CyStir

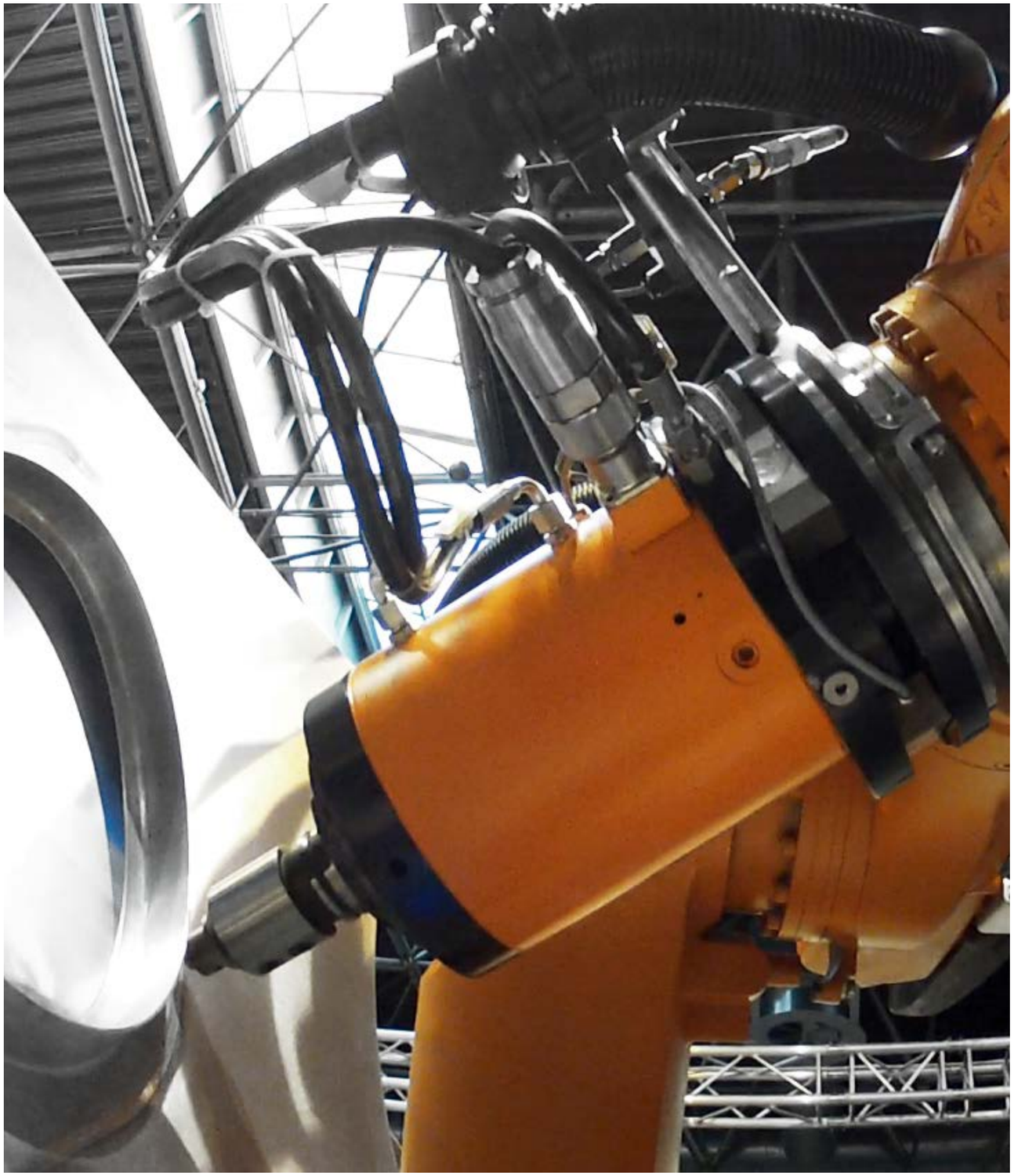
FRICTION STIR WELDING
COMPONENTS

CYTEC SYSTEMS

COMPONENTS EXCELLENCE

CYTEC SYSTEMS
TECHNOLOGY INSIDE
COMPONENTS EXCELLENCE

MADE IN GERMANY



Cytec technology inside for excellent friction stir welding

The Cystir motor spindle and the 2-axis welding head are specifically designed for friction stir welding to create a perfectly fused conjunction between similar and non-similar metals. As a result, the Cytec friction stir welding technology achieves a perfect state of plasticity and a strong conjunction between different materials.

