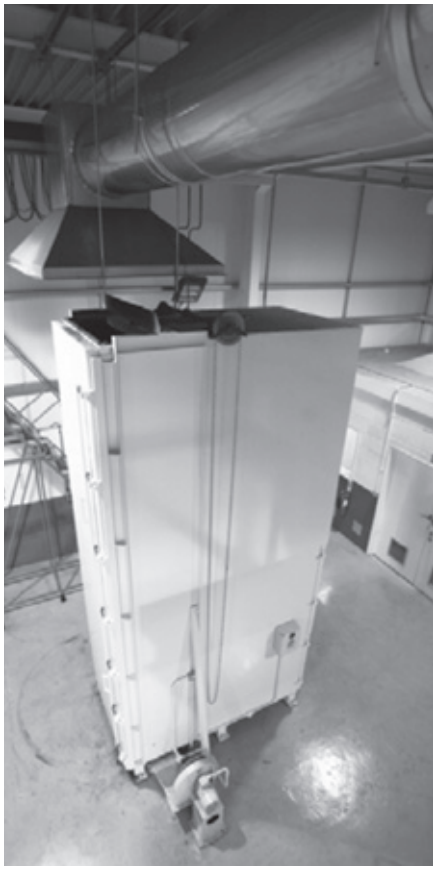
Raucharme Kabel, die bezüglich der Rauchentwicklung eingeschränkt sind, wenn sie in der 3m-Würfel-Rauchkammer bewertet werden, mit Leistungseinschränkungen, die derart ausgewählt werden, daß eine Sichtbarkeit über einen Abstand von 10m gegeben wird. Sie wurden eingeführt, weil es sich zeigt, daß Kabel, die herkömmliche auf PVC basierende Ummantelungswerkstoffe enthalten, ein großes Ausmaß an dichtem Rauch abgeben, wenn sie vom Feuer angegriffen werden. Derartige Kabel werden seit den 70iger Jahren hergestellt, aber erst als Fortschritte in der Technik der Kabelherstellungswerkstoffe in den 80iger Jahre gemacht wurden, standen wirtschaftliche Entwürfe im Markt weit verbreitet zur Verfügung. Sie werden nach IEC61034-2 geprüft.

In der Regel vereinigen Kabel dieser Art auch die Eigenschaften der geringen korrosiven Gasemission und werden mit Einsatz von „halogenfreien" Werkstoffen hergestellt.

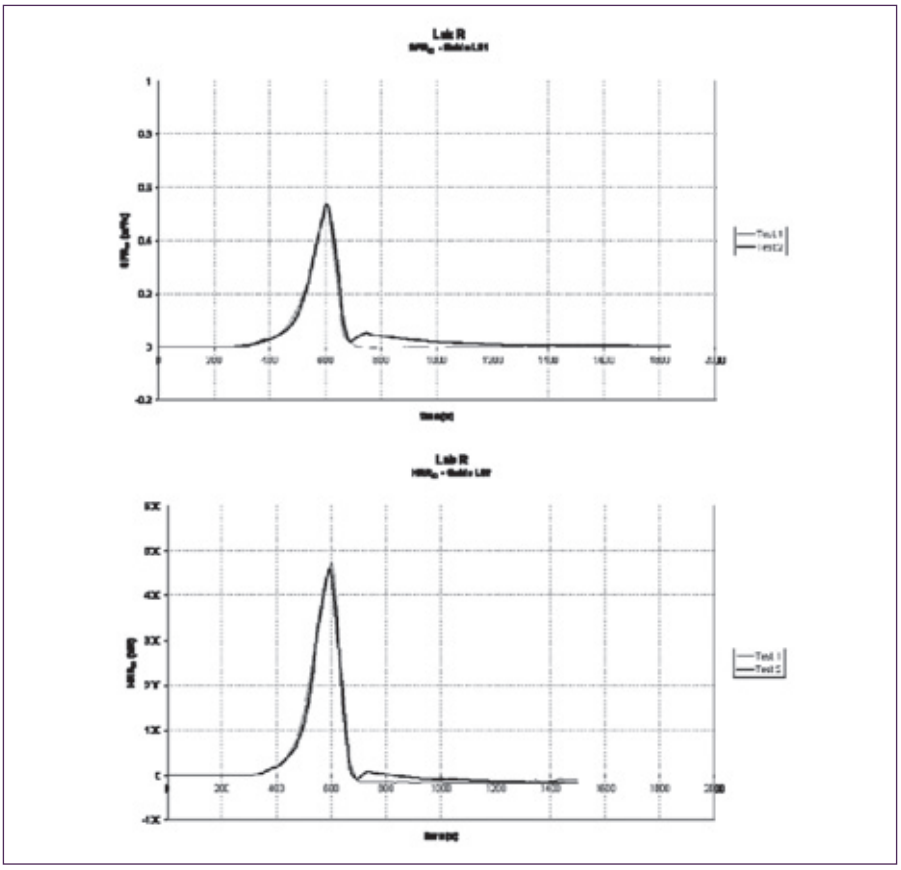
Kabel mit einer geringen korrosiven Gasemission, die bezüglich der Säure- und korrosiven Gasemission eingeschränkt sind, wenn sie durch brennende Werkstoffmuster in einem Rohrofen-Arbeitstisch eingeschätzt werden. Die Kabel wurde zunächst eingeführt als Benutzer Bedenken hinsichtlich des großen Ausmaßes an Säuregasemissionen aus PVC-Kabeln mit brennender reduzierter Flammenfortpflanzung aufkommen ließen.

Es erwies sich, daß dieses korrosive und reizende Gas verheerende Auswirkungen bei den Elektroschalterbrettern zeigt sowie bei der Instrumentation, die dem Brandgas ausgesetzt wird das wiederum durch das brennende Kabel freigesetzt wird (9,10). Die Prüfung der Säuregasemission nach IEC60754-1 und/oder die Prüfung der indirekten Korrosivität nach IEC60754-2 könnte verwendet werden. Die Produkte, die die Anforderungen unter 0,5% Säuregasemission erfüllen, wenn sie nach IEC60754-1 geprüft werden, werden oft als „halogenfrei" bezeichnet. In einigen Produktnormen ist eine zusätzliche Prüfung für den Fluorinhalt (IEC60684-2) erforderlich.

▼ **Bild 2**: *Gerät prEN50399*



▼ **Bild 3:** *Typische SPR- und HRR-Kurven*



Kabel mit einer geringen Emission giftiger Gase sind in der Regel für spezifische Anwendungen eingeschränkt, bei denen Endbenutzer eine derartige Anforderung aufgezwungen haben. Diese Kabel findet man vor allem im Bahnsektor.

Benutzer haben deren eigene Normen für „schädliche Emissionen" von einer einfachen Beschränkung bestimmter elementarer Gruppen bis zu Indexen, die sich aus einer Analyse der sich entwickelten und gewichteten Gase ergeben, entsprechend den bekannten Säugetier-Giftigkeitsfaktoren der vorhandenen Gase.

Der Mangel am allgemeinen Gebrauch der Giftigkeitsprüfung für Kabel kann mittels einer früheren Arbeit erklärt werden, die im UK durchgeführt wurde, die folgende Schlussfolgerung zog: „Aus dieser kurzen Untersuchung über die Folgen, scheint es, daß die Säuregaskonzentrationen, die Menschen verletzen und Anlagen beschädigen könnten, ähnlich sind"[11,12].

Die gängige Arbeit[13] beweist weiterhin den großen Beitrag von Chlorwasserstoff gegenüber Feuergefahr.

Einige interessante neue Arbeitsstudien, die die Wirkung besonders reizender Gase auf Tierlungen[14] untersuchen, haben auch festgestellt, daß Chlorwasserstoff- und PVC-Rauchinhalation einen akuten Effekt, mit einer steilen Abnahme der physiologischen Lungenparameter verursacht.

Aus dem vorliegenden Artikel ist erkennbar, daß eine Position der Kabelindustrie unterstützt wird - die für besondere Anwendungen, Produkte bietet, die keine wichtigen reizende Gase freisetzen (d. h. Chlorwasserstoff von PVC-Mischungen), weil diese Gase fähig sind, die Flucht zu behindern, Lungen zu verletzen - während gleichzeitig die Position der „Azidität" als „Anzeiger" für wichtige reizende giftige Wirkungen gestärkt wird.

Die allgemeine Bezeichnung „Geringe Brandgefahr" (Low Fire Hazard) wurde vor kurzem von europäischen Kabelherstellern aufgenommen, um die Kabel zu beschreiben, die Leistungsmerkmale reduzierter Flammenfortpflanzung enthalten sowie geringe Rauchemission und schädliche Gase.

Obwohl die bestehende Folge der IEC TC20 Normen eine grundlegende Gesamteinstellung gegenüber des Brandschutzes ermöglicht, wenn die verschiedenen Elemente vereinigt werden (es ist für Produktnormen gängig IEC60332-3, IEC61034, IEC60754-1 und/oder IEC60754-2 aufzurufen), haben sich die letzten Entwicklungen nach einer integrierten Vorgehensweise mit Testnormen gerichtet, die fähig sind Flammenausbreitung, Wärmefreisetzung, Rauchvernebelung und Freisetzung von Verbrennungsgas zu messen.

Klasse	Prüfmethode(en)	Klassifizierungskriterium	Zusätzliche Klassifizierung
A_{ca}	EN ISO 1716	PCS ≤ 2,0 MJ/kg (1)	
$B1_{ca}$	$FIPEC_{20}$ Szenario 2 (5) *und*	FS ≤ *1,75 m und* THR_{1200s} ≤ 10 MJ; *und* Spitzenwert HRR ≤ 20 kW; *und* FIGRA ≤ 120 Ws^{-1}	Raucherzeugung (2, 6) und brennendes Abtropfen/Abfallen (3) und Azidität (4, 8)
	EN 60332-1-2	H ≤ 425mm	
$B2_{ca}$	$FIPEC_{20}$ Szenario 1 (5) *und*	FS ≤ *1,5m; und* THR_{1200s} ≤ 15MJ; *und* Spitzenwert HRR ≤ 30 kW; *und* FIGRA ≤ 150 Ws^{-1}	Raucherzeugung (2, 7) und brennendes Abtropfen/Abfallen (3) und Azidität (4, 8)
	EN 60332-1-2	H ≤ 425mm	
C_{ca}	$FIPEC_{20}$ Szenario 1 (5) *und*	FS ≤ 2.0 m; *und* THR_{1200s} ≤ 30 MJ; *und* Spitzenwert HRR ≤ 60 kW; *und* FIGRA ≤ 300 Ws^{-1}	Raucherzeugung (2, 7) und brennendes Abtropfen/Abfallen (3) und Azidität (4, 8)
	EN 60332-1-2	H < 425mm	
D_{ca}	$FIPEC_{20}$ Szenario 1 (5) *und*	THR_{1200s} ≤ 70 MJ; *und* Spitzenwert HRR ≤ 400 kW; *und* FIGRA ≤ 1300 Ws^{-1}	Raucherzeugung (2, 7) und brennendes Abtropfen/Abfallen (3) und Azidität (4, 8)
	EN 60332- 1-2	H ≤ 425mm	
E_{ca}	EN 60332-1-2	H ≤ 425mm	
F_{ca}	Kein Brandverhalten bestimmt		

(1) Für das gesamte Produkt mit Ausnahme metallischer Materialien sowie für jeden äußeren Bestandteil (d. h. Ummantelung) des Produkts.
(2) s1 = TSP_{1200} = 50 m^2 und Spitzenwert SPR = 0,25 m^2/s
s1a = s1 und Transmissionsgrad entsprechend EN 61034-2 = 80%
s1b = s1 und Transmissionsgrad entsprechend EN 61034-2 = 60% < 80%
s2 = TSP_{1200} = 400 m^2 und Spitzenwert SPR = 1,5 m^2/s
s3 = weder s1 noch s2
(3) Für $FIPEC_{20}$ Szenarios 1 und 2: d0 = kein brennendes Abtropfen/Abfallen innerhalb von 1200s; d1 = kein brennendes Abtropfen/Abfallen während mehr als 10 s innerhalb der 1200s; d2 = weder d0 noch d1.
(4) EN 50267-2-3: a1 = Leitfähigkeit < 2,5 µS/mm und pH > 4,3; a2 = Leitfähigkeit < 10 µS/mm und pH > 4,3; a3 = weder a1 noch a2. Keine Angabe = keine Leistung festgestellt.
(5) Der Luftstrom in der Kammer ist auf 8000 ± 800 l/min einzustellen.
$FIPEC_{20}$-Szenario 1 = prEN 50399-2-1 mit Montage und Befestigung wie nachstehend.
$FIPEC_{20}$-Szenario 2 = prEN 50399-2-2 mit Montage und Befestigung wie nachstehend.
(6) Die für Kabel der Klasse $B1_{ca}$ angegebene Rauchentwicklungsklasse muss durch eine $FIPEC_{20}$-Szenario-2-Prüfung ermittelt worden sein.
(7) Die für Kabel der Klassen $B2_{ca}$, C_{ca}, D_{ca} angegebene Rauchentwicklungsklasse muss durch eine $FIPEC_{20}$-Szenario-1-Prüfung ermittelt worden sein.
(8) Messung der Gefährdungseigenschaften von bei Brand entstehenden Gasen, die bei den exponierten Personen die Fähigkeit herabsetzen, sich in Sicherheit zu bringen, nicht eine Beschreibung der Toxizität dieser Gase.

▲ **Bild 4**: *Klassen oder Brandverhalten elektrischer Kabel*

Europäische Klassifizierung des Brandverhaltens für Kabel nach der Bauproduktenrichtlinie

Von besonderer Bedeutung ist für den europäischen Markt die Entwicklung der Norm prEN50399[15,16] bzw. eine Testnorm basierend auf eine Vorrichtung der Norm IEC60332-3-10 mit Zusatz eines Abgasrohrs, das zur Messung der Wärmefreisetzungsrate und Rauchentwicklungsrate ausgestattet ist.

prEN50399 wurde entwickelt, um die Klassifizierung „Brandverhaltensklassen für elektrische Kabel" zu unterstützen, enthalten in der Entscheidung der Kommission vom 27. Oktober 2006, die die Entscheidung 2000/147/EC ergänzt, die wiederum die Richtlinie 89/106/EG des Rats in Bezug auf die Klassifizierung des Brandverhaltens von Bauprodukten durchführt. Es bestimmt die Testmethoden "$FIPEC_{20}$ SZENARIO 2" und "$FIPEC_{20}$ SZENARIO 1", enthalten in der Kommissionsentscheidung.

Die wesentlichen Anforderungen der Entscheidung der Kommission sind in der nachfolgenden Tabelle beschrieben.

Obwohl die prEN50399 Testausrüstung auf vorher bestehenden IEC60332-3

Reihen basiert, können die Ergebnisse aus den zwei Verfahren nicht verglichen werden, weil das prEN50399 Verfahren auf einer standardisierten Kabelmontage nach dem „schlimmsten Fall" basiert, wie in der Entscheidung aufgenommen, während das IEC-Verfahren auf einer „wie installierten" Kabelmontage basiert.

Die Raucherzeugung wird im dynamischen Test prEN50399 gemessen, aber der Beschluß ist derart, daß die Prüfung nicht die niedrigen Niveaus des Rauchs messen kann, die mit den raucharmen Kabeln nach dem Stand der Technik für Metroanwendungen und ähnliches verknüpft sind.

Die IEC(EN)61034-2-Methode ist daher enthalten, um die höchste Klasse zu bewerten. Azidität wird mit Einsatz der bestehenden Methode EN50267-2-3 abgeschätzt, die technisch IEC60754-2 entspricht.

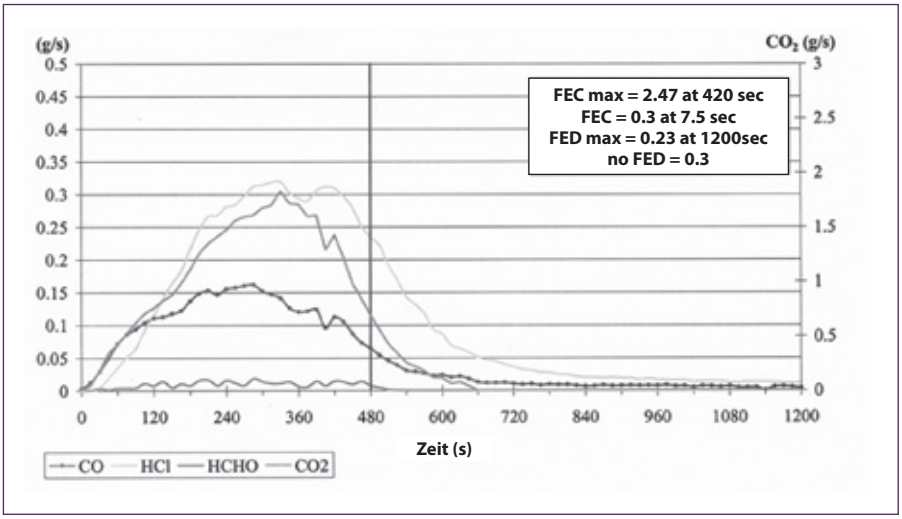
Mit der Veröffentlichung der Entscheidung der Kommission, wird das Thema der Verfügbarkeit klassifizierter Kabel wichtig. Obwohl alle geforderten Testmethoden, zumindest in der Entwurfsform, zur Verfügung stehen, können keine CE-gekennzeichnete Kabel nach der Bauproduktenrichtlinie für deren Brandverhalten auf dem Markt sein, solange nicht alle erforderlichen Normen verfügbar sind, um diese Kennzeichnung zu unterstützen.

Um den notifizierten Stellen die Ausgabe einer Zertifizierung der Produktkonformität zu ermöglichen, ist es erforderlich, europäisch harmonisierte Produktnormen (ENs) vorzubreiten sowie weitere Stütznormen im Auftrag der Europäischen Kommission.

CENELEC (Europäisches Komitee für elektrotechnische Normung) muß diese Normen entwickeln und veröffentlichen, und solange diese beauftragten Normen nicht veröffentlicht sind, kann keine Zertifizierung für die CE-Markierung nach der Bauproduktenrichtlinie für Brandverhalten von Kabeln offiziell herausgegeben werden.

Das Mandat (M/443) (17) für Kabel über die Normungsarbeit für harmonisierte Normen wurde Juni 2009 CEN (Europäisches Komitee für Normung)/ CENELEC im Anwendungsbereich erteilt, der Strom-, Steuer- und Kommunikations- sowie Lichtwellenleiterkabel umfaßt, für den Einsatz in Gebäuden und anderen Hoch- und Tiefbauten, die der Vorschrift unterliegen (einschließlich aller Stromspannungen).

In Bezug auf die Leistungsmerkmale, schließt der Anwendungsbereich



▲ **Bild 5**: *Typische Durchsatzkurve der Erzeugung giftiger Gase in einer Prüfung EN50399*

Brandverhalten, Feuerbeständigkeit und Gefahrstoffe ein. CENELEC nahm das Mandat grundsätzlich an und sollte eine detaillierte Antwort mit einem Arbeitsplan innerhalb 2009 vorlegen.

Die erste Phase der Arbeit sollte sich auf die Unterlagen fokussieren, die erforderlich sind, um die Kennzeichnung in Bezug auf Brandverhalten zu unterstützen, jedoch ist deren Vervollständigung innerhalb Ende 2011 unwahrscheinlich.

Die harmonisierte Produktnorm ist der Schlüssel zur CE-Markierung nach der Bauproduktenrichtlinie, jedoch stellt die Entwicklung einer solchen Norm ein großes Problem dar, da es viele unterschiedliche Kabeltypen gibt und die Bauproduktenrichtlinie nur für deren Brandverhalten, Feuerbeständigkeit und Gefahrstoffe zutrifft, während andere Sicherheitsparameter in der Niederspannungsrichtlinie (LVD) enthalten sind.

Eine Lösung für eine leistungsbezogene Norm, die für jeglichen Kabeltyp angesetzt werden kann und spezifische Aspekte nach der Bauproduktenrichtlinie einschließt, steht zur Diskussion.

Die Klassifizierungsnorm ist eine wichtige amtliche Bescheinigung, die Testergebnisse mit einer Klassifizierung verbindet und Informationen über die durchzuführenden Tests, die Anzahl der Tests für die Klassifizierung, die Beurteilung der Ergebnisse und das Klassifizierungskriterium einschließt.

CEN und CENELEC haben grundsätzlich vereinbart, daß die Kabel in einer Novelle der bestehenden EN 13501-1 eingeschlossen werden, so daß ein Dokument alle Produkte nach der Bauproduktenrichtlinie beinhaltet.

Die Norm der Testmethode (EN 50399) muß sicherstellen, daß die für die Klassifizierung erforderlichen Angaben erlangt werden können. Die Norm entsprechend des endgültigen Entwurfs steht für die formelle Abstimmung in CENELEC bereit.

Im Zuge der Entwicklung der Testmethode, haben über 20 Labors an eine nachweislichen Prüfung zwischen Laboratorien teilgenommen, dabei erwiesen sich die Wiederholbarkeit und Reproduzierbarkeit als vergleichbar mit anderen umfangreichen Prüfungen, wie z. B. die SBI (Single Burning Item). Eine große Erfahrung (über 200 Tests an Kabeln, die allgemeine, in Europa verbreitet eingesetzte Konstruktionen darstellen) wurde ebenfalls mit der Testmethode während des CEMAC II Projekts erzielt, das Kabelhersteller, Forschungs- sowie Prüflaboratorien und Forschungsanstalten im Durchführungsverfahren zusammenbrachte, um den technischen Hintergrund zu entwerfen.

Ein spezifisches Ziel des CEMAC II Projekts war Regeln und Verfahren für einen erweiterten Anwendungsbereich der Testergebnisse (EXAP) zu entwickeln, die festlegen, welche Konstruktionen geprüft werden sollten, um eine Klassifizierung für eine bestimmte Familie von Kabelaufbauten zu erzielen. Der Endbericht wurde vor Ende 2009 angenommen.

Endgültige dokumentierte Regeln für einen erweiterten Anwendungsbereich (EXAP) sind erforderlich, um einen Lage zu vermeiden, wo jeder einzelne Kabelaufbau für die Klassifizierung geprüft werden muß.

Es besteht daher die Erfordernis festzulegen, welche Kabel geprüft werden müssen, um die Genehmigung für eine

Produktauswahl durch Regeln einzuholen, die Tests an bestimmten Produkten innerhalb einer Familie ermöglichen, die für andere ähnliche Konstruktionen innerhalb der Familie abgeleitet werden können.

Die EXAP-Regeln wurden durch das CEMAC II Forschungsprojekt entwickelt und werden durch CENELEC veröffentlicht.

Mögliche zukünftige Entwicklungen

Es ist klar ersichtlich, daß die europäische Kabelindustrie stark an der neu integrierten Testvorgehensweise des Brandverfahrens von EN50399 beteiligt sein wird und das wird gemeinsam mit den anderen Testanforderungen der europäischen Klassifizierung, einen beträchtlichen Aufwand in der Entwicklung von Produkten erfordern, damit die verschiedenen Euroclasses erfüllt werden.

Wahrscheinlich wird EN50399 von IEC bei der nächsten wichtigen Revision der Testmethoden der Flammausbreitung in Betracht gezogen, die 2012 – 2015 ausgeführt wird.

Obwohl derzeit keine starkes Interesse der Regelung von Anregungen der Benutzer besteht, fängt die Industrie an, geeigneten Produkttests Beachtung zu schenken, und zwar jenen die eingesetzt werden könnten, um Brandgase zu messen und Angaben zu liefern, die wiederum in Brandschutz-Entwurfstudien, wie z. B. zur Fluchtsimulierung, eingesetzt werden könnten.

Der integrierte EN50399 Test könnte eine gute Grundlage bieten, wenn er später eingerichtet wird, um die Brandgasmenge und -qualität zu messen.

Die Entwicklung der FT-IR-Technik um Brandgas in Ist-Zeit zu messen, führte zu einigen Vorarbeiten, die durchgeführt werden um festzulegen, ob es möglich ist die Brandgasqualität während des EN50399-Tests zu messen.

Die im Mai 2009 während des Europa-cable Seminars „Sicherheit im Brandfall“[18,19,20] veröffentlichten Artikel, wiesen darauf hin, daß die Messung von Brandgas vom EN50399 Test mit Einsatz der FT-IR-Technik möglich war sowie der Einsatz dieser Techniken, um die vom Rauch erzeugten Brandgase zu untersuchen und den Eintrag bei einer Simulation kritischer Fluchtbedingungen zu benutzen, um den Einsatz unterschiedlicher Kabeltypen zu vergleichen.

Die Bestimmung eines FED- und FEC-Index gemäß ISO TS13571 während des Tests könnte eine nützliche Messung liefern.

Durch den Einsatz dieser Techniken, folgte aus der Simulationsstudie, daß dort wo sich kritische Bedingungen für einige Räume für den Entwurfbrand ergaben - wenn (PVC-ummantelte) Standardkabel in Betracht gezogen wurden, wegen der Erzeugung reizender Gase (HCl, Creolin, Formaldehyden) und Rauch (Reduktion der Sichtbarkeit unter 10 m) - sich keine kritische Bedingungen für jegliche Räume ergaben, wenn Kabel geringerer Brandgefahr in Betracht gezogen wurden.

Schlußfolgerungen

In Bezug auf Brandverhalten, bietet die Kabelindustrie, als Antwort auf die Anforderungen seiner Kunden, weiterhin eine Auswahl an Produkten mit unterschiedlichen Leistungsniveaus an, die mit den Benutzeranforderungen für besondere Anwendungen und Installationsbedingungen übereinstimmen.

Die vor über 20 Jahren festgelegten Grundsätze zur Kontrolle des Brands, der Rauchemission und Emission der wichtigsten korrosiven und reizenden Gase sind heute noch gültig, obwohl eine Verfeinerung und Verbesserung der Methoden in den letzten Jahren erzielt wurde.

Das Aufkommen neuer Anforderungen basierend auf integrierten Prüfungen, die die Wärmefreisetzung einschließen, war und wird auch zukünftig noch eine wichtige Herausforderung insbesondere in Europa sein.

Die Wirkungen des neuen europäischen Regelungsrahmens für die Klassifizierung des Brandverhaltens für Kabel werden eine wichtige Änderung zur bestehenden individuellen Position darstellen.

Es ist schwer vorauszusehen wie die europäische Klassifizierung und CE-Kennzeichnung des Brandverhaltens nach der Bauproduktenrichtlinie den Kabelmarkt beeinflussen werden.

Die Durchführung ist eine rein nationale Sache und während es bekannt ist, daß einige Länder, die derzeit das Brandverhalten von Kabeln nicht regeln auch nicht beabsichtigen es zukünftig zu tun, haben andere Länder die Absicht gezeigt, die Klassifizierung entsprechend der Regelung umzusetzen.

Jedoch ist das Thema, welche Euroclass für jede besondere Anwendung bestimmt ist, wieder eine nationale Sache.

Auf europäischem Niveau wird die Kabelindustrie wahrscheinlich weiterhin gefordert viele verschiedene Leistungsniveaus zu bieten, obwohl mit der Zeit erwartet werden kann, daß Benutzer sich höheren Klassen zuwenden sobald kostengünstige Kabelaufbauten verfügbar sind.

Ein Vergleich zwischen den prEN50399 Tests mit den Ergebnissen aus den bestehenden IEC-Tests ist schwierig, wegen den unterschiedlichen Bedingungen, die für die Test ausgewählt werden sowie der Vorgehensweise der Klassifizierung basierend auf mehrere Kriterien.

Die durch das CEMAC II Projekt erworbene Erfahrung zeigte, daß die prEN50399-Ergebnisse grundsätzlich von der Kabelgröße wesentlich beeinflußt sind – je kleiner das Kabel, je aufwendiger der Test.

Die Ergebnisse für größere Stromkabel (Leitergröße über 35mm2) kann in der Regel aus dem IEC60332-3-24 (Kategorie C) Testergebnissen vorhergesagt werden, da die Montage je Test ähnlich ist, jedoch gibt es einen solchen Zusammenhang nicht bei kleineren Kabeln, vor allem wegen der komplett unterschiedlichen Montage je Test.

Eine kürzlich veröffentlichte Untersuchung hat bewiesen, dass die Ist-Zeit-Messung von Brandgas in einem umfangreichen Brandtest (wie z. B. prEN50399) möglich ist und daß diese Ergebnisse als Eingabe bei den Modellstudien benutzt werden können. Es ist jedoch klar ersichtlich, daß eine weitere Untersuchung erforderlich ist, bevor eine Standardisierung stattfinden könnte. Dank der fortlaufenden und bewiesenen Fähigkeit in die Forschung zu investieren, befindet sich die Kabelindustrie in einer guten Position, um die Herausforderungen zu erfüllen, die sich aus jeder neuen Aufsichtbehörde sowie aus den Endnutzeranforderungen bezüglich des Brandverhaltens dieser Produkte ergeben. ■

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Кабельные зажимы с двухмерным штрихкодом упрощают администрирование сетей

В сложных сетях, особенно в вычислительных центрах, обнаружение и четкое определение всех абонентов является необходимым условием как для полного документирования сети в соответствии с установленными стандартами, так и для сетевого управления, включая управление сетевыми ресурсами, их заказ и техническое обслуживание.

Теперь обозначенные двухмерным штрихкодом зажимы для крепления коммутационных шнуров, которые поставляются компанией «Детвилер» (Dätwyler), предоставляют возможность обнаружения и четкого определения соединительных кабелей с помощью сканера, а также упрощения общего управления инфраструктурой сети.

В целях экономии времени и финансовых средств должна предусматриваться возможность документирования и организации всех кабелей и компонентов в автоматическом режиме с использованием штрихкодов, сканеров и соответствующего программного обеспечения, т. е. без требующего больших затрат ручного ввода данных.

Компания «Детвилер» теперь снабжает все коммутационные шнуры кабельными зажимами и двухмерным штрихкодом, благодаря чему обеспечивается легкое и безошибочное опознавание. Преимущества использования кабельных зажимов ощущаются в первую очередь в серверных помещениях и вычислительных центрах с количеством коммутационных шнуров более 500 шт., система документирования в которых

▲ *Новая система штрихкодирования от компании «Детвилер»*

определяется стандартом EN 50174-1:2009-09.

Напечатанные с обеих сторон каждого соединительного кабеля номера изделий и серийные номера, которые могут наноситься с учетом требований заказчика, обеспечивают однозначную идентификацию продукции. Номер с двухмерным штрихкодом также содержит много дополнительной информации, например, информацию о качестве или товарной категории, размерности и цветовой маркировке.

Для облегчения процесса сканирования каждый кабельный зажим, в отличие от самоламинирующихся этикеток, можно переместить в другое, удобное для считывания положение, не допуская «сползания» изображения, часто возникающего при работе с идентификаторами.

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Опыт на службе города

Компания «Драка коммьюникейшнз» (Draka Communications) заключила договор об оказании консультационных услуг, лицензировании и обучении с поставщиком услуг оптоволоконной связи «э.ва рисс нетце» (e.wa riss Netze), которым совместно владеют коммунальное предприятие г. Биберах и «ЭнБВ» (EnBW) – энергетическая компания из юго-западной Германии.

«э.ва рисс нетце» (сети) сможет воспользоваться накопленным компанией «Драка» опытом в области FTTH технологий и разработанным ею программным комплексом DrakaXSNet для развития собственной высокоскоростной волоконно-оптической сети, обслуживающей жителей г. Биберах.

Услуги стали предоставляться в январе 2010 года, и сегодня в их рамках в деловых и жилых районах г. Биберах на привлекательных условиях предлагаются пакеты мультисервисных услуг по фиксированным тарифам от 39,90 до 69,90 евро и со скоростями передачи данных от 50 до 150 Мб/с.

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Модульная проводка для призового строительного проекта

Компания «Модьюлар уайеринг системз» (Modular Wiring Systems), являющаяся дочерним предприятием производителя электрокабельной продукции «Тратос лтд.» (Tratos Ltd.), разработала, изготовила и поставила модульные системы для силовой и осветительной распределительных сетей на строительную площадку под административное здание Ropemaker Place в Лондоне, проект которого удостоен различных наград.

Ropemaker Place, застройщиком которого является компания «Бритиш лэнд» (British Land), представляет собой 20-этажное административное здание площадью 603 000 кв. футов (около 56 019 кв. м), предназначенное в первую очередь для арендаторов из числа предприятий, оказывающих профессиональные и финансовые услуги.

Проект получил множество наград, включая престижную награду Британской строительной промышленности в категории «Крупный проект» за высокое качество дизайна, инновационную конструкцию и высокий уровень энергоэкономичности.

В рамках проекта Ropemaker Place компания «Модьюлар уайеринг системз» работала с целым рядом подрядчиков, оказывая содействие в проектировании силовой и осветительной распределительных сетей, а также в изготовлении и поставке таких систем сборной конструкции для каждого этажа.

▲ *Строительство элитного административного здания Ropemaker Place в Лондоне*

На последних нескольких этажах, которые предстоит принять, в настоящее время заканчиваются отделочные работы. Использование модульных систем межсоединений согласуется с заложенными в проекте Ropemaker Place принципами ориентации на качество, инновационные решения и рациональное использование ресурсов.

Модульная система межсоединений – это быстро и легко монтируемая распределительная сеть сборной конструкции, которая изготавливается вне строительной площадки. Фактически система представляет собой линейные цепи с традиционной схемой подключений. И, наконец, применение модульной системы межсоединений дает ключ к решению задачи рационального использования ресурсов. С учетом того, что система изготавливается за пределами строительной площадки, отпадает необходимость в процессах резки и обработки материалов давлением – а это благоприятно для окружающей среды, положительным образом сказывается на решении проблем охраны труда и техники безопасности, важно в плане контроля и утилизации отходов и, что еще более существенно, имеет большое значение с точки зрения итоговой прибыльности.

Modular Wiring Systems (Великобритания)
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Адрес электронной почты: info@modwire.com
Web-страница: www.modularwiring.com

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Реакция кабельных изделий на воздействие огня

Теренс Журно, «Призмиан кейблз энд системз лимитед» (Великобритания)

Аннотация

В настоящей работе рассматривается принятое в октябре 2006 года решение Европейской комиссии о введении в силу Директивы Совета ЕС 89/106/ЕЕС о классификации строительных материалов и изделий по реакции на воздействие огня, а также мероприятия, осуществляемые для ее реализации.

Анализируется ситуация с внедрением различных необходимых стандартов на методики испытаний, классификационные требования, продукцию и правила расширенного применения (EXAP); рассматриваются начальные результаты финансируемого Европейской конфедерацией ассоциаций производителей изолированных проводов и кабелей (Europacable) проекта CEMAC II (маркировка кабельных изделий логотипом CE) для обобщения технической базы в целях внедрения Директивы, а также проблемы разработки новой продукции.

Введение

Настоящая работа имеет целью представить обзор текущего состояния деятельности регулирующих органов, составителей спецификаций и производителей кабельной продукции, связанной с решением проблемы реакции кабельных изделий на воздействие огня при горении, и возможных направлений этой работы в будущем.

В частности, рассматривается ситуация, сложившаяся в Европейском союзе.

Авторы не ставят перед собой задачи подробного описания используемых методов испытаний или обсуждения степени их обоснованности.

Предприятия кабельной промышленности имеют многолетний опыт разработок современных методик испытаний и новой продукции, которые ведутся с целью уменьшения воздействия опасных факторов, обусловленных горением кабельных изделий, начиная с 60-х годов прошлого века.

Кабельное производство было одним из первых в электротехнической промышленности, где были разработаны методики испытаний выпускаемой продукции для определения реакции на воздействие огня.

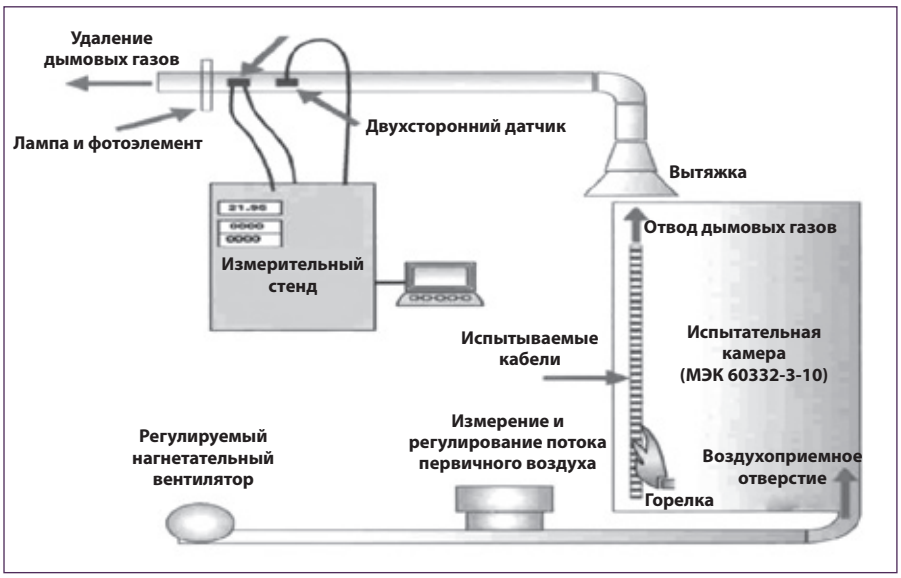
Все эти годы работы по доработке и совершенствованию этих методик продолжаются.

Сегодня широко применяются стандарты на распространение пламени, тепловыделение, непрозрачность, коррозионную активность и токсичность выделений при пожаре, и отрасль продолжает финансовую поддержку научных исследований, направленных на улучшение характеристик огнестойкости выпускаемой продукции и определение технических условий на соответствующие методы испытаний.

Вопросы пожарной безопасности на протяжении многих лет регламентируются международными стандартами через Международную электротехническую комиссию (МЭК), и многие национальные и региональные стандарты, например, европейский стандарт (EN), основываются на публикациях МЭК.

В рамках этого международного нормативного поля в разных регионах и в разных странах, разумеется, существуют различные подходы применительно к тому, как решаются вопросы предупреждения опасности возгорания кабелей, и какие области практического применения рекомендованы для установленных методов испытаний.

▼ **Рис. 1.** *Принципиальная схема испытательной установки согласно стандарту prEN 50399*



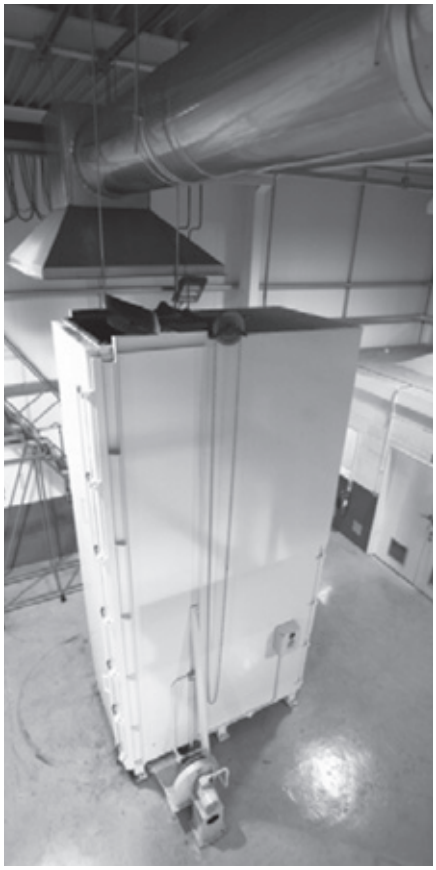
В этой связи предприятия кабельной промышленности выпускают продукцию в широким диапазоне классов реакции на воздействие огня с учетом различных требований конечных пользователей.

История вопроса

Большая часть ранних исследований по улучшению характеристик огнестойкости электрических кабелей относится к 70-80 гг. XX века [1, 2, 3]. В то время применялся четырехэтапный подход:

- минимизация уровня опасности за счет ограничения фронта горения и снижения распространения огня вдоль кабельной трассы;
- минимизация дымовыделения, ведущего к задымлению выходов и препятствующего аварийной эвакуации;
- минимизация выделения кислотных газов, вызывающих коррозию оборудования;
- минимизация выделения ядовитых газов, вызывающих нарушение двигательных способностей, раздражение дыхательных путей и препятствующих аварийной эвакуации людей.

▼ **Рис. 2.** *Испытательная установка согласно стандарту prEN 50399*



Было признано, что степень значимости этих факторов будет меняться в зависимости от конкретного сектора рынка и с учетом стандартных условий монтажа [4]. Кроме того, в кабельной промышленности понимали, что для надлежащей оценки эксплуатационных характеристик выпускаемой продукции необходимо разработать собственные методики испытаний.

Несмотря на то что на первых порах такие разработки привели к появлению ряда испытательных методик, которым, так сказать, не хватало целостности, данный подход, если принять его в целом, хорошо укладывается в современные представления.

Другим важным аспектом, который следовало учитывать, являлось то, что соответствующие полномасштабные испытания должны были разрабатываться для всех случаев, когда необходимо было оценить эксплуатационные характеристики всей выпускаемой продукции в режиме, до некоторой степени аналогичном режиму эксплуатации «по месту монтажа».

Международные исследования сконцентрировались на разработке методов испытаний, которые могли бы быть приняты в качестве «дополнения» к стандартам на продукцию для обеспечения максимально широкого диапазона характеристик огнестойкости, охватывающего все виды выпускаемой продукции.

Современное положение дел

Соответствующие стандарты на условия испытаний, принятые МЭК, за последние годы не претерпели существенных изменений, однако в них постоянно вносятся уточнения [5, 6, 7, 8]. Например, стандарт МЭК 332-3 стал состоять из нескольких частей, в каждой из которых рассматриваются разные условия монтажа или разное время воздействия источника пожара.

Принципы, установленные этими стандартами на ранних этапах их разработки, до сих пор с успехом применяются производителями и пользователями кабельной продукции, и стандарты МЭК приняты во многих странах. В зависимости от того, какие из этих испытаний используются, на рынке представлены следующие кабельные изделия:

- кабели с ограниченной способностью к распространению пламени (RP), которые после вертикальной прокладки в пучках в соответствии с рекомендованным порядком распространяют горение на расстояние от источника, не превышающее установленной величины. Начиная с 70-х гг. такие кабели получили широкое распространение при прокладке кабельных сетей на участках, где вследствие условий монтажа (например, при вертикальной прокладке кабелей в пучках) существует высокий риск быстрого распространения огня. Их испытания проводятся в соответствии с требованиями различных частей стандарта МЭК 60332-3;

- кабели с низким уровнем дымовыделения, для которых установлены ограничения на выделение дыма, определяемое в дымовой камере объемом 27 куб. м, с предельными характеристиками, установленными для обеспечения видимости на расстоянии 10 м. Внедрение таких кабелей было обусловлено тем, что кабельные изделия с оболочкой из обычных материалов на основе ПВХ при воздействии огня продемонстрировали выделение большого количества плотного дыма. Эти кабели выпускаются с 70-х гг., но только в результате достижений в технологии материалов для кабельного производства в 80-х годах на рынке стали широко доступны экономически эффективные конструкции. Их испытания проводятся в соответствии со стандартом МЭК 61034-2. Обычно кабели данного типа также сочетают в себе такие характеристики, как малое выделение коррозионно-активных газов, и производятся с использованием «безгалогенных» материалов;

- кабели с низким уровнем выделения коррозионно-активных газов, для которых установлены ограничения на выделение кислых и коррозионно-активных газов, определяемое при горении образцов материалов в лабораторной трубчатой печи. Впервые они были предложены, когда пользователи стали проявлять озабоченность относительно большого количества кислых газов, выделяемых при горении ПВХ кабелей с ограниченной способностью к распространению пламени. Имелись свидетельства разрушительного воздействия обладающих коррозионной активностью и раздражающим действием газов на электрические пульты и контрольно-измерительные приборы, которые подверглись контакту с веществами,

выделяющимися при горении кабелей [9, 10]. Допускается применение методики испытания на определение уровня выделения кислых газов согласно стандарту МЭК 60754-1 и (или) методики испытания на определение коррозионной активности побочных продуктов согласно стандарту МЭК 60754-2. Материалы, которые отвечают требованию, предусматривающему выделение кислых газов в концентрации менее 0,5 % при испытаниях согласно стандарту МЭК 60754-1, часто именуются «безгалогенными». В некоторых стандартах предусматривается проведение дополнительных испытаний на определение содержания фтора (МЭК 60684-2).

Кабели с низким уровнем выделения токсичных газов, как правило, могут использоваться только для определенных практических задач, для которых конечные пользователи установили такое требование. В частности, такие кабели используются на железнодорожном транспорте. У пользователей имеются свои нормативы на «токсичные выбросы»: от простого ограничения по отдельным группам элементов до индексов, полученных на основании анализа выделившихся газов с определением весовых коэффициентов в соответствии с известными показателями токсичности присутствующих газов для млекопитающих. Отсутствие широкого распространения испытаний кабельных изделий на токсичность можно объяснить выводом, который был сделан на ранних этапах исследовательских работ в Великобритании, а именно: «Из этого краткого обращения к последствиям следует, что концентрации кислых газов, которые могут причинить ущерб здоровью человека и повредить оборудование, аналогичны» [11,12].

Ведущиеся в настоящее время исследовательские работы [13] постоянно свидетельствуют о той существенной роли, которая должна отводиться HCl при оценке пожарной опасности. Ряд новых интересных исследований, в ходе которых изучалось влияние основных видов газов раздражающего действия на легкие животных [14], также показал, что вдыхание дыма, содержащего HCl и другие продукты горения ПВХ, вызывает острое отравление, сопровождающееся резким ухудшением физиологических параметров легких. Эти исследования, судя по всему, должны были бы подтвердить позицию, которую занимают производители кабельной продукции, предлагая для определенных практических задач изделия, не выделяющие газов сильного раздражающего действия (т. е. HCl из ПВХ-компаундов), так как такие газы могут создать препятствие для аварийной эвакуации и привести к поражению легких. Исследования также должны были упрочить точку зрения, согласно которой «кислотность» является «показателем» токсического действия основных видов раздражающих веществ.