Automation
As standard the friction stir welding spindles and heads are equipped with an automatic hydromechanical tool clamping system and Shear force transducer for force regulation during the welding process.

FLEXTOOL and CyStir motor spindle offers further automation and technology to close the seam when extending.

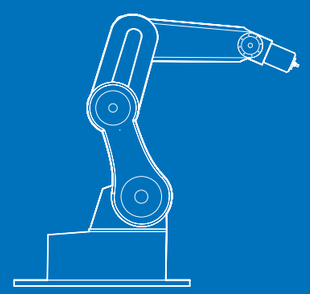
CyFrisCo Tools

Tool Pin retreat
Pin and shoulder rotating
Pin retreat

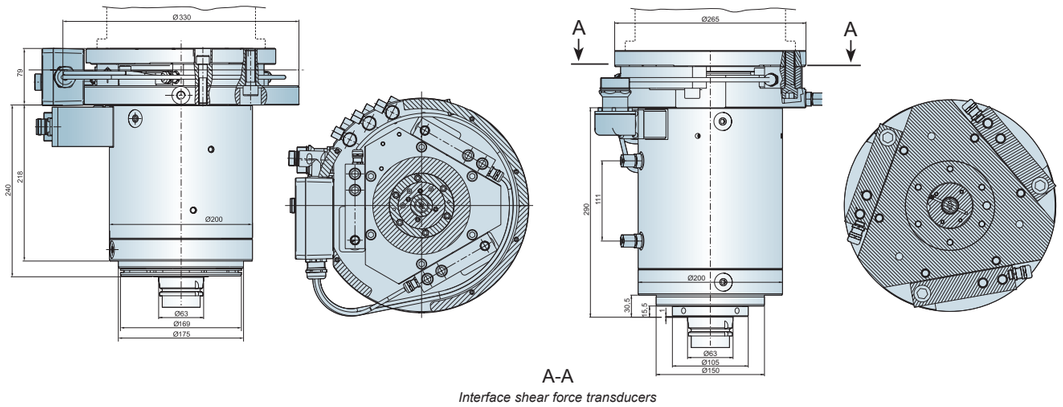
Moving shoulder tool
Pin and shoulder rotating
Pushing shoulder

Cytec technology inside

CYTEC SPINDLE COMPONENTS
High torque Direct Drive motor
Clamping technology with high precision
Sensoring for forced controlled production
Cooling system for long life production
Control System ready for any Robot and Machine

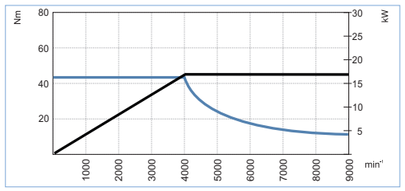


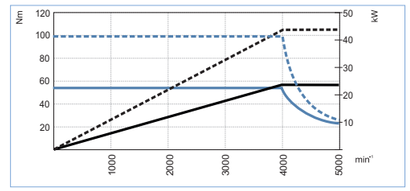
CyStir has developed the CySpeed motor spindle designed specifically for friction stir welding.



Interface shear force transducers

	CyStir 17 kW	CyStir 24 kW
Power:	17 kW (S1)	24 kW (S1)
Nom. speed:	4.000 r.p.m.	5.000 r.p.m.
Max. torque:	43 Nm (S1)	55 Nm (S1)
Max. speed:	9.000 r.p.m.	5.000 r.p.m.
Tool system:	HSK-E63	
Clamping system:	hydr. operated	
Clamping force:	12 kN/50 bar	
Clamping monitoring:	CyCon K 11	
Max. pressure:	120 bar	
Max. axial load:	15 kN	
Max. radial load:	5 kN	
Motor cooling:	Liquid coolant (Antifrogen N/Tyfocor)	





The 2 axis fork head incorporates the finest technology produced

Besides the powerful 42kW motor spindle with an HSK-A 100 tool-interface, the is equipped with 6 spherical arranged shear force transducers.
These sensors are used to detect the radial and axial forces during the welding process.