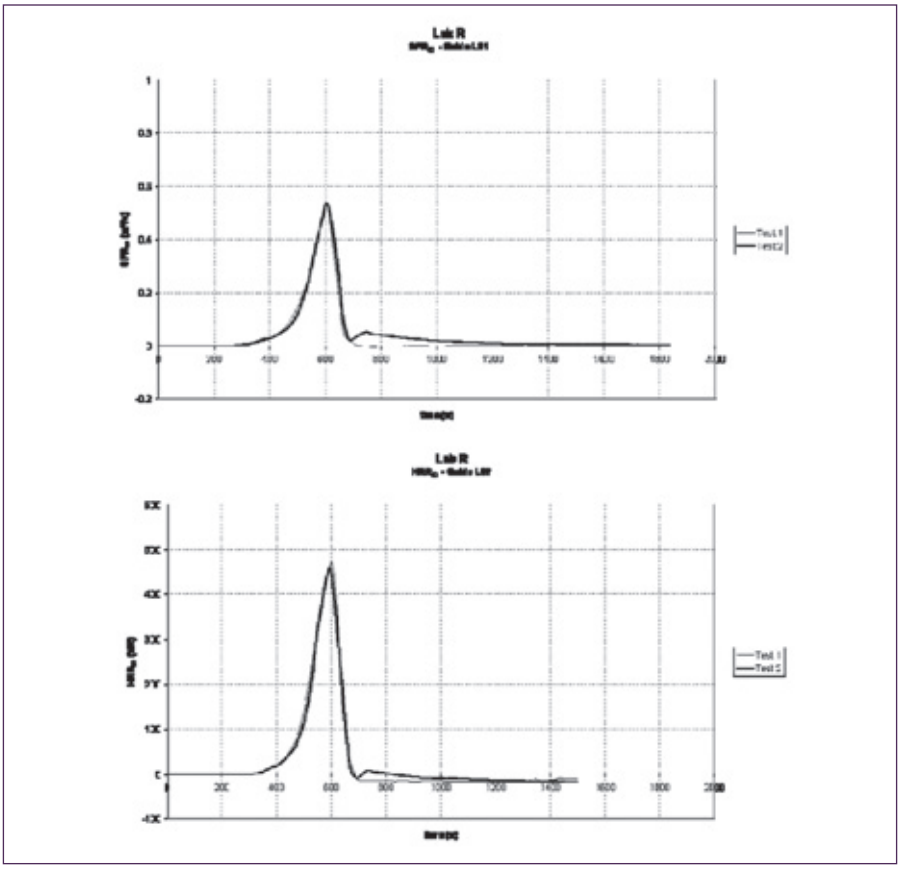
Недавно европейскими производителями кабельной продукции было принято обобщенное определение понятия «низкая степень пожароопасности» для описания кабельных изделий, сочетающих в себе такие эксплуатационные характеристики, как ограниченная способность к распространению пламени и низкий уровень выделения дыма и вредных газов.

Хотя существующий пакет стандартов МЭК в рамках ТК 20 допускает практику общего базового подхода к вопросам пожарной безопасности при совместном использовании различных конструктивных элементов (в стандартах на продукцию обращение к МЭК 60332-3, МЭК 61034, МЭК 60754-1 и (или) МЭК 60754-2 является обычной практикой), в последнее время наблюдается тенденция к применению более комплексного подхода с использованием стандартов на проведение испытаний, предусматривающих возможность количественного определения параметров распространения пламени, тепловыделения, задымления и выделения газообразных продуктов горения.

Европейская классификация кабельных изделий по реакции на воздействие огня в соответствии с Директивой «О безопасности строительных материалов и изделий»

Особое значение для европейского рынка имеет разработка стандарта на проведение испытаний prEN 50399 [15, 16], который основан на использовании оборудования, предусмотренного стандартом МЭК 60332-3-10, с установкой дополнительного вытяжного воздуховода, оснащенного приборами

▼ **Рис. 3.** *Типовые кривые скорости дымообразования и скорости тепловыделения*



Класс	Метод(-ы) испытаний	Критерии классификации	Дополнительная классификация
A_{ca}	EN ISO 1716	PCS (теплота сгорания брутто) <2,0 МДж/кг (1)	
$B1_{ca}$	$FIPEC_{20}$ Scen 2 (5) *и*	FS (распространение пламени) ≤ 1,75 м, а *также* THR_{1200s} (общее количество выделяемого тепла по истечении 20 мин) ≤ 10 МДж, а *также* Peak HRR (максимальная скорость дымообразования) ≤ 20 кВт, а *также* FIGRA (скорость распространения пожара) ≤ 120 Вт/с	Образование дыма (2, 6), наличие горящих капель или частиц (3) и кислотность (4, 8)
	EN 60332-1-2	H ≤ 425 мм	
$B2_{ca}$	$FIPEC_{20}$ Scen 1 (5) *и*	FS (распространение пламени) ≤ 1,5 м; а *также* THR_{1200s} (общее количество выделяемого тепла по истечении 20 мин) ≤ 15 МДж; а *также* Peak HRR (максимальная скорость дымообразования) ≤ 30 кВт; а *также* FIGRA (скорость распространения пожара) ≤ 150 Вт/с	Образование дыма (2, 7), наличие горящих капель или частиц (3) и кислотность (4, 8)
	EN 60332-1-2	H ≤ 425 мм	
C_{ca}	$FIPEC_{20}$ Scen 1 (5) *и*	FS (распространение пламени) ≤ 2,0 м; а *также* THR_{1200s} (общее количество выделяемого тепла по истечении 20 мин) ≤ 30 МДж; а *также* Peak HRR (максимальная скорость дымообразования) ≤ 60 кВт; а *также* FIGRA (скорость распространения пожара) ≤ 300 Вт/с	Образование дыма (2, 7), наличие горящих капель или частиц (3) и кислотность (4, 8)
	EN 60332-1-2	H ≤ 425 мм	
D_{ca}	$FIPEC_{20}$ Scen 1 (5) *и*	THR_{1200s} (общее количество выделяемого тепла по истечении 20 мин) ≤ 70 МДж; а *также* Peak HRR (максимальная скорость дымообразования) ≤ 400 кВт; а *также* FIGRA (скорость распространения пожара) ≤ 1300 Вт/с	Образование дыма (2, 7), наличие горящих капель или частиц (3) и кислотность (4, 8)
	EN60332-1-2	H ≤ 425 мм	
E_{ca}	EN 60332-1-2	H ≤ 425 мм	
F_{ca}	Параметр не определен		

(1) К изделию в целом, за исключением металлических материалов, и к любым наружным деталям (например, к оболочке) изделия.
(2) s1 = TSP_{1200} (общий объем дымообразования по истечении 20 мин) ≤ 50 м² и Peak SPR (максимальная скорость дымообразования) ≤ 0,25 м²/с
s1a = s1 и светопроницаемость в соответствии с EN 61034-2 ≥ 80 %
s1b = s1 и светопроницаемость в соответствии с EN 61034-2 ≥ 60 % < 80 %
s2 = TSP_{1200} (общий объем дымообразования по истечении 20 мин) ≤ 400 м² и Peak SPR (максимальная скорость дымообразования) ≤ 1,5 м²/с
s3 = отличное от s1 или s2
(3) К методам испытаний FIPEC20 Scenario 1 и $FIPEC_{20}$ Scenario 2: d0 = отсутствие горящих капель или частиц во временном интервале 1200 с; d1 = наличие горящих капель или частиц в течение не более 10 с во временном интервале 1200 с; d2 = отличное от d0 или d1.
(4) EN 50267-2-3: a1 = удельная электропроводность < 2,5 мкСм/мм и pH > 4,3; a2 = удельная электропроводность < 10 мкСм/мм и pH > 4,3; a3 = отличное от a1 или a2. Класс не присвоен = Параметр не определен.
(5) Приток воздуха в камеру устанавливается в объеме 8000 ± 800 л/мин.
$FIPEC_{20}$ Scenario 1 = prEN 50399-2-1, монтаж и крепление в соответствии с установленным ниже порядком
$FIPEC_{20}$ Scenario 2 = prEN 50399-2-2, монтаж и крепление в соответствии с установленным ниже порядком
(6) Класс дымообразования, заявленный для кабелей категории B1ca, должен быть основан на результатах испытаний по методу $FIPEC_{20}$ Scen 2.
(7) Класс дымообразования, заявленный для кабелей категорий B2ca, Cca, Dca, должен быть основан на результатах испытаний по методу $FIPEC_{20}$ Scen 1.
(8) Определение опасных свойств образующихся в случае пожара газообразных веществ, которые ведут к нарушению способности человека, оказавшегося под их воздействием, принимать эффективные меры для аварийной эвакуации, без описания токсического действия этих веществ.

▲ **Рис. 4.** *Классы электрических кабелей по реакции на воздействие огня*

измерения скорости тепловыделения и скорости дымообразования.

Стандарт prEN 50399 разработан для подтверждения системы классификации «Классы электрических кабелей по реакции на воздействие огня», представленной в Решении Комиссии от 27 октября 2006 г. о внесении изменений в Решение 2000/147/ЕС о выполнении Директивы Совета ЕС 89/106/ЕС в отношении классификации огнестойкости строительных материалов и изделий по реакции на воздействие огня. Стандарт определяет методы испытаний $FIPEC_{20}$ Scen 2 («Характеристики огнестойкости электрических кабелей. 20-минутные испытания: сценарий 2») и $FIPEC_{20}$ Scen 1 («Характеристики огнестойкости электрических кабелей. 20-минутные испытания: сценарий 1»), указанные в Решении Комиссии.

Основные требования Решения Комиссии представлены в приведенной ниже таблице.

Несмотря на то что схема испытательной установки по prEN 50399 построена на основе оборудования, предусмотренного предшествующей серией стандартов МЭК 60332-3, сравнивать результаты испытаний по этим двум методикам нельзя, так как методика prEN 50399 строится на принятой в Решении унифицированной схеме монтажа кабеля для «самого неблагоприятного случая», тогда как методика МЭК основана на схеме монтажа кабеля «по месту».

Определение дымообразования производится в ходе динамических испытаний по prEN 50399, однако дискретность измерений такова, что при проведении испытаний нельзя определить низкий уровень дымообразования, характерный для современных кабелей с низким выделением дыма, которые предназначены для использования в метрополитене и для других аналогичных задач.

По этой причине метод МЭК (EN) 61034-2 включен для оценки кабельных изделий самого высокого класса. Кислотность оценивается с использованием существующего метода EN 50267-2-3, который в техническом отношении эквивалентен методу МЭК 60754-2.

С публикацией Решения Комиссии приобретает актуальность вопрос о коммерческой доступности кабельных изделий, получивших классификацию. Несмотря на наличие всех требуемых методов испытаний, как минимум, в форме проектов, ни о каких кабельных изделиях, маркированных по их реакции на воздействие огня логотипом CE в соответствии с Директивой «О безопасности строительных материалов и изделий», которые были бы доступны на рынке, нельзя говорить до тех пор, пока не будут подготовлены все стандарты, требуемые для обеспечения такой маркировки.

Для того чтобы нотифицированные органы могли выдавать сертификаты соответствия на продукцию, необходимо подготовить европейские унифицированные стандарты на продукцию (EN), а также другие сопутствующие нормативы согласно Предписанию Европейской комиссии.

Европейский комитет по стандартизации в области электротехники (СЕНЭЛЕК) должен разработать и опубликовать эти стандарты, и до того момента, пока эти предписанные стандарты не будут опубликованы, официальная выдача каких-либо сертификатов на маркировку логотипом CE в соответствии с Директивой «О безопасности строительных материалов и изделий» применительно к реакции

кабельных изделий на воздействие огня не представляется возможной.

Предписание (M/443) (17), касающееся мероприятий по стандартизации кабельных изделий для установления унифицированных стандартов, было выдано Европейскому комитету по стандартизации (CEH) и Европейскому комитету по стандартизации в области электротехники (СЕНЭЛЕК) в июне 2009 года. При этом в объем работ входили силовые кабели, кабели управления и связи, а также волоконно-оптические кабели, предназначенные для использования в помещениях и на других регламентируемых инженерно-строительных объектах (с учетом всех величин напряжения).

В части эксплуатационных характеристик объем работ включал реакцию на воздействие огня, огнестойкость и стойкость к воздействию опасных веществ. СЕНЭЛЕК принял Предписание в принципе и, как ожидается, должен представить развернутый ответ с программой работ в течение 2009 года. Предполагается, что на первом этапе усилия сосредоточатся на подготовке документов, которые необходимы для обеспечения маркировки по классам реакции на воздействие огня, однако вряд ли это удастся выполнить до конца 2011 года.

Унифицированный стандарт на продукцию играет ключевую роль в обеспечении маркировки логотипом CE в соответствии с Директивой «О безопасности строительных материалов и изделий», но разработка подобного стандарта является сложной задачей, поскольку существует большое количество различных типов кабельных изделий, а Директива «О безопасности строительных материалов и изделий» распространяется только на такие характеристики, как реакция на воздействие огня, огнестойкость и стойкость к воздействию опасных веществ, тогда как другие параметры безопасности рассматриваются в Директиве на низковольтное оборудование.

Решение по разработке основанного на эксплуатационных характеристиках стандарта, который мог бы применяться к любому типу кабельных изделий и, в частности, распространялся бы на характеристики, предусмотренные Директивой «О безопасности строительных материалов и изделий», в настоящее время находится на стадии рассмотрения.

Стандарт классификации продукции является важным распорядительным документом, который привязывает результаты испытаний к той или иной классификационной категории и содержит информацию о проводимых испытаниях, количестве испытаний для определения категории, оценке результатов и критериях классификации.

С комитетами CEH и СЕНЭЛЕК достигнута принципиальная договоренность о том, что кабельные изделия будут включены в качестве дополнения к действующему стандарту EN 13501-1, с тем чтобы все изделия, предусмотренные Директивой «О безопасности строительных материалов и изделий», вошли в единый документ.

Стандарт на проведение испытаний (EN 50399) должен предусматривать возможность получения необходимых для классификации данных. Окончательная редакция проекта стандарта подготовлена для представления на официальное голосование в СЕНЭЛЕК.

В рамках разработки методики испытаний более 20 лабораторий приняли участие в проведении круговых контрольных испытаний.

При этом повторяемость и воспроизводимость результатов оказались сопоставимыми с показателями других полномасштабных испытаний, таких как испытания термическим воздействием единичного источника возгорания (SBI).

Кроме того, получен значительный опыт (свыше 200 испытаний кабельных изделий, представляющих типовые конструкции, которые широко используются в Европе) с использованием этого метода испытаний в проекте CEMAC II, при реализации которого производители кабельной продукции, научно-исследовательские и испытательные лаборатории объединили свои усилия для создания технической базы.

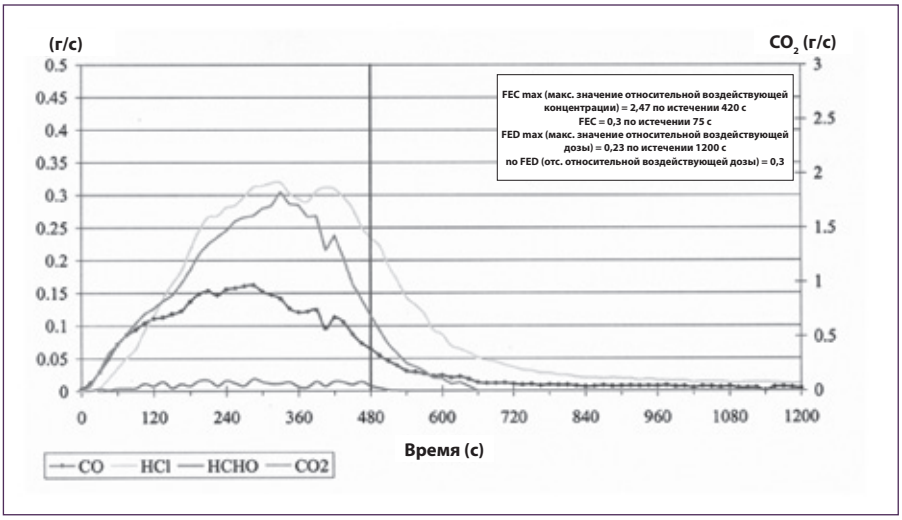
Одна из задач проекта CEMAC II, в частности, состояла в разработке правил и порядка расширенного применения результатов испытаний (EXAP), которые определяют, какие конструкции должны испытываться для получения категории согласно классификации для определенного вида кабельных конструкций. Как ожидается, заключительный отчет будет представлен до конца 2009 года.

Необходимость в окончательном оформлении Правил расширенного применения (EXAP) обусловлена задачей не допустить ситуации, когда для проведения классификации каждая кабельная конструкция должна испытываться индивидуально. Необходимо установить, какие кабельные изделия должны проходить испытания для получения одобрения на всю линейку выпускаемой продукции, посредством использования правил, позволяющих экстраполировать результаты испытаний определенных изделий одного вида на другие аналогичные конструкции того же вида. Правила расширенного применения разработаны в рамках научно-исследовательского проекта CEMAC II и будут опубликованы СЕНЭЛЕК.

Возможные перспективы развития

Очевидно, что европейская кабельная промышленность будет активно заниматься вопросами нового комплексного подхода к

▼ **Рис. 5.** *Типовая кривая выделения токсичных газов при испытаниях по стандарту EN 50399*



испытаниям на определение реакции на воздействие огня по стандарту EN 50399, и в совокупности с остальными требованиями к испытаниям согласно европейской классификации это потребует значительных усилий, направленных на разработку продукции, которая будет отвечать критериям, установленным для различных «евроклассов».

Вероятно, стандарт EN 50399 будет рассмотрен МЭК при следующей масштабной проверке методов испытаний на распространение пламени, которая должна пройти в 2012-2015 гг.

Несмотря на отсутствие в настоящее время сколько-нибудь серьезной нормативно-правовой основы для формирования клиентоориентированной направленности в работе, отрасль начинает уделять внимание вопросу о том, какие испытания продукции могли бы подойти для применения с целью определения характеристик выделяемых веществ и получения данных, которые можно было бы использовать в инженерных исследованиях в области пожарной безопасности, например, при моделировании аварийной эвакуации.

При наличии дополнительного оборудования комплексные испытания по EN 50399 могли бы обеспечить хорошую основу для определения количественного и качественного состава выделяемых веществ.

Разработка методов инфракрасной спектроскопии на основе Фурье-преобразования (FTIR) с возможностью определения выделяемых вредных веществ в реальном масштабе времени послужила толчком к некоторым предварительным исследованиям, которые в настоящее время ведутся с целью установить возможность определения качественных характеристик выделяемых веществ во время испытаний по стандарту EN 50399.

Работы, представленные на семинаре Европейской конфедерации ассоциаций производителей изолированных проводов и кабелей (Europacable) на тему «Безопасность во время пожара», который состоялся в мае 2009 года [18, 19, 20], допускают техническую возможность определения выделений вредных веществ при испытаниях по стандарту EN 50399 с использованием методов инфракрасной спектроскопии на основе Фурье-преобразования, применения этих методов для изучения выделяемого дыма и использования полученных данных при моделировании критических условий эвакуации в целях сравнительного анализа использования различных типов кабельных изделий.

Полезной мерой могло бы стать определение при проведении испытаний показателей относительной воздействующей дозы (FED) и относительной воздействующей концентрации (FEC) согласно ИСО ТС 13571.

С помощью указанных методов по результатам имитационного моделирования был сделан вывод о том, что хотя критические условия для модели пожара применительно к некоторым помещениям были достигнуты при изучении стандартных кабелей (с ПВХ-оболочкой) вследствие образования газов раздражающего действия (HCl, акреолина, формальдегидов) и дыма (ухудшение видимости до расстояния менее 10 м), обеспечить критические условия при изучении кабелей, характеризующихся низкой степенью пожароопасности, ни для каких помещений не удалось.

Выводы

Реагируя на требования своих заказчиков к показателям реакции на воздействие огня, предприятия кабельной промышленности по-прежнему предлагают ассортимент продукции с различными эксплуатационными характеристиками, соответствующими потребностям пользователей применительно к отдельным практическим задачам и условиям монтажа.

Установленные более 20 лет тому назад принципы контроля процессов горения, дымообразования и выделения наиболее опасных корозионно-активных газов и газов раздражающего действия сегодня сохраняют свою актуальность, несмотря на доработки и уточнения, которые были внесены в методики за прошедшие годы.

Появление новых требований, основанных на результатах комплексных испытаний, в том числе по определению характеристик тепловыделения, стало серьезной проблемой, требующей максимума усилий для своего решения, и будет оставаться таковой, в особенности в Европе.

Под влиянием новой европейской нормативно-правовой базы в части классификации кабельных изделий по реакции на воздействие огня существующая позиция, которая носит рекомендательный характер, претерпит существенные изменения.

Прогнозировать же то, как европейская система классификации и маркировки логотипом CE в зависимости от характеристик огнестойкости согласно Директиве «О безопасности строительных материалов и изделий» повлияет на рынок кабельной продукции, представляется сложной задачей.

Ее внедрение является сугубо внутренним вопросом каждого государства, и хотя известно, что некоторые страны, которые в настоящее время не регламентируют характеристики реакции кабельных изделий на воздействие огня, не собираются вводить такие стандарты и в дальнейшем, другие страны заявили о своем намерении использовать эту систему классификации в своих нормативных базах.

Однако вопрос о том, какой «еврокласс» устанавливать для той или иной сферы применения, также относится к компетенции каждой отдельной страны.

На европейском уровне кабельная промышленность, скорее всего, и в дальнейшем должна будет поставлять изделия с самыми разными эксплуатационными характеристиками, хотя можно ожидать, что со временем мы станем свидетелями того, как по мере появления на рынке экономически эффективных кабельных конструкций пользователи будут переходить на продукцию более высокого класса.

Проведение сравнительного анализа результатов испытаний по методике prEN 50399 и испытаний согласно действующим стандартам МЭК представляется затруднительным ввиду различий в условиях, установленных для их проведения, и использования классификационного подхода по нескольким признакам.

Опыт, приобретенный в рамках проекта CEMAC II, показывает, что на результаты испытаний согласно методике prEN 50399, как правило, в значительной мере влияет сечение кабеля: чем меньше кабель, тем более пристрастными являются испытания. Результаты испытаний силовых кабелей более крупного сечения (с сечением проводников свыше 35 мм^2) в большинстве случаев могут прогнозироваться на основании результатов испытаний по стандарту МЭК 60332-3-24 (категория C), так как в каждом из испытаний используются аналогичные схемы монтажа. Однако применительно к кабелям меньшего сечения такой зависимости нет, причем главным образом ввиду использования в каждом испытании абсолютно разных схем монтажа.

Недавние исследования продемонстрировали, что определение выделяющихся веществ в ходе полномасштабных испытаний (таких, как prEN50399) в реальном масштабе времени является возможным и что подобные результаты могут использоваться в качестве исходных данных при имитационном моделировании. Однако представляется очевидным, что прежде, чем можно было бы обеспечить какую-либо стандартизацию, потребуется проведение дополнительных исследований.

Используя имеющиеся у нее и уже наглядно продемонстрированные возможности для инвестирования в научные исследования, кабельная промышленность сможет успешно решать задачи, обусловленные появлением любых новых нормативно-правовых требований или потребностей конечных пользователей в отношении характеристик огнестойкости продукции, которую она выпускает. ■

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Les colliers de câbles avec code à barres 2D facilitent la gestion des réseaux

Dans les réseaux complexes, et notamment dans les centres de calcul, la détection et l'identification claire de la totalité des composants est une condition préalable pour la documentation conforme au standard et pour la gestion de cette dernière, y compris la gestion du stock, l'achat et l'entretien.

Actuellement les colliers de câble pour les câbles patch avec code à barres 2D fournis par Dätwyler offrent l'opportunité de relever et identifier clairement les câbles de connexion par scanner et de faciliter la gestion des infrastructures en général.

Pour réduire les temps et les coûts, grâce à cette solution il est possible de documenter et de gérer les câbles et les composants automatiquement en utilisant les codes à barres, un scanner et un logiciel appropriés, c'est-à-dire sans aucune intervention manuelle coûteuse.

Dätwyler est actuellement en mesure de fournir des cordons de connexion équipés de colliers de câble et un code à barres 2D permettant une simple détection sans erreurs. Les avantages offerts par les colliers de câble sont perçus surtout dans les salles des serveurs et dans les centres de calcul avec plus de 500 cordons dont la documentation est spécifiée par la norme EN50174-1:2009-09.

L'article et les numéros de série imprimés pouvant être également personnalisés, fournissent une identification unique sur les deux côtés de chaque câble de connexion. En outre, le numéro du code à barres 2D contient plusieurs informations concernant la qualité, la catégorie, la longueur et la couleur.

▲ *Nouveau système de code à barres de Dätwyler*

Pour simplifier le balayage, chaque collier de câble, contrairement aux étiquettes auto-laminantes, peut être déplacé dans une position facilement lisible sans "glisser" comme il arrive souvent dans le cas des drapeaux.

Dätwyler, pendant ce deuxième trimestre de l'année, s'emploie à améliorer les solutions du logiciel de gestion "Panorama" et "Panorama Cabling View " (ce dernier en particulier conçu pour la planification et la documentation des infrastructures de câblage) au moyen de codes à barres pour la totalité des câbles et des composants.

Dätwyler Cables – Suisse
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La compétence offre des avantages à la ville

La société Draka Communications vient de signer un contrat pour la consultation, la licence et la formation avec e.wa riss Netze, une entreprise spécialisée dans la fourniture de services de fibres détenue conjointement par le service public de la ville de Biberach et EnBW, un fournisseur d'énergie pour le sud-ouest de l'Allemagne.

e.wa riss Netze (réseaux) bénéficieront ainsi de l'expertise de Draka dans le secteur des fibres jusqu'à domicile (FTTH) et de l'application de la suite logicielle DrakaXSNet pour l'évolution de son actuel réseau à fibres optiques à grande vitesse au service des citoyens de Biberach.

Après des recherches et des études comparatives entraînant différentes solutions de logiciels de planification, e.wa riss Netze a conclu que Draka XSNet est l'option meilleure, la plus flexible et un atout précieux en termes de rentabilité dans la construction des réseaux FTTx.

La société e.wa riss Netze a commencé à construire l'infrastructure en fibres pour ses services à fibres optiques ewacom à Biberach avec l'entreprise de planification de réseaux E9.

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Projet de câbles modulaires couronné de succès

MODULAR Wiring Systems, une filiale du fabricant de câbles électriques Tratos Ltd, a conçu, réalisé et fourni des systèmes modulaires de distribution de puissance et d'éclairage pour le développement du projet couronné de succès du bâtiment Ropemaker Place à Londres.

Ropemaker Place réalisé par British Land est un immeuble de bureaux de 20 étages occupant une surface de 603.000 pieds carrés, conçu principalement pour les professionnels et les acteurs du marché financier.

Le projet a remporté de nombreux prix, dont le prix prestigieux British Construction Industry dans la catégorie des Grands Projets pour son design de haute qualité, de construction innovante et ses créances énergétiques excellentes.

Modular Wiring Systems a travaillé avec divers entrepreneurs pour la réalisation de Ropemaker Place, en fournissant son assistance pour la conception de systèmes de distribution d'énergie et d'éclairage ainsi que pour la fabrication et la fourniture de ces systèmes préfabriqués étage par étage.

Les derniers étages à compléter sont maintenant dans la phase finale d'aménagement. L'utilisation de systèmes de câblage modulaires est en ligne avec l'engagement de Ropemaker Place en ce qui concerne la qualité, l'innovation et la soutenabilité.

▲ *Le prestigieux projet Ropemaker Place à Londres*

Un système de câblage modulaire est un système de distribution modulaire rapide et facile à installer préfabriqué hors du site; le système est essentiellement composé des lignes du circuit d'un schéma traditionnel.

Les systèmes de câblage modulaire sont rapides à installer et exigent une main-d'œuvre réduite, ils sont très flexibles et rentables.

En plus de l'innovation d'un système de câblage modulaire, la qualité est également une caractéristique essentielle, le système complet étant fabriqué hors site dans un environnement contrôlé en usine, ce qui élimine ainsi les risques potentiels des conditions sur place. Enfin, la soutenabilité est également abordée à l'aide d'un système de câblage modulaire. Le système étant fabriqué hors site, il n'y a aucune exigence en matière de coupe et fabrication – ce qui est positif pour l'environnement, pour la santé et la sécurité, pour la gestion des déchets et encore mieux pour la rentabilité.

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Nouveau site web, exhaustif et informatif de data M

La communication n'a jamais été plus facile qu'aujourd'hui. Quelques frappes de touche à l'ordinateur fournissent des informations concernant une société, ses produits et ses services. Un autre clic et on est connecté à la société et on peut entrer en contact direct. data M a choisi le 20ème anniversaire du lancement du WorldWideWeb pour présenter son nouveau site web.

La nouvelle page d'accueil de data M convainc tout d'abord puis surprend: Elle offre une première impression de clarté et d'organisation et transmet de bonnes informations. La navigation est extrêmement simple. Toutefois, en regardant de plus près chaque élément du menu, le site web se révèle être plus élaboré.

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Réaction au feu des câbles

Par Terence Journeaux, Prysmian Cables & Systems Limited, Royaume-Uni

Résumé

Le présent article analyse la décision de la Commission européenne d'octobre 2006 qui transpose la directive 89/106/CEE du Conseil en ce qui concerne la classification des caractéristiques de réaction au feu des produits de construction et les démarches effectuées pour leur réalisation. L'article effectue une révision de l'évolution des différentes normes nécessaires pour les méthodes d'essais, la classification, les produits et les règles EXAP pour l'application étendue ainsi que les résultats préliminaires du projet CEMAC II financé par Europacable pour fournir une base d'études expérimentales pour la réalisation et les défis posés par le développement des produits.

Introduction

L'objectif du présent article consiste à offrir une vue d'ensemble de l'état actuel et de l'éventuelle orientation future adoptée par les organismes normatifs, les rédacteurs des spécifications et les producteurs de câbles pour traiter la réaction au feu en cas d'incendie des câbles. L'article analyse notamment la situation de l'Union Européenne sans fournir une description détaillée des méthodes d'essai utilisées ni créer une discussion quant à leur validité.

L'industrie du câble vante une longue histoire dans le développement de méthodes d'essai et de produits conçus pour réduire les risques causés par les incendies des câbles qui remonte aux années 60. L'industrie du câble a été l'une des premières industries dans le secteur électrotechnique à développer des essais pour l'évaluation de la réaction au feu de ses produits et elle a continué à perfectionner et à améliorer ces essais au fil des ans. Les normes appliquées actuellement concernent la propagation des flammes, l'émission de chaleur, l'opacité, la corrosivité et la toxicité des effluents du feu et l'industrie est constamment engagée à parrainer la recherche pour améliorer le comportement au feu de ses produits et définir des méthodes d'essai appropriées.

Dans le secteur de l'incendie, l'engagement de la Commission Électrotechnique Internationale (IEC) en ce qui concerne les normes internationales est de longue date et de nombreuses normes nationales et régionales, comme par exemple la norme EN (European Standard), sont basées sur des publications européennes. Bien sûr, au sein de ce cadre international, le mode d'aborder les risques de combustion des câbles et les méthodes d'essais auxquelles se réfèrent les applications diffèrent d'une région à l'autre et d'un pays à l'autre.

Par conséquent, l'industrie du câble fournit les produits avec une ample gamme de réactions au comportement au feu pour répondre aux exigences variables des utilisateurs finals.

Développement historique

La majorité des études préliminaires dédiées aux améliorations du comportement au feu des câbles électriques ont été menées dans les années 70 et 80[1,2,3]. À cette époque, l'approche adoptée consistait en quatre phases:

- réduire au minimum le risque en limitant l'entité de l'incendie et en réduisant la propagation du feu le long des câbles
- réduire au minimum les émissions des fumées qui causent la non-visibilité des issus de secours et empêchent la fuite
- réduire au minimum l'émission des gaz acides entraînant la corrosion des équipements
- réduire au minimum l'émission de fumées nocives entraînant inhabilité ou irritation et empêchement de la fuite pour les personnes

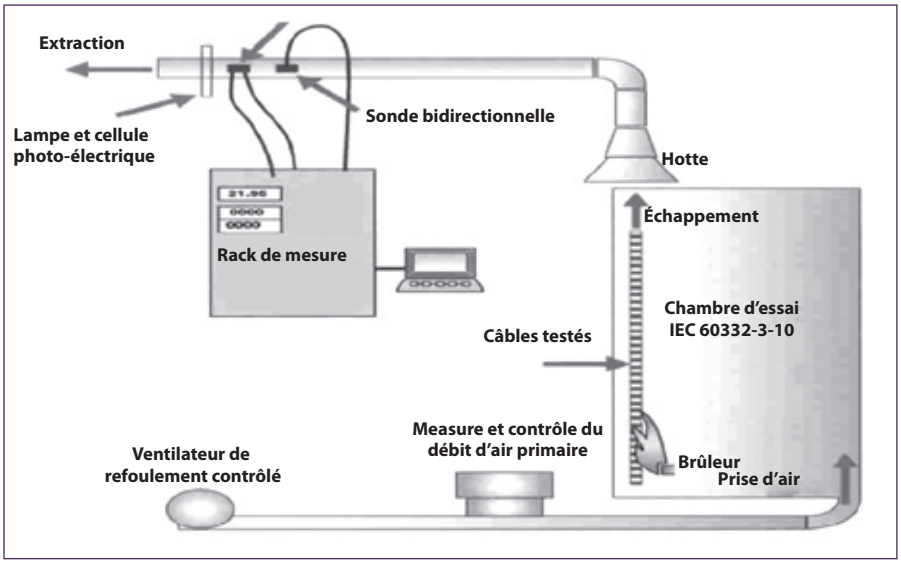
Il a été confirmé que ces facteurs peuvent assumer différents niveaux d'importance en fonction du secteur de marché spécifique et des conditions d'installation typiques considérées[4].

En outre, l'industrie du câble était consciente de la nécessité de développer des essais internes pour effectuer une évaluation correcte des performances de ses produits.

Bien que ce développement préliminaire ait entraîné une série d'essais qui pourraient apparaître dépourvus du point de vue de l'intégration, la méthode considérée globalement convient bien à la vision courante.

Une autre considération importante fut le fait qu'il aurait été nécessaire de développer des essais à grande échelle, si jugés pertinents, afin d'évaluer les performances du produit dans son ensemble dans une condition proche à la condition de "comme installé". Les études internationales portaient sur le développement des méthodes d'essai adoptées comme "complémentaires" aux normes de produit de manière à atteindre les niveaux de comportement au feu l es plus hauts possibles dans la totalité de la gamme des types de produits.

▼ **Figure 1**: *Diagramme de l'appareil d'essai prEN50399*



Situation actuelle

Au cours des dernières années, les normes IEC des essais sont restées essentiellement inchangées, mais ont été soumises à des perfectionnements continus[5,6,7,8].

Par exemple, la norme IEC 332-3 s'est développée dans une norme composée de plusieurs parties, dont chaque partie porte sur une différente condition d'installation ou temps d'exposition au foyer de l'incendie.

Les principes établis au cours des études préliminaires de ces normes sont encore utilisés auprès des producteurs et des utilisateurs de câbles et les normes IEC sont adoptées dans plusieurs pays.

En fonction de l'utilisation de ces essais, plusieurs types de câbles peuvent être trouvés sur le marché.

Câbles à propagation de flammes réduite (RP) lesquels, lorsqu'ils sont installés en nappes en position verticale conformément aux modes opératoires recommandés, ne propagent pas la flamme outre une distance limitée de la source.

Ces câbles se sont affirmés sur le marché au cours des années 70 pour le câblage dans des zones où le risque de propagation d'incendies était élevé à cause des conditions d'installation, comme dans le cas des câbles en nappes en position verticale. Ces câbles sont essayés conformément aux différentes parties de la norme IEC60332-3.

Des câbles à basse émission de fumées caractérisés par une production de fumée limitée, évalués dans une chambre à fumée de «trois mètres au cube» avec des limites de performance préétablies pour une visibilité de 10m de distance.

Ces câbles furent introduits car l'on remarqua que les câbles contenant des matériaux de revêtement traditionnels à base de PVC relâchaient de grandes quantités de fumée dense une fois affectée par le feu.

Ces câbles sont en production depuis les années 70, mais ce n'est qu'après l'évolution de la technologie des matériaux de fabrication dans les années 80 que des projets économiquement rentables ont été réalisés pour une distribution à grande échelle. Ils sont essayés conformément à la norme IEC61034-2.

En général, les câbles de ce type associent également les propriétés d'émission des gaz faiblement corrosifs et sont réalisés en utilisant des matériaux "sans halogènes".

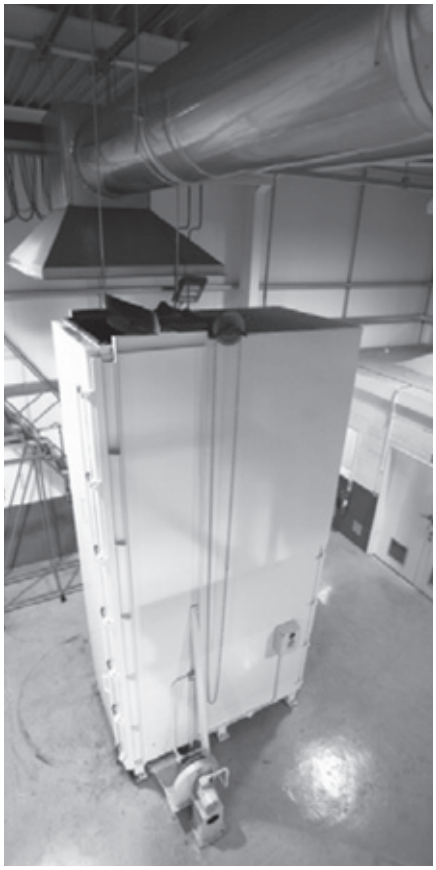
Câbles à faible émission de gaz corrosifs caractérisé par une émission limitée de gaz acides et corrosifs lorsque essayés en brûlant des échantillons de matériaux dans un mini four à tube. Ces câbles furent lancés sur le marché pour la première fois lorsque les utilisateurs commençaient à manifester des soucis en ce qui concerne les grandes quantités d'émissions de gaz acide produites par l'incendie de câbles en PVC à propagation de la flamme réduite.

Il avait été remarqué que le gaz corrosif et irritant entraînait des effets destructeurs sur les panneaux et sur les instruments électriques exposés aux effluents générés par l'incendie du câble (9,10). L'on peut utiliser l'essai d'émission de gaz acide conformément à la norme IEC60754-1 et/ou l'essai de corrosivité indirecte conformément à la norme IEC60754-2.

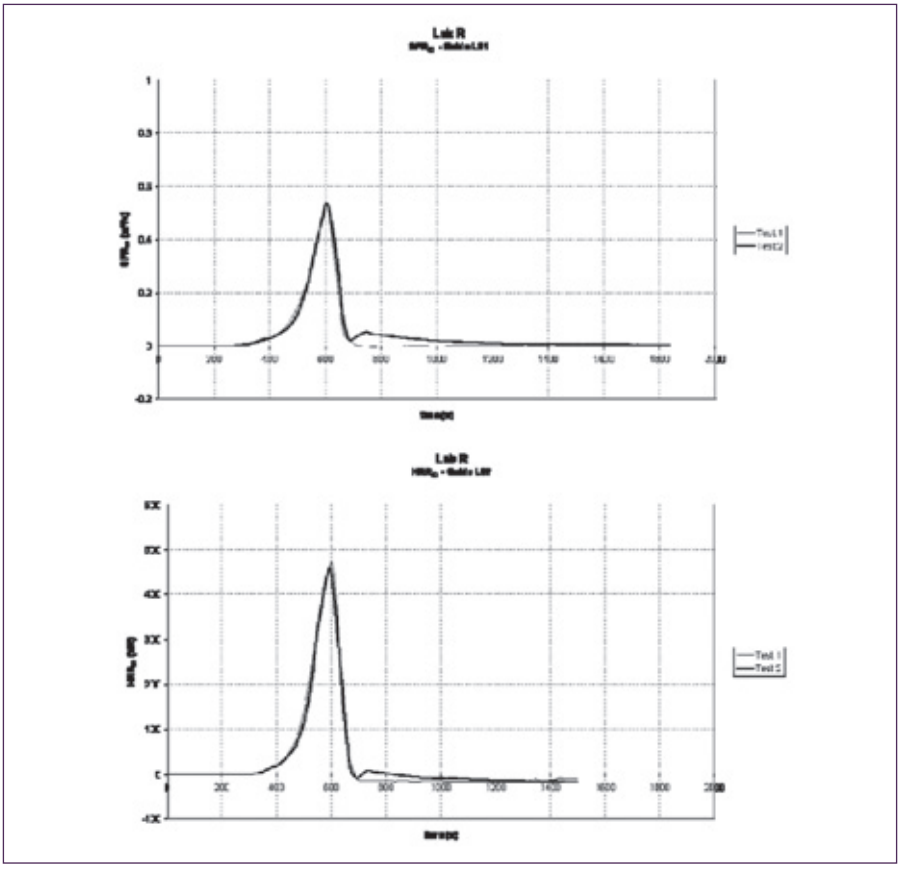
Les produits répondant à la spécification d'émission de gaz acide inférieure à 0,5% lorsque essayés conformément à la norme IEC60754-1 sont souvent désignés "sans halogène". Certaines normes de produit prévoient un essai supplémentaire de la teneur en fluor (IEC60684-2).

Câbles caractérisés par une faible émission de gaz toxiques, généralement limités à des applications spécifiques où les utilisateurs finals exigent ce type de condition.

▼ **Figure 2**: *appareil prEN50399*



▼ **Figure 3**: *Courbes SPR et HRR typiques*



Ces câbles sont particulièrement répandus dans le secteur ferroviaire. Les utilisateurs font appel à leurs normes internes pour les "émissions toxiques" allant d'une simple limitation de certains groupes élémentaires à des indices obtenus d'une analyse des gaz, développés et pondérés selon les facteurs de toxicité connus pour les mammifères des gaz présents.

Le manque d'essais de toxicité d'utilisation générale pour les câbles peut être expliqué par une étude précédente menée au Royaume-Uni, selon laquelle "de cette brève analyse des conséquences, il apparaît que les concentrations de gaz acide susceptibles de causer des dommages aux personnes et aux installations sont similaires."[11,12].

Des études en cours[13] continuent à démontrer la vaste contribution apportée par le chlorure d'hydrogène (HCl) au risque d'incendie.

Des études récentes et intéressantes qui analysent l'effet de gaz irritants importants sur les poumons des animaux[14] ont également démontré que l'inhalation de fumée de chlorure d'hydrogène et de PVC cause un effet sérieux avec une décadence rapide des paramètres de la physiologie pulmonaire.

Ces câbles sembleraient supporter une position de l'industrie du câble laquelle, pour des applications spécifiques, offre des produits à faible émission de gaz irritants (c'est-à-dire HCl généré par des composés à base de PVC) étant donné la caractéristique de ces gaz d'empêcher l'évacuation et d'endommager les poumons et, en même temps, de renforcer la position selon laquelle l'"acidité" est un "indicateur" d'effets toxiques importants.

La description générique "Risque d'incendie réduit" (*Low Fire Hazard*) a été récemment adoptée par les fabricants de câbles européens pour indiquer les câbles possédant des caractéristiques de performance de propagation des flammes réduite et de faible émission de fumées et de gaz nuisibles.

Bien que l'ensemble des normes IEC TC20 existant déjà permette une approche globale de base à la sécurité contre l'incendie, lorsque les différents éléments sont combinés (en général, pour les normes de produit on fait référence aux normes IEC60332-3, IEC61034, IEC60754-1 et/ou IEC60754-2), les développements récents se sont penchés sur une méthode plus intégrée avec les normes d'essai prévoyant la possibilité de mesurer la propagation des flammes, le dégagement de chaleur, l'obscurcissement par la fumée, et le dégagement de gaz de combustion.

Classe	Méthode/s d'essai	Critères de classification	Classification supplémentaire
A_{ca}	EN ISO 1716	PCS ≤ 2,0 MJ/kg (1)	
$B1_{ca}$	$FIPEC_{20}$ Scén 2 (5) *et*	FS£ *1,75 m; et* THR_{1200s} ≤ 10 MJ; et Pointe HRR ≤ 20 kW; et FIGRA ≤ 120Ws^{-1}	Production de fumée (2, 6) et gouttelettes/particules enflammées (3) e acidité (4, 8)
	EN 60332-1-2	H ≤ 425mm	
$B2_{ca}$	$FIPEC_{20}$ Scén 1 (5) *et*	FS≤ *1, 5m; et* THR_{1200s} ≤ 15MJ; *et* Pointe HRR ≤ 30 kW; *et* FIGRA ≤ 150Ws^{-1}	Production de fumée (2, 7) et gouttelettes/particules enflammées (3) e acidité (4, 8)
	EN 60332-1-2	H ≤ 425mm	
C_{ca}	$FIPEC_{20}$ Scén 1 (5) *et*	FS ≤ 2,0 m; *et* THR_{1200s} ≤ 30 MJ; *et* Pointe HRR ≤ 60 kW; *et* FIGRA ≤ 300 Ws^{-1}	Production de fumée (2, 7) et gouttelettes/particules enflammées (3) e acidité (4, 8)
	EN 60332-1-2	H ≤ 425mm	
D_{ca}	$FIPEC_{20}$ Scén 1 (5) *et*	THR_{1200s} ≤ 70 MJ; *et* Pointe HRR ≤ 400 kW; *et* FIGRA ≤ 1300 Ws^{-1}	Production de fumée (2, 7) et gouttelettes/particules enflammées (3) e acidité (4, 8)
	EN 60332- 1-2	H ≤ 425mm	
E_{ca}	EN 60332-1-2	H ≤ 425mm	
F_{ca}	Aucune performance déterminée		

(1) Pour le produit dans son ensemble, à l'exclusion des matériaux métalliques, et pour tout composant externe (par exemple la gaine) du produit
(2) s1 = $TSP_{1\ 200}$ = 50 m^2 et SPR de pointe = 0,25 m^2/s
s1a = s1 et transmittance en conformité avec EN 61034-2 = 80%
s1b = s1 et transmittance en conformité avec EN 61034-2 = 60% < 80%
s2 = $TSP_{1\ 200}$ = 400 m^2 et SPR de pointe = 1,5 m^2/s
s3 = ni s1 ni s2
(3) Pour les scénarios $FIPEC_{20}$ 1 et 2: d0 = Absence de gouttelettes/particules enflammées avant 1200 s; d1 = Absence de gouttelettes/particules persistant plus de 10 s avant 1200 s; d2 = ni d0 ni d1
(4) EN 50267-2-3: a1 = conductivité < 2,5 µS/mm et pH > 4,3; a2 = conductivité < 10 µS/mm et pH>4,3; a3 = ni a1 ni a2. Aucune déclaration = Aucune performance déterminée
(5) Le débit d'air dans la chambre est réglé à 8000 ± 800 l/min
$FIPEC_{20}$ Scénario 1 = prEN 50399-2-1 avec montage et fixation comme ci-dessous
$FIPEC_{20}$ Scénario 2 = prEN 50399-2-2 avec montage et fixation comme ci-dessous
(6) La classe de fumée déclarée pour les câbles $B1_{ca}$ doit résulter de l'essai $FIPEC_{20}$ Scénario 2
(7) La classe de fumée déclarée pour les câbles $B2_{ca}$,C_{ca}, D_{ca} doit résulter de l'essai $FIPEC_{20}$ Scénario 1
(8) Cette classification vise à mesurer les propriétés dangereuses des gaz formés en cas d'incendie, qui compromettent la capacité des personnes qui y sont exposées de prendre des mesures efficaces pour fuir, et non pas à décrire la toxicité de ces gaz

▲ **Figure 4**: *Classification des caractéristiques de réaction au feu des câbles électriques*

Classification européenne des caractéristiques de réaction au feu de câbles conformément à la Directive Produits de Construction (CPD)

Le développement de la norme prEN50399[15,16] revêt un intérêt particulier pour le marché européen: il s'agit d'"une norme d'essai qui se base sur le dispositif de la norme IEC60332-3-10 avec l'addition d'un conduit d'échappement équipé pour mesurer le taux de dégagement de chaleur et la vitesse de production de fumée.