The well-engineered CyTec FSW fork-head. Specially designed for gantry systems.

Allows to add optional devices within the control panel to monitor the welding process.

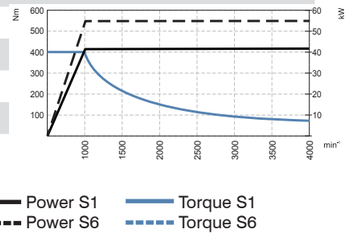
These devices can be for example:

- Cameras
- Lasers
- Mechanical auxiliaries

Head	C-Axis	A-Axis Fork
Max. swivel torque:	5.100 Nm	8.100 Nm
Clamping torque:	14.000 Nm (50 - 70 bar)	12.000 Nm (50 - 70 bar)
Swivel angle:	+/-360° (option continuously)	+/-90°
Power dissipation:	5 kW (10 l/min)	
Positioning accuracy:	± 2“	± 2,5“

Drive

Power:	42 kW (S1)	53 kW (S6)
Nom. speed:	1000 r.p.m	
Max. torque:	400 (S1) Nm	510 (S6) Nm
Max. speed:	4000 r.p.m	
Tool system:	HSK A100	
Clamping system:	hydr. operated	
Clamping force:	40 kN /75 bar	
Clamping monitoring:	CyCon K11	
Max. pressure:	120 bar	
Max. axial load:	40 kN	
Max. radial load:	20 kN	



Characteristic spindle components

HSK-tool interface with positive locking hydromechanical tool clamping system

Spindle-torque motor, can be combined with all common control systems

pre-loaded hybrid bearings

Shear force transducer for force regulation during welding process

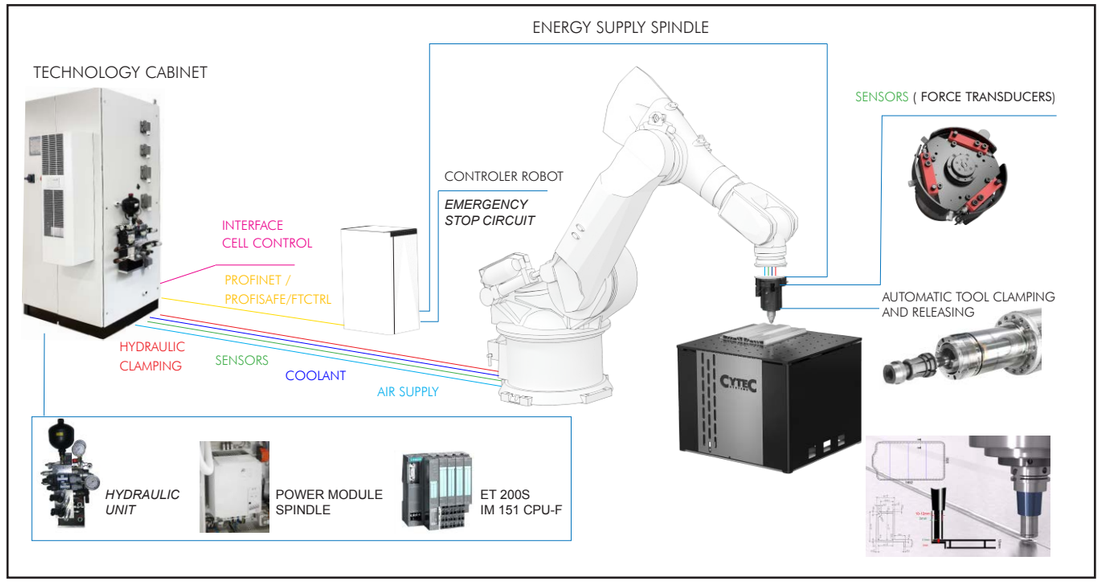
Rotary union for transmission of clamp- and release-hydraulic

Clamping system & Control signal processing

Automatic Tool Clamping system
Cytec Friction stir welding spindles and heads are equipped with an automatic hydromechanical tool clamping system and shear force transducer for an optimal force regulation during the welding process. The Flextool and CyStir motor spindle offers further automation solutions to seal the weld seam.