La norme prEN50399 a été développée comme support de la classification "Classification des caractéristiques au feu des câbles électriques" prévue par la Décision de la Commission du 27 octobre 2006 modifiant la décision 2000/147/CE, portant modalités d'application de la Directive du Conseil 89/106/CEE en ce qui concerne la classification des caractéristiques de réaction au feu des produits de construction.

Elle définit les méthodes d'essai "$FIPEC_{20}$ Scénario 2" et "$FIPEC_{20}$ Scénario 1" indiquées dans la Décision de la Commission. Le tableau suivant illustre les spécifications essentielles de la Décision de la Commission.

Bien que les équipements d'essai conformes à la norme prEN50399 soient basés sur la série de la norme IEC60332-3

existant déjà, les résultats obtenus des deux modes opératoires ne sont pas comparables puisque la méthode prEN50399 est basée sur le montage d'un câble classé comme "le pire cas", comme visé par la Décision, alors que la méthode IEC est basée sur un montage d'un câble du type "comme installé".

La production de fumée est mesurée dans l'essai dynamique prEN50399, mais la résolution est telle que l'essai ne permet pas de mesurer les bas niveaux de fumée associés aux câbles à faible émission de fumées selon l'état de l'art pour des applications métro et similaires. Par conséquent, la méthode IEC(EN)61034-2 est incluse pour évaluer la classe la plus élevée.

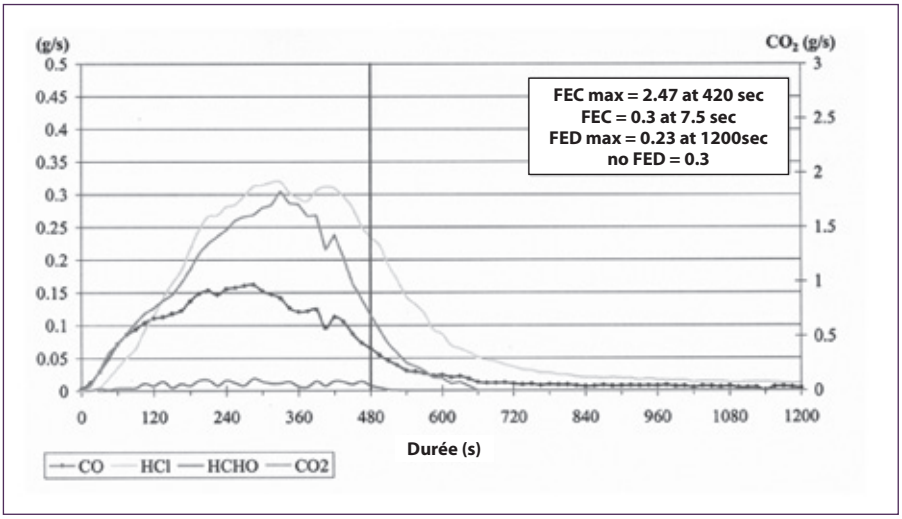
L'acidité est évaluée en utilisant la méthode EN50267-2-3 existant déjà qui est équivalente à la méthode IEC60754-2 du point de vue technique.

Avec la publication de la Décision de Commission, la question de la disponibilité des câbles classés devient importante. Malgré la disponibilité de la totalité des méthodes d'essai requis, au moins sous forme préliminaire, il n'est pas possible d'avoir sur le marché des câbles marqués CE conformément à la directive produits de construction (CPD) en ce qui concerne le comportement au feu jusqu'à ce que les normes requises de support de ce marquage ne soient disponibles.

Afin de permettre aux Organismes Notifiés d'émettre des certifications de conformité des produits, il est nécessaire de rédiger des Normes Européennes Harmonisées de Produit (EN) et d'autres normes de support sous mandat de la Commission Européenne. CENELEC (Comité Européen de Normalisation Électrotechnique) doit développer et publier ces normes et jusqu'à la publication de ces Normes sous Mandat, il n'est possible d'émettre officiellement aucune Certification pour le marquage CE en conformité avec la Directive Produits de Constructions (CPD) en ce qui concerne la réaction au feu des câbles électriques.

Le Mandat (M/443) (17) pour les câbles concernant le travail de normalisation pour la création de normes harmonisées a été conféré à CEN (Comité Européen de Normalisation)/CENELEC en juin 2009 avec un champ d'application comprenant: câbles de puissance, de contrôle, de communication, et à fibres optiques pour l'utilisation dans des bâtiments et d'autres travaux d'ingénierie sujets à des règlements (toutes les tensions incluses).

En ce qui concerne les caractéristiques de performance, le champ d'application comprend la réaction au feu, la résistance au feu et aux substances dangereuses. En principe, l'organisme de normalisation CENELEC avait accepté le mandat et devait soumettre une réponse détaillée avec un programme de travail en 2009.



▲ **Figure 5**: *Courbe de débit tipique du gaz toxique dans un essai EN50399*

La première partie de l'étude devait porter sur les documents requis comme support du marquage CE en ce qui concerne la réaction au feu, mais il est improbable que ce programme puisse être complété avant fin 2011.

La Norme de Produit Harmonisée est la clé du marquage CE conformément à la Directive produits de construction (CPD), mais le développement de cette norme présente des difficultés étant donné qu'il existe différents types de câbles et la directive s'applique uniquement à la réaction au feu, à la résistance au feu et aux substances dangereuses, tandis que les autres paramètres de sécurité sont prévus par la Directive "Basse tension" (LVD).

Toutefois, une solution est en train d'être étudiée pour définir une norme basée sur les performances, pouvant être appliquée à tout type de câble et portant sur des aspects spécifiques en conformité avec la directive CPD.

La norme de classification constitue un document administratif important qui associe les résultats des essais à la classification et comprend les informations sur les essais à effectuer, le nombre pour la classification, l'évaluation des résultats et les critères de classification.

En principe, les organismes de normalisation CEN et CENELEC ont établi que les câbles seront inclus comme modification de la norme EN 13501-1 existant déjà de manière à ce que tous les produits conformes à la directive CPD soient inclus dans un document unique. La norme relative à la méthode d'essai (EN 50399) doit assurer l'obtention des données nécessaires à la classification. Le brouillon final de la norme est prêt pour le vote formel auprès du CENELEC.

Dans le cadre de la méthode d'essai, plus de 20 laboratoires ont participé à un essai interlaboratoire qui a démontré que la répétabilité et la reproductibilité étaient comparables avec d'autres essais à grande échelle, tels que l'essai SBI (Single Burning Item).

En outre, une expérience considérable a été acquise (plus de 200 essais sur les câbles qui représentaient des structures génériques amplement utilisées en Europe) avec la méthode d'essai au cours du projet CEMAC II qui a réuni des producteurs de câbles, des laboratoires de recherche et d'essai et des centres de recherche dans le processus de réalisation pour la création d'une base d'études expérimentales.

Un objectif spécifique du projet CEMAC II consistait à développer des règlements et des modes opératoires pour le champ d'application étendu des résultats des essais (EXAP), pouvant définir quelles structures devraient être soumises à l'essai pour obtenir une classification référée à une famille déterminée de structures de câbles. Le rapport final était prévu pour fin 2009.

Des règles définitives et documentées sont nécessaires pour le champ d'application étendu (EXAP) afin d'éviter une situation où chaque structure de câble doit être soumise à un essai aux fins de la classification.

Il est également nécessaire d'établir quels câbles exigent d'être essayés pour obtenir l'approbation pour une gamme de produits au moyen de règles permettant

d'extrapoler les essais sur les produits définis au sein d'une famille et de les appliquer à d'autres structures similaires à l'intérieur de la même famille. Les règles EXAP ont été développées grâce au projet de recherche CEMAC II et seront publiées par le CENELEC.

Développements futurs probables

Il est évident que l'industrie du câble européenne sera fortement impliquée dans la nouvelle méthode d'essai intégrée concernant la réaction au feu de la norme EN50399 et ce, avec d'autres prescriptions d'essai de la classification européenne, exigera un grand effort dans le développement de produits pouvant répondre aux exigences des diverses Euroclasses.

On prévoit que la norme EN50399 sera prise en considération par IEC au cours de la prochaine révision principale des méthodes d'essai de propagation de la flamme qui aura lieu de 2012 à 2015.

Malgré la carence d'une réglementation efficace des initiatives des utilisateurs, l'industrie commence à prendre en considération des essais de produits indiqués pour la mesure des effluents et pour fournir des données qui pourraient être utilisés dans les études d'ingénierie pour la sécurité contre l'incendie comme la modélisation de l'évacuation.

L'essai EN50399 intégré peut offrir une base adéquate si équipé davantage pour mesurer la quantité et la qualité des effluents.

Le développement de techniques FT-IR pour la mesure des effluents en temps réel a amené aux études préliminaires réalisées pour déterminer s'il est possible de mesurer la qualité des effluents durant l'essai EN50399.

Les documents présentés au cours de la conférence Europacable intitulée "Sécurité durant un incendie" qui s'est déroulée en mai 2009[18,19,20] suggéraient qu'il est possible de mesurer les effluents résultant de la norme EN50399 en utilisant les techniques FT-IR, qu'il est possible d'utiliser ces techniques pour analyser les effluents générés par la fumée et qu'il est possible d'utiliser les données dans une simulation de conditions d'évacuation critiques pour comparer les différents types de câbles.

La détermination d'un indice FED et FEC selon la norme ISO TS13571 durant l'essai peut fournir une mesure utile.

En utilisant ces techniques, les résultats de l'étude de simulation ont amené à la conclusion suivante: dans un cas de figure d'incendie d'étude, les conditions critiques étaient réalisées pour certains locaux dans le cas des câbles standard (revêtus de PVC) à cause de la production de gaz irritants (HCl, créoline, formaldéhydes) et fumée (réduction de la visibilité au-dessous de 10m), alors que les conditions critiques n'étaient réalisées pour aucun local dans le cas de câbles à bas risque d'incendie.

Conclusions

En réponse aux exigences de ses clients en ce qui concerne la réaction au feu, l'industrie du câble offre constamment des produits caractérisés par différents niveaux de performance en ligne avec les exigences des utilisateurs pour des conditions d'application et d'installation spécifiques.

Les principes établis, il y a plus de 20 ans, en ce qui concerne le contrôle des incendies, le contrôle des émissions de fumée et le contrôle des émissions de gaz corrosifs et irritants plus importants, restent valables encore aujourd'hui malgré les modifications et les perfectionnements apportés aux méthodologies au cours des dernières années.

L'introduction de nouvelles prescriptions basées sur les essais intégrés concernant le dégagement de chaleur a représenté et continuera à représenter un défi difficile surtout en Europe.

Le nouveau cadre de règlementation européen concernant la classification des caractéristiques de réaction au feu entraînera un changement important aux positions individuelles actuelles.

Il est difficile de prévoir avec exactitude comment la classification européenne et le marquage CE concernant les caractéristiques de réaction au feu conformément à la directive CPD vont influencer le marché du câble.

L'application est une question de caractère strictement national et, alors qu'il est notoire que certains pays actuellement sans règlementation en ce qui concerne le comportement au feu n'ont pas l'intention de se régulariser pour le futur, d'autres pays ont manifesté l'intention d'utiliser cette classification visée par le règlement.

Toutefois, quelle est l'Euroclasse spécifiée pour chaque application est encore une question de caractère national. À un niveau européen, on prévoit que la demande à l'industrie du câble pour la fourniture de différents niveaux de performance continuera, bien que dans le futur, une tendance des utilisateurs vers des classes supérieures sera prévisible dès que des structures de câble plus économiques seront disponibles.

La comparaison des essais prEN50399 avec les résultats obtenus des essais IEC courants est difficile à cause des différentes conditions de sélection pour les essais et de la méthode basée sur les critères multiples de la classification.

En général, l'expérience acquise grâce au projet CEMAC II a démontré que les résultats de l'essai prEN50399 sont considérablement influencés par les dimensions du câble; plus petit est le câble, et plus onéreux est l'essai.

Les résultats pour les câbles de puissance de dimensions majeures (dimensions du conducteur supérieures à 35mm^2) peuvent être généralement prévus à partir des résultats de la norme IEC60332-3-24 (Catégorie C), puisque dans chaque essai le montage est similaire, mais il n'existe pas une telle relation pour les câbles plus petits surtout à cause du montage complètement divers dans chaque essai.

Des études menées récemment ont démontré que la mesure des effluents effectuée en temps réel dans un essai d'incendie à grande échelle (comme le prEN50399) est possible et que ces résultats peuvent être utilisés comme base dans les études de modélisation.

Toutefois, il est évident que des études supplémentaires seraient nécessaires avant de réaliser toute normalisation.

Grâce à sa capacité constante et confirmée d'investir dans la recherche, l'industrie du câble sera toujours en mesure de répondre aux défis posés par tout organisme normatif ou aux exigences des utilisateurs finals en ce qui concerne les caractéristiques de réaction de ses produits. ■

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Le fascette per cavi con codice a barre 2D semplificano la gestione delle reti

Nelle reti complesse, in particolare nei centri di calcolo, il rilevamento e la chiara identificazione di tutti i componenti costituiscono un prerequisito sia per disporre di una documentazione completa secondo standard sia per la gestione della stessa – inclusa la gestione del magazzino, l'acquisto e la manutenzione.

Attualmente le fascette per cavi patch con codice a barre 2D forniti da Dätwyler offrono l'opportunità di rilevare e identificare con chiarezza i cavi di connessione tramite scanner e di semplificare la gestione dell'intera infrastruttura.

Per risparmiare tempo e denaro, con questa soluzione è possibile documentare e gestire tutti i cavi e componenti automaticamente utilizzando codici a barre, scanner e software adeguati evitando costosi inserimenti manuali di dati.

Dätwyler ora è in grado di fornire tutti i cavi patch completi di fascette ed un codice a barre 2D che consentono una semplice rilevazione senza errori. I vantaggi offerti dalle fascette per cavi si avvertono soprattutto nelle sale server e nei centri di calcolo con oltre 500 cordoni la cui documentazione è specificata dalla norma EN50174-1:2009-09.

L'articolo e i numeri di serie stampati, che possono anche essere personalizzati, forniscono un'identificazione chiara su entrambi i lati di ciascun cavo patch. Inoltre, il numero di codice a barre 2D contiene numerose informazioni sul qualità, categoria, lunghezza e colore.

▲ *Nuovo sistema di codice a barre di Dätwyler*

Per semplificare la scansione, ciascuna fascetta per cavo, a differenza delle etichette autolaminanti, può essere spostata in una posizione facilmente leggibile senza "scivolare" come spesso avviene con le bandiere.

Nel secondo trimestre di quest'anno, Dätwyler aggiornerà le soluzioni software di gestione "Panorama" e "Panorama Cabling View " (quest'ultimo progettato in particolare per la pianificazione e la documentazione delle infrastrutture di cablaggio) mediante codici a barre per tutti i cavi e componenti.

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La competenza offre vantaggi alla città

La società Draka Communications si è aggiudicata un contratto di consulenza, licenza e formazione con e.wa riss Netze, una joint venture di servizi di fibre costituita dall'impresa di servizi pubblici della città di Biberach e EnBW, fornitore di energia per la Germania sud-occidentale.

e.wa riss Netze (networks) beneficerà così della competenza di Draka nel settore delle fibre a domicilio (FTTH) e dell'applicazione del pacchetto software DrakaXSNet per l'evoluzione della sua attuale rete in fibra ad alta velocità al servizio dei cittadini di Biberach.

A seguito di ricerche e di studi di comparazione che affrontano diverse soluzioni di software di progettazione, e.wa riss Netze ha concluso dicendo che Draka XSNet è l'opzione migliore e più flessibile e che rappresenta una risorsa preziosa in termini di redditività nella costruzione di reti FTTx. Il software intelligente messo a punto da Draka consente ai costruttori di reti di identificare una soluzione ottimale, permettendo di ridurre il costo complessivo di proprietà durante la fase di costruzione della rete.

e.wa riss Netze ha iniziato a costruire l'infrastruttura in fibra ottica per i propri servizi di fibra del marchio ewacom a Biberach assieme alla società di pianificazione di reti E9.

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Premiato progetto con cavi modulari

Modular Wiring Systems, filiale del fabbricante di cavi elettrici Tratos Ltd., ha progettato, realizzato e fornito sistemi modulari di distribuzione elettrica e di illuminazione per lo sviluppo del progetto premiato dell'edificio Ropemaker Place a Londra.

Il Ropemaker Place, costruito da British Land è un palazzo di uffici di 20 piani che occupa una superficie di 603.000 piedi quadrati, progettato principalmente per professionisti e operatori finanziari.

Il progetto ha vinto numerosi premi, tra cui il prestigioso premio British Construction Industry nella categoria Grandi Progetti per il suo design di alta qualità, le costruzioni innovative e le eccellenti credenziali energetiche.

Modular Wiring Systems ha collaborato con vari appaltatori nella costruzione del Ropemaker Place, fornendo la propria assistenza nella progettazione dei sistemi di distribuzione di energia e d'illuminazione, nonché per la fabbricazione e la fornitura di questi sistemi prefabbricati piano per piano.

Gli ultimi piani da completare sono ora nella fase finale di allestimento. L'utilizzo di sistemi di cablaggio modulare è in linea con l'impegno di Ropemaker Place in termini di qualità, innovazione e sostenibilità.

Un sistema di cablaggio modulare è un sistema di distribuzione modulare rapido e di facile installazione, prefabbricato all'esterno. Il sistema è sostanzialmente composto di linee di circuito di uno schema tradizionale.

▲ *Il prestigioso progetto Ropemaker Place a Londra*

I sistemi di cablaggio modulari sono veloci da installare, non richiedono molta manodopera, sono molto flessibili e convenienti. Oltre all'innovazione di un sistema di cablaggio modulare, anche la qualità è un elemento chiave, poiché tutto il sistema è realizzato esternamente, in un ambiente di officina controllato, eliminando così i rischi potenziali presenti sul posto.

Infine, il sistema di cablaggio modulare tiene conto anche della sostenibilità.

Realizzando il sistema fuori sede, non vi è alcun requisito per il taglio e la fabbricazione – il che è positivo per l'ambiente, per la salute e la sicurezza, per la gestione dei rifiuti e ancora meglio per la redditività.

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Nuovo sito web, completo e informativo di data M

La comunicazione non è mai stata così facile come oggi. Poche battute sui tasti del computer forniscono informazioni su una società, sui suoi prodotti e servizi. Un altro clic e si è connessi alla società e si può entrare in contatto diretto.

data M ha scelto il 20° anniversario dal lancio del WorldWideWeb per presentare il suo nuovo sito web.

"Oggi, siamo in grado di interagire direttamente con i nostri clienti via internet", ha dichiarato Albert Sedlmaier di data M.

"Questo rappresenta un gran vantaggio per entrambe le parti. Basti pensare ai nostri servizi di formazione online.

"Agende piene di impegni e luoghi diversi complicano gli spostamenti dei progettisti per i corsi di formazione. Per questo motivo proponiamo una formazione online, i cosiddetti webinar, sin d'ora."

La nuova homepage di data M convince a prima vista per poi sorprendere: Dà una prima impressione chiara e organizzata e trasmette buone informazioni. La navigazione è estremamente semplice. Tuttavia, osservando più da vicino le singole voci del menu, il sito web risulta essere più elaborato. La molteplicità di informazioni tecniche illustra in dettaglio i servizi di ingegneria del software developer bavarese.

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Reazione all'azione dell'incendio dei cavi

A cura di Terence Journeaux, Prysmian Cables & Systems Limited, Regno Unito

Riassunto

Il presente articolo prende in esame la decisione della Commissione Europea dell'ottobre 2006 che attua la Direttiva 89/106/CEE del Consiglio per quanto riguarda la classificazione della reazione all'azione dell'incendio dei prodotti da costruzione e i passi intrapresi per la relativa realizzazione. L'articolo, inoltre, riesamina l'evoluzione delle diverse norme necessarie per i metodi di prova, la classificazione, i prodotti e le norme EXAP per l'applicazione estesa, i risultati iniziali del progetto CEMAC II finanziato da Europacable per fornire un background tecnico richiesto per l'attuazione e le sfide poste dallo sviluppo dei prodotti.

Introduzione

L'obiettivo del presente articolo consiste nell'offrire una panoramica dello stato attuale e del possibile orientamento futuro che assumeranno gli organismi normativi, i redattori di specifiche e i produttori di cavi per trattare l'argomento della reazione all'azione dell'incendio dei cavi. Nello specifico, l'articolo tratta la situazione presente nell'Unione Europea e non intende fornire una descrizione dettagliata dei metodi di prova utilizzati né una discussione circa la loro validità.

L'industria del cavo vanta lunghi trascorsi nello sviluppo di metodi di prova e di prodotti progettati per ridurre i rischi provocati dall'incendio di cavi, che risalgono agli anni '60.

L'industria del cavo fu una delle prime del settore elettrotecnico a sviluppare prove per la valutazione della reazione all'azione dell'incendio dei propri prodotti e ha continuato a perfezionare e migliorare queste prove nel corso degli anni.

Attualmente, si applicano norme che riguardano la propagazione delle fiamme, l'emanazione del calore, l'opacità, la corrosività e la tossicità degli effluenti dell'incendio e l'industria sponsorizza costantemente la ricerca, allo scopo di migliorare le prestazioni di reazione al fuoco dei propri prodotti e definire dei metodi di prova idonei.

Nel settore dell'incendio, è di lungo corso l'impegno rispetto alle norme internazionali tramite la Commissione Elettrotecnica Internazionale (IEC) e sono numerose le norme nazionali e regionali, come ad esempio le norme EN (European Standard) che si basano sulle pubblicazioni IEC.

Certamente, nell'ambito di questo contesto internazionale, il modo di analizzare i rischi di combustione dei cavi e i metodi di prova ai quali si fa riferimento per le varie applicazioni differiscono da regione a regione e da paese a paese.

Pertanto, l'industria del cavo fornisce prodotti con un'ampia gamma di reazioni all'azione dell'incendio per soddisfare i diversi requisiti degli utilizzatori finali.