The tools are inserted either manually or by a pickup station into the tool interface.

The PLC triggers the hydraulic operation to lock the tool high clamping force. The tool clamping is controlled by an analog volume flowmeter combined with an electronic evaluation device integrated in the control cabinet.



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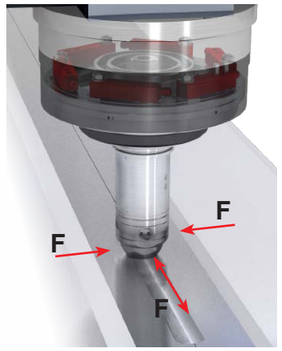
Force regulation with shear force transducers

The force measurement is carried out by three shear force transducers which are arranged in tilt position by 120° each around the longitudinal axis. They detect any axial deflexion during welding over the full range of 360°. As a result in every situation a reliable and safe regulation of the processing force is guaranteed.



Shear force transducers
(4-20mA analog), 6 pcs. and 3 pcs.

Evaluation electronic
(Sum signal) Σ

6 force sensors as standard feature of the 2 axis FSW head
3 force sensors as standard feature of the robot FSW Spindle

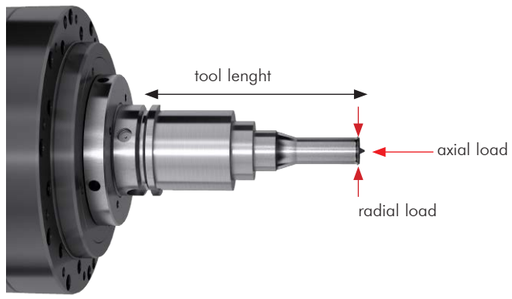
The zero point is adjusted to 12 mA so that a deflexion in both axial directions can be detected. For determination of the force that impacts the FSW-tool, the evaluation electronic reports a summation of all three sensor values.

So radial influences can be filtered out. As a result a purely axial value is available for the regulation of the pressing force.

FSW Tool	
Max. tool length:	250 mm
Axial load:	< 10.000 N
Radial load:	< 5.000 N

Tool length:	100 mm
Max. axial load:	< 40.000 N
Max. radial load:	< 20.000 N

Shear force transducers	
Nom. load:	20 kN
Accuracy:	0,1 % f. s.
Initial signal:	12 +/- 8 mA
Zero point:	12 mA



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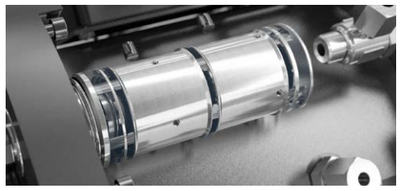
FLEXTOOL

High surface finish, less process force and heat, Highly dynamic welding enabled by non-rotating tool shoulder Separate retraction of the Pin or separate pushing shoulder.

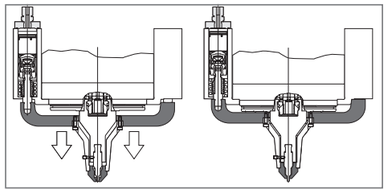
This special join process is more sensitive and a good alternative to great better surface finish. Judi the Friction Pin rotate into the material. The non rotating shoulder give a slight pressure to the welding surface. This process create less force and heat. This type of FSW tool is often used on thin workpieces. With the Flextool an axial shoulder compression at the end of the welding process is able. During the shoulder stay on the surface the Pin return from the material.

Mounting ring with feed and clamping units (3 pcs.)