Sviluppo storico

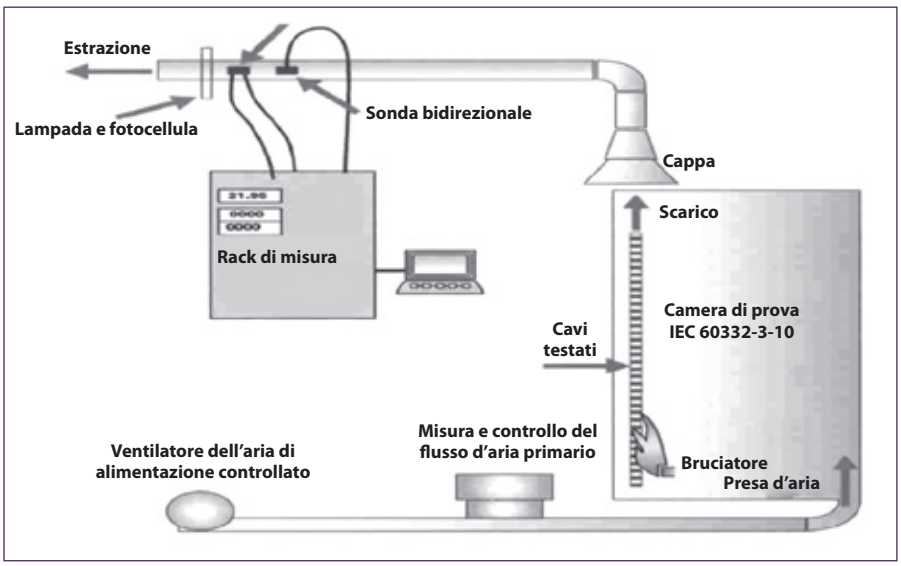
Gran parte degli studi preliminari per migliorare le reazioni all'azione dell'incendio dei cavi elettrici furono condotti negli anni '70 e '80[1,2,3]. All'epoca, l'approccio adottato consisteva in quattro fasi:

- minimizzare il rischio limitando l'entità dell'incendio e riducendo la propagazione del fuoco lungo i tratti dei cavi
- minimizzare le emissioni di fumo che causano l'oscuramento delle vie di fuga e l'impedimento della fuga
- minimizzare l'emissione di gas acido che causa la corrosione degli equipaggiamenti
- minimizzare l'emissione di fumi nocivi che causano inabilità o irritazione e impedimento alla fuga da parte delle persone

È stato confermato che questi fattori possono assumere vari livelli d'importanza secondo il particolare settore di mercato e le condizioni d'installazione tipiche considerate[4].

L'industria del cavo, inoltre, era consapevole che sarebbe stato necessario sviluppare delle prove internamente per effettuare una valutazione corretta delle prestazioni dei propri prodotti. Sebbene questo primo sviluppo abbia condotto ad una serie di prove che potrebbero

▼ **Figura1**: *Schema dell'apparecchiatura di prova prEN50399*



apparire carenti di integrazione, il metodo, se considerato globalmente, è in piena sintonia con il pensiero corrente.

Un'altra importante considerazione fu che avrebbero dovuto essere sviluppati test su vasta scala, qualora ritenuti necessari, al fine di valutare le prestazioni del prodotto nel suo insieme in una condizione prossima alla condizione di "come installato".

Gli studi internazionali si sono concentrati sullo sviluppo di metodi di prova che potessero essere adottati come "complementari" alle norme di prodotto, in modo da raggiungere i massimi livelli possibili di reazione all'azione dell'incendio in tutta la gamma dei tipi di prodotto.

Situazione attuale

Negli ultimi anni, le norme IEC pertinenti ai test sono rimaste sostanzialmente invariate, ma sono state sottoposte a continui perfezionamenti[5,6,7,8].

Ad esempio, la norma IEC 332-3 si è sviluppata in una normativa composta di più parti, ciascuna delle quali tratta una diversa condizione di installazione o tempo di esposizione alla sorgente dell'incendio. I principi stabiliti negli studi preliminari di queste norme sono tuttora utilizzati dai produttori e dagli utilizzatori di cavi e le norme IEC sono adottate in numerosi paesi.

In base all'utilizzo di queste prove, è possibile reperire sul mercato vari tipi di cavi.

Cavi a ridotta propagazione di fiamma (RP) che, se installati in fasci verticali secondo le procedure raccomandate, non propagano la fiamma oltre una distanza limitata dalla sorgente.

Tali cavi si sono affermati sul mercato sin dagli anni '70 per il cablaggio in zone in cui il rischio di propagazione di incendi è elevato a causa delle condizioni di installazione, come nel caso dei cavi disposti a fascio montati verticalmente. Questi cavi sono testati secondo le varie parti della norma IEC60332-3.

Cavi a bassa emissione di fumo con limitata produzione di fumo, valutati in una camera fumo di "tre metri al cubo" con limiti di prestazioni prestabiliti per una visibilità a 10m di distanza. Furono introdotti poiché si era notato che i cavi contenenti materiali di rivestimento tradizionali a base di PVC emettevano grandi quantità di fumo denso al contatto con il fuoco.

Questi cavi sono in produzione dagli anni '70, ma solo dopo gli sviluppi nella tecnologia dei materiali di fabbricazione dei cavi intervenuti negli anni '80, è stato possibile realizzare dei progetti economicamente vantaggiosi per una distribuzione su vasta scala. Questi cavi sono testati secondo la norma IEC61034-2.

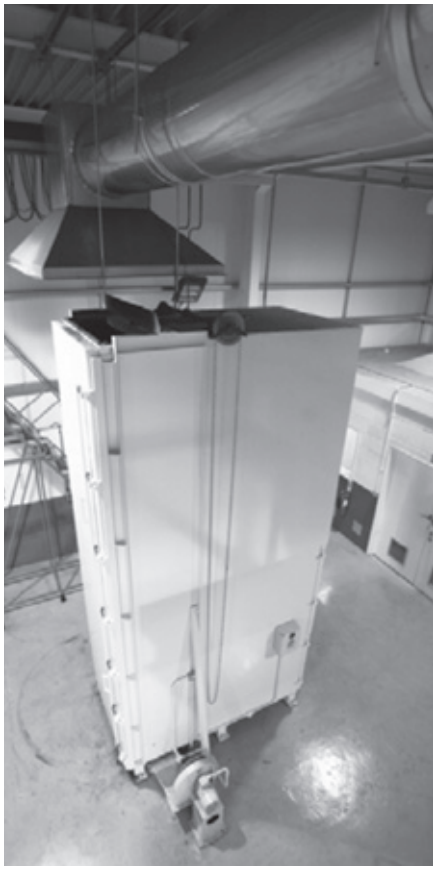
In generale, i cavi di questo tipo associano inoltre proprietà di bassa emissione di gas corrosivo e sono fabbricati utilizzando materiali "privi di alogeni". Cavi a bassa emissione di gas corrosivo con limitata emissione di gas acidi e corrosivi, valutati incendiando campioni di materiali in un forno a tubo da banco.

Questi cavi furono introdotti per la prima volta quando gli utilizzatori iniziarono a manifestare preoccupazione per le grandi quantità di emissioni di gas acido prodotti dall'incendio di cavi di PVC a propagazione ridotta.

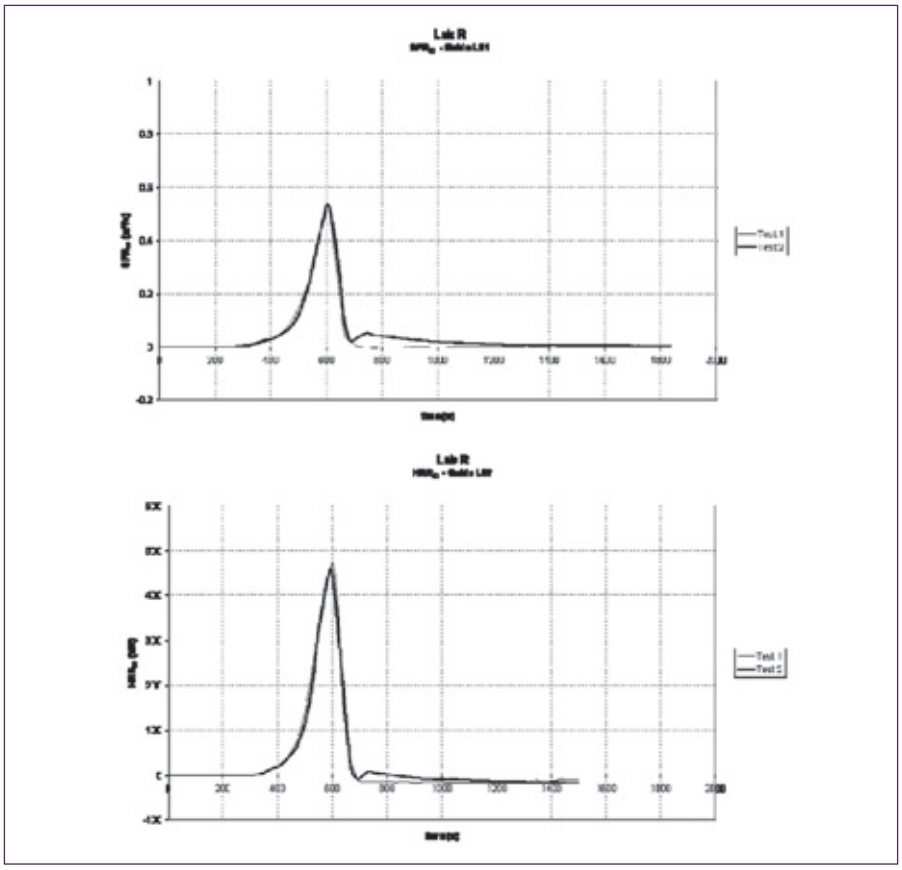
Era stato riscontrato che questo gas corrosivo e irritante presentava effetti devastanti sui pannelli elettrici e sugli strumenti esposti agli effluenti prodotti dall'incendio del cavo (9,10).

E' possibile utilizzare il test di emissione di gas acidi secondo la norma IEC60754-1 e/o il test di corrosività indiretta secondo

▼ **Figura 2:** *apparecchiatura prEN50399*



▼ **Figura 3:** *Curve caratteristiche SPR e HRR*



la norma IEC60754-2. I prodotti che soddisfano la specifica di emissioni di gas acido inferiori allo 0,5% durante la prova secondo la norma IEC60754-1 sono spesso definiti "privi di alogeni". Alcune norme di prodotto prevedono un test supplementare del contenuto di fluoro (IEC60684-2).

Cavi che presentano una bassa emissione di gas tossici, generalmente limitati ad applicazioni specifiche ove gli utilizzatori finali richiedono questo requisito. Questi cavi sono particolarmente diffusi nel settore ferroviario. Gli utilizzatori si avvalgono di proprie norme sulle "emissioni tossiche" che vanno da una semplice limitazione di alcuni gruppi elementari a indici derivanti da un'analisi dei gas, sviluppati e ponderati secondo i noti fattori di tossicità per i mammiferi dei gas presenti.

La mancanza di test di tossicità di utilizzo generale per i cavi può essere spiegata da uno studio precedente condotto nel Regno Unito, secondo il quale "Da questa breve analisi delle conseguenze, appare che le concentrazioni di gas acido suscettibili di causare danni alle persone e agli impianti sono simili"[11,12].

Degli studi in corso[13] continuano a dimostrare il vasto contributo del cloruro di idrogeno (HCl) al rischio di incendio. Alcuni nuovi e interessanti studi che analizzano l'effetto di gas irritanti importanti sui polmoni degli animali[14] hanno inoltre dimostrato che l'inalazione dei fumi di cloruro di idrogeno e di PVC causa un effetto acuto con rapido decadimento dei parametri della fisiologia polmonare.

Questi studi sembrerebbero supportare una posizione dell'industria del cavo che, per particolari applicazioni, offre prodotti che non rilasciano apprezzabili gas irritanti (cioè HCl da composti a base di PVC) data la caratteristica di tali gas di impedire la fuga e danneggiare i polmoni e, contemporaneamente, rafforzare la posizione secondo la quale l'"acidità" è un "indicatore" di importanti effetti tossici irritanti.

La generica descrizione "Basso Rischio d'Incendio" (*Low Fire Hazard*) è stata recentemente adottata dai fabbricanti di cavi europei per descrivere i cavi che presentano caratteristiche di ridotta propagazione della fiamma e bassa emissione di fumo e gas nocivi.

Sebbene il complesso delle norme IEC TC20 esistente consenta un approccio globale di base alla sicurezza antincendio, quando si combinano i vari elementi (per le norme di prodotto è consuetudine fare riferimento alle norme IEC60332-3,

Classe	Metodo(i) di prova	Criteri di classificazione	Classificazione supplementare
A_{ca}	EN ISO 1716	PCS ≤ 2,0 MJ/kg (1)	
$B1_{ca}$	$FIPEC_{20}$ Scen 2 (5) *e*	FS≤ *1,75 m e* THR_{1200s} ≤ 10 MJ; *e* Picco HRR ≤ 20 kW; *e* FIGRA ≤ 120Ws^{-1}	Produzione di fumo (2, 6) e gocce/ particelle ardenti (3) e acidità (4, 8)
	EN 60332-1-2	H ≤ 425mm	
$B2_{ca}$	$FIPEC_{20}$ Scen 1 (5) *e*	FS£ *1, 5m; e* THR_{1200s} ≤ 15MJ; *e* Picco HRR ≤ 30 kW; *e* FIGRA ≤ 150Ws^{-1}	Produzione di fumo (2, 7) e gocce/ particelle ardenti (3) e acidità (4, 8)
	EN 60332-1-2	H ≤ 425mm	
C_{ca}	$FIPEC_{20}$ Scen 1 (5) *e*	FS ≤ 2,0 m; *e* THR_{1200s} ≤ 30 MJ; *e* Picco HRR ≤ 60 kW; *e* FIGRA ≤ 300 Ws^{-1}	Produzione di fumo (2, 7) e gocce/ particelle ardenti (3) e acidità (4, 8)
	EN 60332-1-2	H ≤ 425mm	
D_{ca}	$FIPEC_{20}$ Scen 1 (5) *e*	THR_{1200s} ≤ 70 MJ; *e* Picco HRR ≤ 400 kW; *e* FIGRA ≤ 1300 Ws^{-1}	Produzione di fumo (2, 7) e gocce/ particelle ardenti (3) e acidità (4, 8)
	EN 60332- 1-2	H ≤ 425mm	
E_{ca}	EN 60332-1-2	H ≤ 425mm	
F_{ca}	Resistenza non determinata		

(1) Per il prodotto nel suo insieme, tranne le parti metalliche, e per ogni componente esterno (ad esempio guaina) del prodotto.
(2) s1 = $TSP_{1\,200}$ = 50 m² e picco SPR = 0,25 m²/s
s1a = s1 e trasmittanza in conformità con EN 61034-2 = 80%
s1b = s1 e trasmittanza in conformità con EN 61034-2 = 60% < 80%
s2 = $TSP_{1\,200}$ = 400 m² e picco SPR = 1,5 m²/s
s3 = non s1 o s2
(3) Per gli scenari $FIPEC_{20}$ 1 e 2: d0 = Assenza di gocce/particelle ardenti entro 1200 s; d1 = Assenza di gocce/particelle persistenti oltre 10 s entro 1200 s; d2 = non d0 o d1.
(4) EN 50267-2-3: a1 = conduttività < 2,5 µS/mm e pH > 4,3; a2 = conduttività < 10 µS/mm e pH>4,3; a3 = non a1 o a2. Nessuna dichiarazione = Resistenza non determinata
(5) Flusso d'aria in entrata nella camera regolato a 8000 ± 800 l/min.
$FIPEC_{20}$ Scenario 1 = prEN 50399-2-1 con montaggio e fissaggio come indicato di seguito
$FIPEC_{20}$ Scenario 2 = prEN 50399-2-2 con montaggio e fissaggio come indicato di seguito
(6) La classe di fumo dichiarata per la classe di cavi $B1_{ca}$ deve derivare dal test $FIPEC_{20}$ Scenario 2.
(7) La classe di fumo dichiarata per le classi di cavi $B2_{ca}$,C_{ca}, D_{ca} deve derivare dal test $FIPEC_{20}$ Scenario 1.
(8) Misurazione delle caratteristiche di pericolosità dei gas che si sprigionano durante un incendio, i quali compromettono la capacità delle persone ad essi esposte di agire prontamente per mettersi in salvo, e non descrizione della tossicità di tali gas.

▲ **Figura 4**: *Classi di reazione all'azione dell'incendio dei cavi elettrici*

IEC61034, IEC60754-1 e/o IEC60754-2), i recenti sviluppi si sono orientati verso un metodo più integrato con le norme dei test che contemplino la possibilità di misurare la propagazione della fiamma, l'emanazione del calore, l'oscuramento da fumo e il rilascio di gas da combustione.

Classificazione europea alla reazione degli incendi per cavi in conformità con la direttiva prodotti da costruzione (CPD)

Di particolare importanza per il mercato europeo è lo sviluppo della norma prEN50399[15,16], ovvero una norma per test che si basa sul dispositivo della norma IEC60332-3-10 con l'aggiunta di un condotto di scarico equipaggiato per misurare il tasso di emanazione del calore e la velocità di rilascio del fumo.

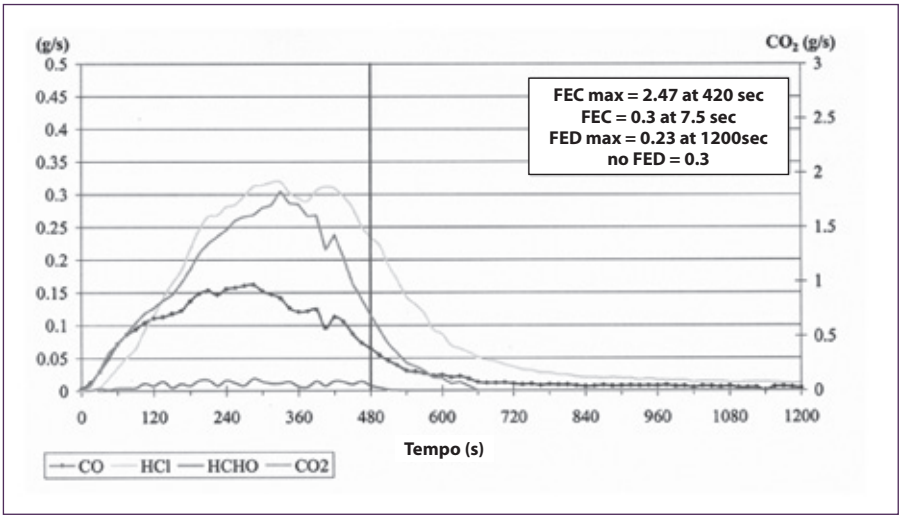
La norma prEN50399 è stata sviluppata a supporto della classificazione "Classi di reazione all'azione dell'incendio dei cavi elettrici" prevista nella Decisione della Commissione del 27 ottobre 2006 che modifica la decisione 2000/147/CE, con la quale si attua la Direttiva del Consiglio 89/106/CEE per quanto riguarda la classificazione della reazione all'azione dell'incendio dei prodotti da costruzione.

Essa definisce i metodi di prova "$FIPEC_{20}$ Scenario 2" e "$FIPEC_{20}$ Scenario 1" indicati nella Decisione della Commissione.

La tabella seguente illustra i requisiti essenziali della Decisione della Commissione.

Sebbene gli equipaggiamenti di prova conformi alla norma prEN50399 si basino sulla serie preesistente della norma IEC60332-3, i risultati ottenuti dalle due procedure non sono comparabili poiché la procedura prEN50399 si basa sul montaggio di un cavo classificato come il "caso peggiore", come previsto dalla Decisione, mentre la procedura IEC si basa su un montaggio di un cavo del tipo "come installato".

La produzione di fumo si misura nel test dinamico prEN50399, ma la risoluzione è tale che il test non consente di misurare i bassi livelli di fumo associati ai cavi a bassa emissione di fumi secondo lo stato dell'arte per applicazioni metro e simili.



▲ **Figura 5**: *Curva caratteristica di portata del gas tossico in un test EN50399*

Pertanto, viene incluso il metodo IEC(EN)61034-2 per valutare la classe più elevata. L'acidità viene valutata utilizzando il metodo EN50267-2-3 esistente che è tecnicamente equivalente al metodo IEC60754-2.

Con la pubblicazione della Decisione della Commissione, la questione della disponibilità dei cavi classificati diventa rilevante. Nonostante la disponibilità di tutti i metodi di prova richiesti, quanto meno sotto forma di bozza, non è possibile avere sul mercato cavi marcati CE in conformità con la direttiva prodotti da costruzione (CPD) per quanto riguarda la reazione all'azione dell'incendio fintantoché non saranno disponibili tutte le norme richieste a supporto di tale marcatura.

Al fine di consentire agli Organismi Notificati di emettere certificazioni di conformità dei prodotti, è necessario redigere delle Norme Europee Armonizzate di Prodotto (EN) ed altre norme di supporto su mandato della Commissione Europea.

CENELEC (Comitato europeo di normazione elettrotecnica) deve sviluppare e pubblicare queste norme e fino al momento di pubblicazione di queste Norme sotto Mandato, non è possibile rilasciare ufficialmente alcuna Certificazione per la marcatura CE in conformità con la direttiva prodotti da costruzione (CPD) per quanto riguarda la reazione all'azione dell'incendio dei cavi.

Il Mandato (M/443)[17] per i cavi, relativo al lavoro di standardizzazione per la creazione di norme armonizzate è stato conferito a CEN (Comitato Europeo di Normazione)/CENELEC nel giugno 2009 con un campo di applicazione comprendente cavi di potenza, controllo, comunicazione e a fibre ottiche per l'utilizzo in edifici e altre opere d'ingegneria civile soggette a regolamentazione (inclusi tutti i voltaggi).

Per quanto concerne le caratteristiche di prestazione, il campo di applicazione contempla la reazione all'azione dell'incendio, la resistenza al fuoco e alle sostanze pericolose.

L'organismo di standardizzazione CENELEC aveva accettato il mandato in linea di principio, e doveva sottoporre una risposta dettagliata unitamente ad un programma di lavoro entro il 2009.

La prima parte dello studio si basava sui documenti richiesti a supporto della marcatura CE per quanto riguarda la reazione all'azione dell'incendio, ma è improbabile che possa essere completato prima della fine del 2011.

La Norma Armonizzata di Prodotto è la chiave della marcatura CE in conformità con la direttiva sui prodotti da costruzione (CPD), ma lo sviluppo di tale norma presenta delle difficoltà poiché esistono numerosi tipi di cavi diversi e la direttiva CPD si applica unicamente alla reazione all'incendio, alla resistenza al fuoco e alle sostanze pericolose, mentre gli altri parametri di sicurezza sono contemplati dalla direttiva "Bassa tensione" (LVD).

È tuttavia allo studio una soluzione per definire una norma basata sulle prestazioni che possa essere applicata a qualsiasi tipo di cavo e che contempli aspetti specifici in conformità con la direttiva CPD.

La norma di classificazione costituisce un importante documento amministrativo che associa i risultati delle prove alla classificazione e include le informazioni sulle prove da eseguire, il numero di prove per la classificazione, la valutazione dei risultati e i criteri di classificazione.

In linea di principio, gli organismi di standardizzazione CEN e CENELEC hanno concordato che i cavi saranno inclusi come modifica nella norma EN 13501-1 esistente così che tutti i prodotti conformi alla direttiva CPD siano inclusi in un unico documento.

La norma relativa al metodo di prova (EN 50399) deve assicurare l'ottenimento dei dati necessari alla classificazione. La bozza finale della norma è pronta per il voto formale presso CENELEC.

Nell'ambito dello sviluppo del metodo di prova, oltre 20 laboratori hanno partecipato ad una prova interlaboratorio in cui è stato riscontrato che la ripetibilità e la riproducibilità erano comparabili con altre prove su vasta scala, come la prova SBI (Single Burning Item).

È stata inoltre acquisita una notevole esperienza (più di 200 prove su cavi che rappresentavano strutture generiche ampiamente utilizzate in Europa) con il metodo di prova durante il progetto CEMAC II che ha riunito produttori di cavi, laboratori di ricerca e di prova e istituti di ricerca nel processo di realizzazione per la creazione di un background tecnico.

Un obiettivo specifico del progetto CEMAC II era quello di sviluppare regole e procedure per il campo di applicazione estesa dei risultati delle prove (EXAP) che definiscano quali strutture debbano essere sottoposte a prova per ottenere una classificazione per una determinata famiglia di strutture di cavi. Il rapporto finale era previsto entro la fine del 2009.

Sono necessarie delle regole definitive e documentate per il campo di applicazione estesa (EXAP) al fine di evitare una situazione in cui ciascuna struttura di cavo debba essere sottoposta a una prova per la classificazione.

È necessario inoltre stabilire quali cavi necessitano di essere testati per ottenere l'approvazione per una gamma di prodotti attraverso regole che consentano di estrapolare i test su prodotti definiti all'interno di una famiglia e applicarla ad altre strutture simili nell'ambito della famiglia stessa.

Le regole EXAP sono state sviluppate tramite il progetto di ricerca CEMAC II e saranno pubblicate da CENELEC.

Possibili sviluppi futuri

È evidente che l'industria del cavo europea sarà intensamente coinvolta nel nuovo metodo di prova integrato relativo alla reazione all'azione dell'incendio della norma EN50399 e questo, unitamente ad altri requisiti di prova della classificazione europea, richiederà un notevole sforzo nello sviluppo di prodotti che soddisfino le esigenze delle varie Euroclassi.

Si prevede che la norma EN50399 sarà considerata da IEC nella prossima importante revisione dei metodi di prova di propagazione della fiamma prevista dal 2012 al 2015.

Nonostante l'attuale carenza di una efficace regolamentazione delle iniziative degli utilizzatori, l'industria sta iniziando a prendere in considerazione delle prove di prodotti idonee per la misurazione degli effluenti e per fornire dati che potrebbero essere utilizzati negli studi di progettazione per la prevenzione degli incendi come i modelli di simulazione di esodo.

La prova EN50399 integrata può offrire una buona base se ulteriormente equipaggiata per la misurazione della quantità e della qualità degli effluenti.

Lo sviluppo di tecniche FT-IR per la misurazione degli effluenti in tempo reale ha condotto ad alcuni studi preliminari realizzati per determinare se è possibile misurare la qualità degli effluenti durante la prova EN50399.

Gli elaborati presentati alla conferenza Europacable dal titolo "Sicurezza durante un incendio" nel maggio 2009[18,19,20] suggerivano che è fattibile la misurazione degli effluenti risultante dal test EN50399 utilizzando le tecniche FT-IR, che è possibile utilizzare tali tecniche per analizzare gli effluenti prodotti dal fumo e che si possono utilizzare i dati in una simulazione delle condizioni critiche di evacuazione per confrontare l'utilizzo di diversi tipi di cavi.

La determinazione di un indice FED e FEC secondo la norma ISO TS13571 durante la prova può fornire una misura utile. Utilizzando tali tecniche, i risultati dello studio di simulazione hanno condotto alla conclusione che, in uno scenario di incendio di progetto, le condizioni critiche si realizzavano per alcuni locali nel caso di cavi standard (rivestiti di PVC) a causa della produzione di gas irritanti (HCl, creolina, formaldeidi) e fumo (riduzione della visibilità al di sotto di 10m), mentre le condizioni critiche non si realizzavano per nessun locale nel caso di cavi a basso rischio d'incendio.

Conclusioni

In risposta ai requisiti dei propri clienti riguardo alla reazione all'azione dell'incendio, l'industria del cavo continua ad offrire una gamma di prodotti con diversi livelli di prestazione in linea con le esigenze degli utilizzatori per condizioni di applicazione ed installazione particolari.

I principi stabiliti oltre 20 anni or sono relativamente al controllo degli incendi, al controllo delle emissioni di fumo e al controllo delle emissioni dei gas corrosivi ed irritanti più importanti restano validi ancora oggi nonostante le modifiche e i perfezionamenti apportati alle metodologie negli scorsi anni.

L'introduzione di nuovi requisiti basati su test integrati che riguardano il rilascio di calore ha rappresentato e continuerà a rappresentare una sfida ardua soprattutto in Europa.

Il nuovo quadro normativo europeo relativo alla classificazione della reazione all'azione dell'incendio dei cavi, apporterà profondi cambiamenti alle attuali posizioni individuali. È difficile prevedere con esattezza come la classificazione europea e la marcatura CE riguardo la reazione all'azione dell'incendio conformemente alla direttiva CPD influenzeranno il mercato del cavo.

L'attuazione è una questione di carattere strettamente nazionale e, mentre è noto che alcuni paesi attualmente privi di regole per la reazione all'azione dell'incendio dei cavi non intendono mettersi in regola per il futuro, altri paesi hanno manifestato l'intenzione di utilizzare tale classificazione di cui al regolamento.

Tuttavia, quale sia l'Euroclasse specificata per ciascuna applicazione è nuovamente una questione di carattere nazionale.

A livello europeo, si prevede che prosegua la domanda all'industria del cavo per la fornitura di diversi livelli di prestazione, sebbene in futuro sia prevedibile un orientamento degli utilizzatori verso classi più alte non appena ci sarà disponibilità di strutture di cavo più economiche.

La comparazione delle prove prEN50399 con i risultati ottenuti dalle prove IEC correnti è difficile a causa delle diverse condizioni di selezione per le prove e del metodo basato su criteri multipli della classificazione.

In generale, l'esperienza acquisita grazie al progetto CEMAC II ha dimostrato che i risultati della prova prEN50399 appaiono notevolmente influenzati dalle dimensioni del cavo; quanto più piccolo è il cavo, tanto più onerosa è la prova.

I risultati per cavi di potenza di dimensioni maggiori (dimensioni del conduttore superiori a 35mm^2) si possono generalmente prevedere a partire dai risultati della prova della norma IEC60332-3-24 (Categoria C), poiché in ciascuna prova il montaggio è simile, ma non esiste una tale relazione per cavi più piccoli soprattutto a causa del montaggio completamente diverso nelle singole prove.

Alcuni studi recenti hanno dimostrato che la misurazione degli effluenti effettuata in tempo reale in una prova d'incendio su vasta scala (come prEN50399) è possibile e che tali risultati possono essere utilizzati come base negli studi di modellizzazione. Tuttavia, è chiaro che sarebbero necessari ulteriori studi prima di realizzare qualsiasi standardizzazione.

Attraverso la sua costante e provata capacità di investire nella ricerca, l'industria del cavo sarà sempre in grado di rispondere alle sfide poste da qualsiasi organismo normativo o alle richieste degli utenti finali riguardo la reazione all'azione dell'incendio dei propri prodotti. ■

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Marcadores con código de barras 2D simplifican la gestión de las redes

En redes de trabajo complejas, especialmente en centros de datos, la detección y clara identificación de todos y cada uno de los componentes es un requisito indispensable tanto para disponer de una documentación completa y cumpliendo con estándares normalizados, como para la adecuada gestión de los mismos, incluyendo la gestión del almacenaje, orden y mantenimiento de los mismos.

Ahora los latiguillos que ofrece Dätwyler provistos de marcador con código de barras 2D incorporado ofrece la posibilidad de detectar e identificar los latiguillos por escáner, suponiendo una simplificación importante de la gestión de toda la infraestructura.

Para ahorrar tiempo y dinero, con esta solución es posible documentar y gestionar adecuadamente todos los cables y componentes de manera automática utilizando códigos de barras, escáneres y su correspondiente software evitando la utilización de cualquier sistema manual que resulta sin duda mucho más costosa.

Este sistema permite detectar los cables de manera simple y sin errores. Los beneficios de este sistema se hacen palpable de manera importante en salas de servidores y centros de datos con más de 500 latiguillos donde la documentación correspondiente se rige por la EN50174-1:2009-09.

El artículo y números de serie impresos, que pueden ser específicos de cada cliente, identifican de modo unívoco el latiguillo en sus dos extremos. El código de barras 2D también contiene gran cantidad de información sobre la calidad, categoría, longitud y color.

Para simplificar el escaneado, cada marcador, a diferencia de las etiquetas autolaminadas, puede ser cambiado de una posición a otra de más fácil lectura sin "caerse", como suele pasarle a las banderitas.

▲ *Nuevo sistema de identificación mediante código de barras de Dätwyler*

En el segundo trimestre de este año, Dätwyler estuvo actualizando sus softwares de gestión "Panorama" y "Panorama Cabling View", éste último diseñado específicamente para la planificación y documentación de infraestructuras de cableado mediante códigos de barras para todos los latiguillos y componentes.

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Premiado proyecto con cableado modular

Modular Wiring Systems, subsidiaria del fabricante de cables eléctricos Tratos Ltd., ha diseñado, fabricado y suministrado sistemas de distribución eléctrica y de alumbrado modulares para el desarrollo del proyecto premiado del edificio Ropemaker Place de Londres.

El Ropemaker Place, construido por la promotora British Land, es un bloque de oficinas de 20 plantas de 603.000 pies cuadrados de superficie diseñado principalmente para profesionales y operadores financieros.

El proyecto ha sido ganador de numerosos premios, incluido un prestigioso premio British Construction Industry en la categoría Major Project por su diseño de alta calidad, innovación constructiva e impresionantes credenciales en cuanto a sostenibilidad.

Modular Wiring Systems ha trabajado con una serie de contratistas en la construcción del Ropemaker Place, ayudando en el diseño de las instalaciones de suministro eléctrico y de alumbrado, así como en la fabricación y suministro de estos sistemas prefabricados planta por planta.

Las últimas plantas del edificio se encuentran ahora en la fase final de equipamiento. El uso de sistemas de cableado modulares sigue el compromiso de calidad, innovación y sostenibilidad del Ropemaker Place.

Un sistema de cableado modular es un sistema de distribución modular, prefabricado fuera de la obra y de instalación fácil y rápida. El sistema está constituido básicamente por las líneas de los circuitos siguiendo un esquema tradicional.

▲ *El prestigioso proyecto del Ropemaker Place en Londres*

Los sistemas de cableado modulares se instalan con rapidez, requieren poca mano de obra y se distinguen por su alta fiabilidad y rentabilidad. Además de la innovación que aporta un sistema de cableado modular, la calidad también es un factor clave, ya que todo el sistema es fabricado fuera de la obra, en un ambiente de fábrica controlado, con lo que se eliminan los riesgos potenciales presentes in situ.

Por último, los sistemas de cableado modulares también mejoran la sostenibilidad. Al fabricarse el sistema en otro lugar, no es necesario cortar ni fabricar directamente en la obra, algo beneficioso para el medioambiente, para la salud y la seguridad laboral, para la gestión de desechos e incluso mejor para la rentabilidad.

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La experiencia beneficia a la ciudad

Draka Communications se ha adjudicado un contrato de consultoría, licencia y capacitación de e.wa riss Netze, joint venture de servicios de fibra formada entre la empresa de suministro eléctrico de la ciudad de Biberach y EnBW, sociedad de suministro energético del suroeste de Alemania.

e.wa riss Netze (networks) dispondrá así de la experiencia de Draka en el campo FTTH y de la aplicación del paquete de programas DrakaXSNet para la evolución de su actual red de fibra de alta velocidad al servicio de los ciudadanos de Biberach.

e.wa riss Netze, junto con la empresa de planificación de redes E9, empezó a construir en Biberach la infraestructura de fibra óptica necesaria para sus servicios de fibra de la marca ewacom.

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Reacción al fuego de los cables

Por Terence Journeaux de Prysmian Cables & Systems Limited, Reino Unido

Resumen

Este artículo trata sobre la decisión tomada por la Comisión Europea en octubre de 2006 para la aplicación de la Directiva 89/106/CEE del Consejo en lo que respecta a la clasificación de las propiedades de reacción al fuego de los productos de construcción y los pasos a seguir para dicha aplicación.

Revisa la evolución de varias normas necesarias para los métodos de ensayo, clasificación, productos y reglas para un campo de aplicación extendido (reglas EXAP), analiza los primeros resultados del proyecto CEMAC II financiado por Europacable para ofrecer la formación técnica y experiencia requeridas para la implementación y examina los desafíos de desarrollo de productos.

Introducción

El objeto de este artículo es ofrecer una panorámica del estado actual y posible dirección futura a tomar por los organismos reguladores, especificadores y fabricantes de cables para afrontar el tema de las propiedades de reacción al fuego de los cables cuando se queman.

El artículo trata la situación específica de la Unión Europea. No quiere dar una descripción detallada de los métodos de ensayo usados ni poner en cuestión su validez.

La industria del cable tiene una larga historia a sus espaldas en el desarrollo de métodos de ensayo y productos diseñados para reducir los peligros derivados de la combustión de cables, retrocediendo a los años '60.

La industria era una de las primeras del sector eléctrico en desarrollar ensayos para la evaluación de las propiedades de reacción al fuego de sus productos y ha seguido afinando y mejorando estos métodos a lo largo de los años.

Hoy en día se aplican las normas sobre propagación de la llama, desprendimiento de calor, opacidad, corrosividad y toxicidad de los efluentes del fuego, y la industria sigue patrocinando la investigación para mejorar las prestaciones frente al fuego de sus productos y determinar los métodos de ensayo idóneos.

En el sector del fuego se ha venido cumpliendo desde hace tiempo un compromiso con las normas internacionales a través de la IEC (*International Electrotechnical Commission*) y numerosas normas nacionales y regionales; por ejemplo, las normas EN (*European Standard*) se basan en las publicaciones de la IEC. En este marco internacional se observan, evidentemente, diferencias de zona a zona y de país a país en la manera en que se analizan los peligros de la combustión de cables y los métodos de ensayo a los que se hace referencia para las distintas aplicaciones.

Por tanto, la industria del cable ofrece productos con una amplia variedad de propiedades de reacción al fuego para responder a los variados requisitos de los usuarios finales.

Desarrollo histórico

Gran parte de los primeros estudios para mejorar las prestaciones de los cables eléctricos frente al fuego fue realizado en los años '70 y '80[1,2,3]. En aquella época se aplicaba un método de cuatro fases:

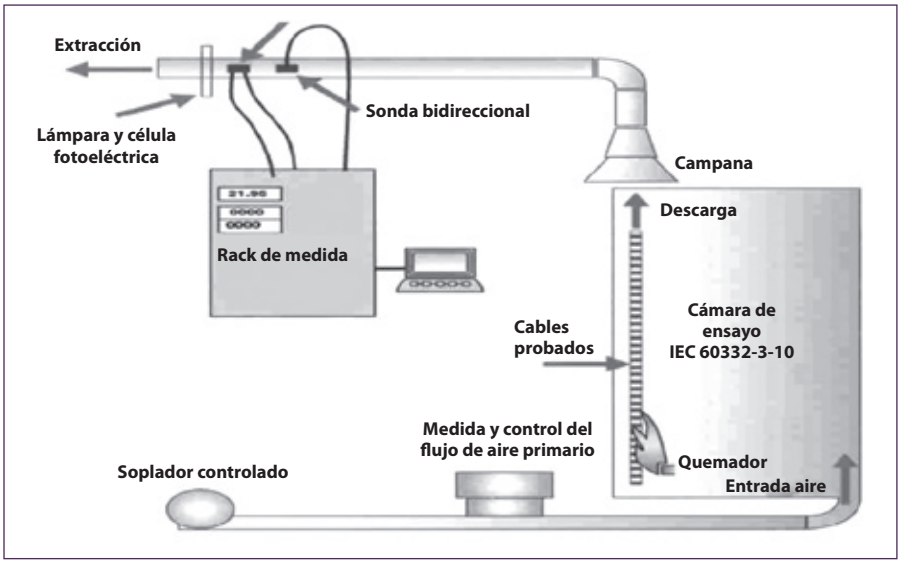
- minimizar el peligro reduciendo la cantidad de material quemado y la propagación del fuego a lo largo de los cables;
- minimizar la emisión de humo que impide la visibilidad de las salidas y obstaculiza la fuga;
- minimizar la emisión de gas ácido que causa la corrosión de los equipos;
- minimizar la emisión de humo peligroso que imposibilita o causa irritación a las personas, obstaculizándoles la fuga.

Se comprobó que estos factores asumían distintos niveles de importancia según el sector de mercado específico y las condiciones de instalación típicas consideradas[4]. La industria del cable era consciente también de que tenía que desarrollar sus propios métodos de ensayo para verificar adecuadamente las prestaciones de sus productos.

Aunque este primer desarrollo haya llevado a una serie de ensayos que parecen necesitar mayor integración, el método general se ajusta bien a la manera de pensar actual.

Otra importante consideración era que se debían desarrollar métodos de ensayo a gran escala donde fuera necesario para

▼ **Figura 1**: *Esquema del aparato de ensayo prEN50399*



verificar las propiedades del producto en su conjunto en condiciones similares a las del sistema de cable instalado.

El trabajo internacional se centró en el desarrollo de métodos de ensayo que se pudieran utilizar como métodos "complementarios" a las normas de los productos, para alcanzar los niveles de prestaciones frente al fuego más elevados posibles a través de toda la tipología de productos.

Situación corriente

En los últimos años, las normas de ensayo IEC no han sufrido importantes modificaciones, pero han sido perfeccionadas continuamente[5,6,7,8]. Por ejemplo, la norma IEC 332-3 ha sido elaborada en varias partes, cada una referente a distintas condiciones de instalación o a distintos tiempo de exposición a la fuente de combustión.

Los principios establecidos en las primeras versiones de estas normas siguen siendo útiles para los productores y usuarios, y las normas IEC son adoptadas en muchos países.

Según el uso de estos ensayos, se pueden encontrar en el mercado varios tipos de cables.

Cables de propagación reducida de la llama (RP) que cuando se instalan en haces verticales según los procedimientos recomendados, no propagan la llama a más de una distancia limitada de la fuente.

Estos cables se han consolidado bien en el mercado desde los años '70 instalándose en zonas de alto riesgo de propagación de fuego debido a las condiciones de instalación, por ejemplo cables en haces montados verticalmente.

La prueba de estos cables se hace según lo establecido en las distintas partes de la norma IEC60332-3.

Cables de baja emisión de humo, caracterizados por una limitada producción del humo cuando se prueban en una cámara de humo de 3m al cubo con límites de prestaciones seleccionados para ofrecer visibilidad a 10m de distancia.

Fueron introducidos en el mercado porque se había notado que los cables que contenían materiales de revestimiento de PVC producían grandes cantidades de humo denso al contacto con el fuego.

Estos cables se fabrican desde los años '70, pero sólo con los adelantos tecnológicos en el campo de los materiales para la fabricación de cables de los años '80 ha sido posible obtener diseños rentables de estos cables para la producción a gran escala. La prueba de estos cables se hace según lo establecido en la norma IEC61034-2.

Generalmente, este tipo de cables combinan propiedades de baja emisión de gases corrosivos y se fabrican usando materiales "sin halógenos".

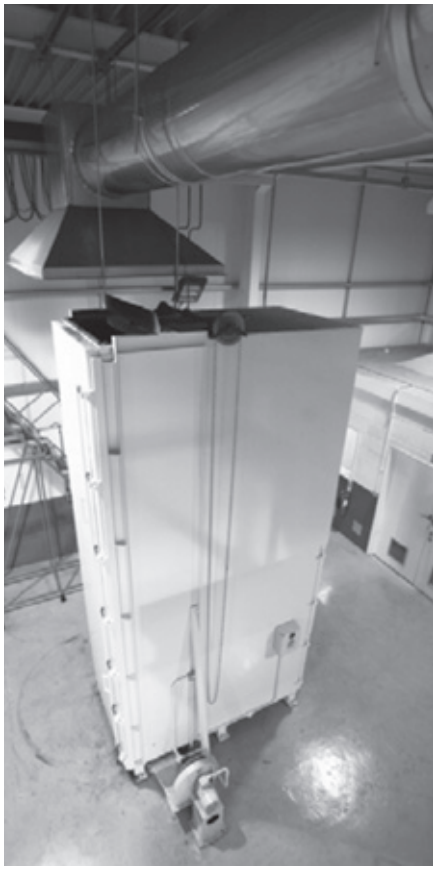
Cables con baja emisión de gases corrosivos, caracterizados por una limitada emisión de gases ácidos y corrosivos durante los ensayos efectuados quemando muestras de materiales en un horno de tubo de banco.

Fueron lanzados por primera vez cuando se iniciaron a tener problemas debidos a las elevadas emisiones de gas ácido que se producían quemando cables de PVC de propagación reducida.

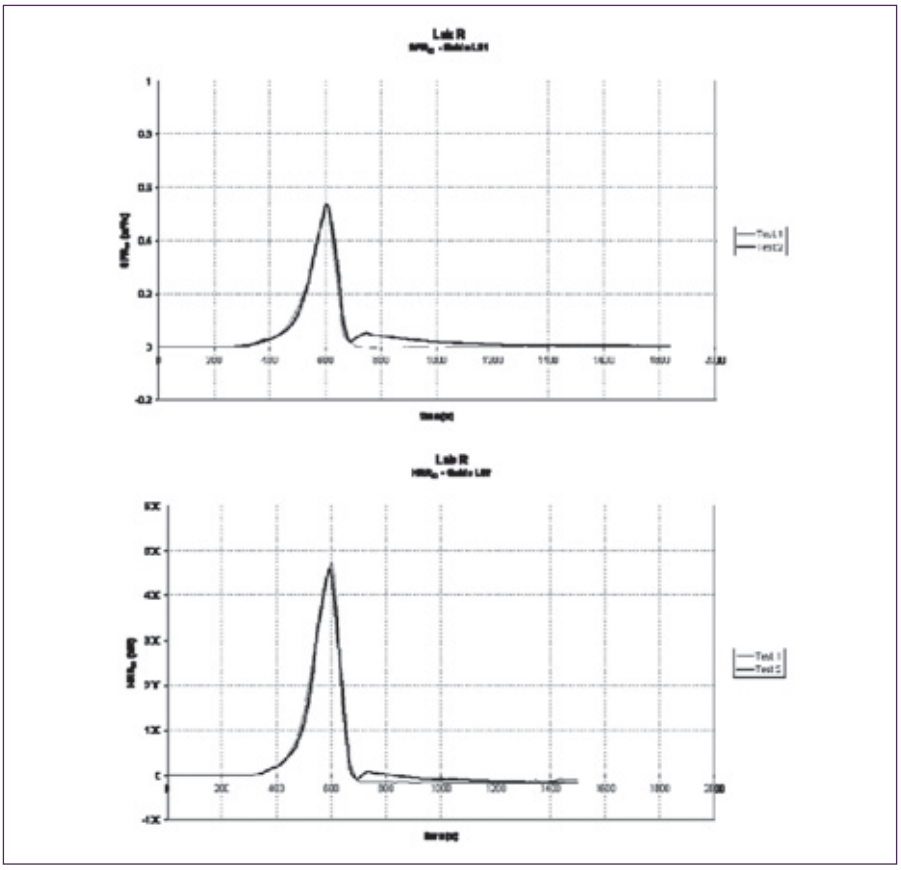
Se ha comprobado que este gas corrosivo e irritante tiene efectos terribles en los paneles eléctricos e instrumentos expuestos a los efluentes del fuego del cable. Se puede usar el ensayo de emisión de gases ácidos de la norma IEC60754-1 o el ensayo de corrosión indirecta de la norma IEC60754-2.

Los productos que cumplen el requisito de emisiones de gas inferiores a 0,5% durante el ensayo según la norma IEC60754-1

▼ **Figura 2**: *Aparato prEN50399*



▼ **Figura 3**: *Curvas SPR y HRR típicas*



suelen ser llamados "sin halógenos". En algunas normas de productos se requiere un ensayo suplementario del contenido de flúor (IEC60684-2).

Cables con baja emisión de gases tóxicos, caracterizados generalmente por un uso limitado a aplicaciones específicas donde se requiere este tipo de propiedad.

En particular, estos cables son utilizados en el sector del ferrocarril. Los usuarios tienen sus propias normas de "emisión tóxica", que van de una simple limitación de ciertos grupos elementales a índices derivados de análisis de gases, desarrollados y ponderados según los factores conocidos de toxicidad para mamíferos de los gases contenidos.

La falta de ensayos de toxicidad de uso general para cables puede ser explicada por un trabajo anterior realizado en el Reino Unido que concluía que "De este breve análisis de los efectos, resulta que las concentraciones de gas ácido que pueden causar daños a personas y plantas son similares[11, 12].

El trabajo que se está realizando actualmente[13] también demuestra el considerable aporte del HCl al peligro de incendio. Algunos trabajos nuevos e interesantes que estudian el efecto de importantes gases irritantes en los pulmones de los animales[14] han demostrado que la inhalación de humo de PVC tiene graves efectos que producen un rápido decaimiento de los parámetros fisiológicos de los pulmones.

Este trabajo parece respaldar una posición de la industria del cable que, para aplicaciones especiales, ofrece productos que no desprenden gases irritantes importantes (ej. HCl de compuestos de PVC) que pueden limitar la visibilidad de las vías de fuga y dañar los pulmones y, al mismo tiempo, refuerza la posición que considera la "acidez" un "indicador" de graves efectos tóxicos irritantes.

La indicación general "bajo riesgo de incendio" (*Low Fire Hazard*) ha sido adoptada recientemente por los fabricantes de cables europeos para describir los cables que presentan características de propagación reducida de la llama y baja emisión de humo y gases dañinos.

Aunque el conjunto de normas IEC TC20 existente ofrezca un enfoque general de base a la seguridad frente al fuego, cuando se combinan los distintos elementos (es normal para normas de productos hacer referencia a las normas IEC60332-3, IEC61034, IEC60754-1 y/o IEC60754-2), los avances recientes se orientan hacia un método más integrado que permita medir la propagación de la llama, el desprendimiento de calor, el oscurecimiento causado por el humo y la emisión de gases de combustión.

Clase	Método(s) de ensayo	Criterios de clasificación	Clasificación adicional
A_{ca}	EN ISO 1716	PCS ≤ 2,0 MJ/kg (1)	
$B1_{ca}$	$FIPEC_{20}$ Escen 2 (5) *y*	FS ≤ 1,75 m *y* THR_{1200s} ≤ 10 MJ; *y* Pico HRR ≤ 20 kW; *y* FIGRA ≤ 120 W^{s-1}	Producción de humo (2, 6) y Caída de partículas/gotas inflamadas (3) y Acidez (4, 8)
	EN 60332-1-2	H ≤ 425mm	
$B2_{ca}$	$FIPEC_{20}$ Escen 2 (5) *y*	FS ≤ 1,5m; *y* THR_{1200s} ≤ 15MJ; *y* Pico HRR ≤ 30 kW; *y* FIGRA ≤ 150 Ws^{-1}	Producción de humo (2, 7) y Caída de partículas/gotas inflamadas (3) y Acidez (4, 8)
	EN 60332-1-2	H ≤ 425mm	
C_{ca}	$FIPEC_{20}$ Escen 1 (5) *y*	FS ≤ 2,0 m; *y* THR_{1200s} ≤ 30 MJ; *y* Pico HRR ≤ 60 kW; *y* FIGRA ≤ 300 Ws^{-1}	Producción de humo (2, 7) y Caída de partículas/gotas inflamadas (3) y Acidez (4, 8)
	EN 60332-1-2	H ≤ 425mm	
D_{ca}	$FIPEC_{20}$ Escen 1 (5) *y*	THR_{1200s} ≤ 70 MJ; *y* Pico HRR ≤ 400 kW; *y* FIGRA ≤ 1300 Ws^{-1}	Producción de humo (2, 7) y Caída de partículas/gotas inflamadas (3) y Acidez (4, 8)
	EN 60332- 1-2	H ≤ 425mm	
E_{ca}	EN 60332-1-2	H ≤ 425mm	
F_{ca}	Resistencia no determinada		

((1) Para el producto en su conjunto, excepto los materiales metálicos, y para cualquier componente externo (cubierta) del producto.
(2) s1 = TSP_{1200} = 50 m^2 y SPR máx = 0,25 m^2/s
s1a = s1 y transmitancia según EN 61034-2 = 80%
s1b = s1 y transmitancia según EN 61034-2 = 60% < 80%
s2 = TSP_{1200} = 400 m^2 y SPR máx = 1,5 m^2/s
s3 = ni s1 ni s2
(3) Para Escenarios 1 y 2 $FIPEC_{20}$: d0 = Sin caída de gotas/partículas inflamadas durante 1200s; d1 = Sin caída de gotas/partículas inflamadas que persistan más de 10s durante 1200s; d2 = ni d0 ni d1.
(4) EN 50267-2-3: a1 = conductividad < 2,5 µS/mm y pH > 4,3; a2 = conductividad < 10 µS/mm y pH>4,3; a3 = ni a1 ni a2. Ninguna declaración = Sin determinación de propiedades.
(5) El flujo de entrada de aire en la cámara deberá fijarse en 8000 ± 800 l/min.
Escenario 1 $FIPEC_{20}$ = prEN 50399-2-1 con montaje y fijación según se indica más abajo
Escenario 2 $FIPEC_{20}$ = prEN 50399-2-2 con montaje y fijación según se indica más abajo
(6) La clase de humo declarada para los cables de la clase $B1_{ca}$ debe derivar del ensayo del escenario 2 $FIPEC_{20}$.
(7) La clase de humo declarada para los cables de las clases $B2_{ca}$, C_{ca}, D_{ca} debe derivar del ensayo del escenario 1 $FIPEC_{20}$.
(8) Medición de las propiedades peligrosas de los gases que se forman en caso de incendio que merman la capacidad de quienes están expuestos a ellos para actuar con eficacia y lograr escapar, y no descripción de su toxicidad.

▲ **Figura 4**: *Clases de reacción al fuego de los cables eléctricos*

Clasificación europea de reacción al fuego de cables según la directiva de productos de construcción CPD

De importancia particular para el mercado europeo es el desarrollo de la norma prEN50399[15,16], una norma para ensayos que se basa en el aparato de la norma IEC60332-3-10 al cual se ha añadido un tubo de escape equipado para medir la velocidad de desprendimiento de calor y de producción de humo.

La prEN50399 ha sido desarrollada como respaldo a la clasificación "Clases de reacción al fuego de los cables eléctricos" prevista en la Decisión de la Comisión del 27 de octubre de 2006 que modifica la Decisión 2000/147/CE, para la aplicación de la Directiva 89/106/CEE del Consejo en lo que respecta a la clasificación de las propiedades de reacción al fuego de los productos de construcción.

Determina los métodos de ensayo "Escenario 2 $FIPEC_{20}$" y "Escenario 1 $FIPEC_{20}$"

indicados en la Decisión de la Comisión. En la tabla siguiente se indican los requisitos esenciales de la Decisión de la Comisión.

Aunque los equipos del ensayo de la norma prEN50399 se basen en la serie IEC60332-3 anterior, los resultados de los dos procedimientos no pueden ser comparados porque el procedimiento prEN50399 se basa en el montaje de cable clasificado como "caso peor", como establece la Decisión, mientras que el procedimiento IEC se basa en un montaje de cable de tipo "como instalado".

La producción de humo se mide con el ensayo dinámico prEN50399, pero el nivel de resolución no permite medir niveles de humo bajos asociados a cables de baja emisión de humo para aplicaciones metro y similares.

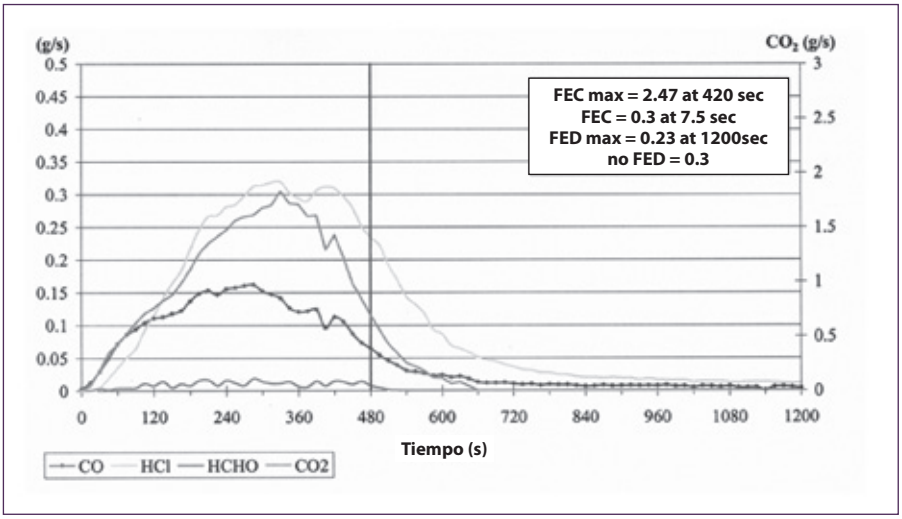
Por lo tanto, se incluye el método IEC(EN)61034-2 para evaluar la clase más alta. La acidez se evalúa usando el método EN50267-2-3 existente, que técnicamente es equivalente al método IEC60754-2.

Con la publicación de la Decisión de la Comisión, la cuestión de la disponibilidad de cables clasificados adquiere importancia.

Aunque todos los métodos de ensayo requeridos estén disponibles, por lo menos en versión preliminar, no es posible tener en el mercado cables marcados CE según la directiva europea de productos de construcción CPD (*Construction Product Directive*) sobre propiedades de reacción al fuego hasta que no están disponibles todas las normas requeridas para soportar dicha marca.

Para que los organismos notificados puedan emitir certificación de conformidad de productos, es necesario preparar normas armonizadas de productos europeas (ENs) y otras normas de soporte bajo el mandato de la Comisión Europea. El CENELEC debe desarrollar y publicar estas normas, y hasta el momento de publicación de estas normas de mandato no es posible emitir oficialmente ninguna certificación para la marca CE según la directiva CPD sobre las propiedades de reacción al fuego de los cables.

El mandato (M/443)[17] para cables, pertinente al trabajo de normalización para la elaboración de normas armonizadas fue asignado al CEN/CENELEC en junio de 2009, con un campo de acción que comprendía cables de suministro, control y comunicación, y fibra óptica para uso en edificios y otras obras de ingeniería civil sujetas a reglamentación (para cualquier nivel de tensión).



▲ **Figura 5**: *Curva típica de salida de la producción de gas tóxico en un ensayo EN50399*

Por lo que se refiere a las prestaciones, el campo de acción cubría la reacción al fuego, la resistencia al fuego y a las sustancias peligrosas.

En principio, el CENELEC aceptó el mandato y debía presentar una respuesta detallada junto con un programa de trabajo antes de finales de 2009.

La primera fase del trabajo se debía centrar en los documentos necesarios para soportar la marca CE para la reacción al fuego, pero es improbable que pueda ser completado antes de finales de 2011.

La norma armonizada de productos es la clave de la marca CE según la directiva CPD, pero el desarrollo de esta norma presenta algunas dificultades porque hay muchos tipos de cables distintos y la directiva CPD se aplica solamente a la reacción al fuego, resistencia al fuego y a sustancias peligrosas, mientras que los otros parámetros de seguridad están contemplados en la directiva de baja tensión LVD (*Low Voltage Directive*).

Se está estudiando una solución para definir una norma basada en las prestaciones, que pueda ser aplicada a cualquier tipo de cable y comprenda aspectos específicos de acuerdo con la directiva CPD.

La norma de clasificación es un documento administrativo importante que asocia los resultados de los ensayos con la clasificación e incluye la información sobre los ensayos a realizar, el número de ensayos para la clasificación, la evaluación de los resultados y los criterios de clasificación.

En principio, los organismos de normalización CEN y CENELEC han convenido que los cables serán incluidos como modificación en la norma EN 13501-1 existente, de manera que todos los productos conformes con la directiva CPD queden reunidos en un solo documento.

La norma del método de ensayo (EN 50399) debe asegurar la posibilidad de obtener los datos necesarios para la clasificación. El borrador final de la norma está listo para su votación oficial en el CENELEC.

Para el desarrollo del método de ensayo, más de 20 laboratorios participaron en un ensayo entre laboratorios que demostró que la repetibilidad y reproducibilidad eran comparables a las de otros ensayos a gran escala como el ensayo SBI (*Single Burning Item*).

Se obtuvo también una considerable experiencia (más de 200 ensayos de cables que representaban estructuras genéricas muy usadas en Europa) con el método de ensayo durante el proyecto CEMAC II, que ha reunido fabricantes de cables, laboratorios de búsqueda y ensayo, y centros de investigación en el proceso de implementación para crear competencias técnicas de base.

Un objetivo específico del proyecto CEMAC II era desarrollar reglas y procedimientos para el campo de aplicación extendido de resultados de ensayos (EXAP) que determinen qué estructuras deben ser probadas para obtener la clasificación para una determinada familia de estructuras de cables. La entrega del informe final estaba prevista para finales de 2009.

Es necesario disponer de reglas documentadas definitivas para el campo de aplicación extendido (EXAP) para no tener que aprobar cada diseño de cable para su clasificación. Es necesario establecer qué cables necesitan ser

probados para obtener la aprobación de una gama de productos mediante la aplicación de reglas que permitan extrapolar los ensayos de determinados productos dentro de una familia para aplicarlos a otras estructuras similares de la misma familia.

Las reglas EXAP han sido desarrolladas a través del proyecto de investigación CEMAC II y serán publicadas por CENELEC.

Posibles desarrollos futuros

Está claro que la industria del cable europea estará involucrada fuertemente en el nuevo método de ensayo de reacción al fuego integrado de la norma EN50399, y esto, junto con los otros requisitos de ensayo de la clasificación europea, requerirá un esfuerzo considerable en el desarrollo de productos que cumplan las distintas Euroclases.

Es probable que la norma EN50399 sea tenida en cuenta por IEC en la próxima e importante revisión de los métodos de ensayo de propagación de la llama prevista entre 2012 y 2015.

Aunque actualmente no tenemos ninguna reglamentación para las iniciativas de los usuarios, la industria está empezando a considerar ensayos de productos válidos para medir los efluentes y proveer datos que podrían ser usados en estudios de ingeniería para la prevención de incendios como los modelos de simulación de vías de escape.

El ensayo EN50399 integrado puede suponer una buena base si es dotado de equipos adicionales para medir la cantidad y la calidad de los efluentes.

El desarrollo de técnicas FT-IR en tiempo real para medir los efluentes ha llevado a algunos trabajos preliminares realizados para determinar si es posible medir la calidad de los efluentes durante el ensayo EN50399. Los artículos presentados en el Seminario Europacable "Seguridad durante los incendios" en mayo de 2009[18,19,20]) indicaban que es factible medir los efluentes del ensayo EN50399 usando técnicas FT-IR, que se pueden usar estas técnicas para estudiar los efluentes generados por el humo, y que se pueden usar los datos en una simulación de las condiciones de evacuación críticas para comparar el uso de tipos de cables diferentes.

La determinación de un índice FED y FEC según la norma ISO TS13571 durante el ensayo puede dar una medida útil.

Usando estas técnicas, los resultados del estudio de simulación han demostrado que en un escenario de incendio de diseño en algunas viviendas las condiciones se volvían críticas usando cables estándares (revestidos con PVC) debido a la producción de gases irritantes (HCl, creolina, formaldehídos) y humo (reducción de la visibilidad debajo de 10m), mientras que con cables de tipo "bajo riesgo de incendio" ninguna vivienda llegaba a condiciones críticas.

Conclusiones

Como respuesta a las exigencias de sus clientes en cuanto a propiedades de reacción al fuego, la industria del cable continúa ofreciendo una gama de productos con distintos niveles de prestaciones de acuerdo con las necesidades de los usuarios, para condiciones de aplicación e instalación especiales.

Los principios establecidos hace más de 20 años sobre el control de incendios, el control de la emisión de humo y el control de la emisión de los gases corrosivos e irritantes más importantes siguen siendo válidos hoy en día, aunque en los últimos años se hayan perfeccionado y mejorado los métodos.

La introducción de nuevos requisitos basados en ensayos integrados que incorporan el desprendimiento de calor representa y siguen representando el mayor desafío, especialmente en Europa.

El nuevo marco reglamentario europeo para la clasificación de las propiedades de reacción al fuego de los cables supondrá un cambio importante respecto a las posiciones individuales corrientes.

Es difícil prever cómo se verá afectado el mercado del cable por la nueva clasificación europea y la marca CE de las prestaciones frente al fuego según la directiva CPD.

La aplicación es una cuestión estrictamente nacional. Se sabe ya que algunos países que actualmente no regulan las propiedades de reacción al fuego de los cables, no tienen ninguna intención de regularlas más adelante.

No obstante, otros países han manifestado su intención de usar la clasificación para la regulación. Sin embargo, la Euroclase a aplicar a cada caso en particular es de nuevo una cuestión nacional.

A nivel europeo, es probable que el sector del cable siga recibiendo demanda de numerosos y distintos niveles de prestaciones, aunque se espera que en el futuro los usuarios se muevan hacia clases más altas cuando se disponga de diseños de cables rentables.

La comparación entre los ensayos prEN50399 y los resultados de los ensayos IEC existentes es difícil debido a las diferentes condiciones seleccionadas para los ensayos y el método de clasificación basado en varios criterios.

En general, la experiencia adquirida con el proyecto CEMAC II ha mostrado que los resultados del ensayo prEN50399 dependen mucho de las dimensiones del cable (cuanto más pequeño es el cable, más caro resulta el ensayo).

Generalmente, es posible prever los resultados de los cables de suministro de sección mayor (conductor de más de 35mm^2) a partir de los resultados del ensayo de la norma IEC60332-3-24 (Categoría C) dado que el montaje de cada ensayo es similar, pero esta relación no es válida para cables más pequeños, debido principalmente al montaje totalmente diferente de cada ensayo.

Trabajos recientes han demostrado que la medición en tiempo real de los efluentes en un ensayo del incendio a gran escala (como el prEN50399) es posible y que dichos resultados pueden ser usados como base para estudios de modelado.

Sin embargo, está claro que sería necesario llevar a cabos otros estudios antes de establecer cualquier normalización.

Gracias a la continua inversión realizada en el campo de la investigación, la industria del cable podrá afrontar los desafíos impuestos por cualquier organismo regulador o responder a las demandas de los usuarios finales en cuanto a prestaciones frente al fuego de sus productos. ■

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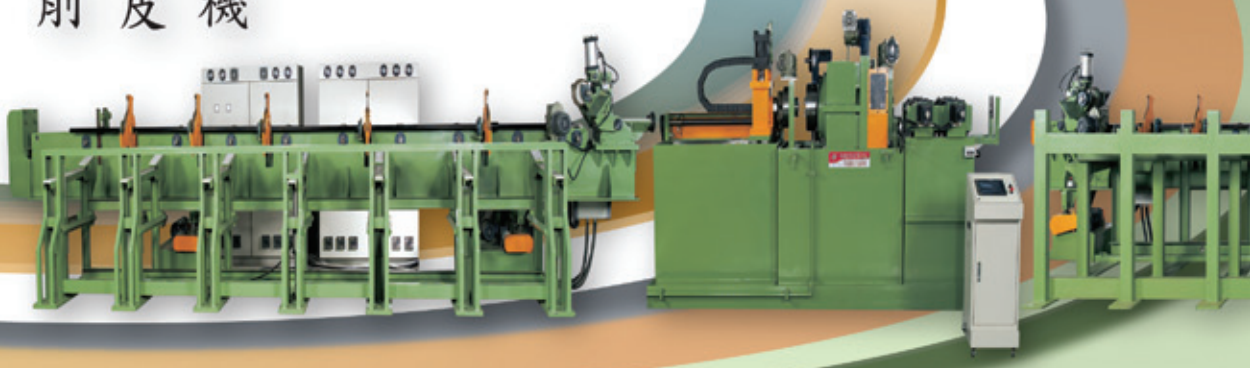

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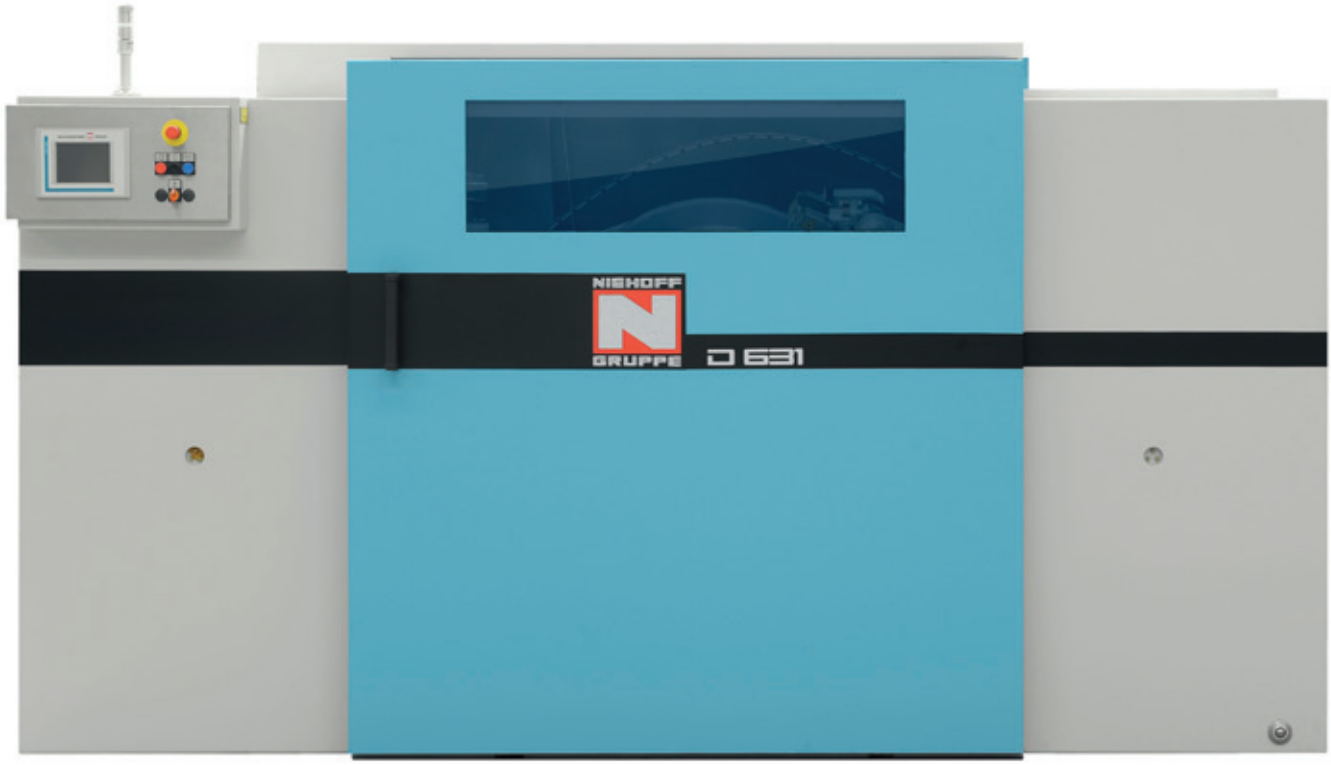

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