Tool and pin

Axial moving shoulder



CyStir Robot Welding

FlexTool

FlexTool

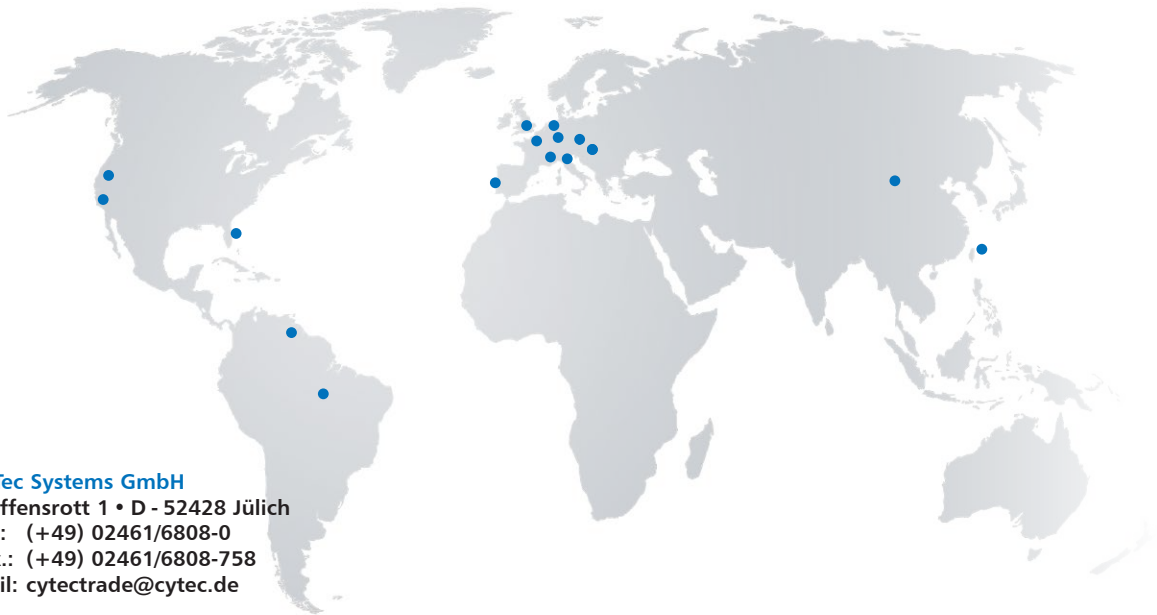
Max. axial load:	15 kN
Max. radial load:	5 kN
Stroke feed:	6 mm
Preloaded spring force feed unit:	430 N
Max. clamping force of the clamping system:	3 x 11 kN
Max. clamping pressure of the clamping system:	70 bar
Weight tool pin:	1,2 kg
Weight moving shoulder:	8,2 kg
Total weight:	28,4 kg

CyFrisCo Tools

Tool Pin retreat
Pin and shoulder rotating
Pin retreat

Moving shoulder tool
Pin and shoulder rotating
Pushing shoulder

CYTEC WORLD WIDE



1 CyTec Systems GmbH
Steffensrott 1 • D - 52428 Jülich
Tel.: (+49) 02461/6808-0
Fax.: (+49) 02461/6808-758
Mail: cytectrade@cytec.de

Sales department
CyTec Systems GmbH South
Carl-Zeiss-Str. 7
D- 72124 Pliezhausen
Tel.: (+49) 7127/811 880
Fax.: (+49) 7127/811 885
Mail: cytectrade@cytec.de

Great Britain
CyTec Systems UK Ltd.
Unit H • 100 Shaw Road
(Off Daltry Str.)
GB- Oldham, OL1 4AB
Tel.: (+44) 0161/678 70 90
Mail: sales@cytec-uk.com
Web: www.cytecsystems-uk.com

France
CyTec Systems SARL
Parc des Erables
66 route de Sartrouville
F- 78230 Le Pecq
Tel.: (+33) 01 30 87 13 50
Fax.: (+33) 01 30 87 13 51
Mail: sales@cytec-fr.com
Web: www.cytec-systems.fr

Portugal
Nelson S. Bernardo Lda
No 3, Loja 17
Rua Fonte Cabeco d'El Rey
2400-719 Leiria
Tel.: (+351) 244 691 446
Fax.: (+351) 244 695 166
Mail: geral@nsb.pt
Web: www.nsb.pt

Italy
Emanuele Mascherpa S.p.A.
Via Natale Battaglia, 39
I- 20127 Milano
Tel.: (+39) 02/280031
Fax.: (+39) 02/2829945
Mail: postmaster@mascherpa.it
Web: www.mascherpa.it

Czech Republic
KJ-tech
S.R.O. Vilová 350460
10 Liberec 10
Tel.: (+420) 486141688
Fax: (+420) 485150130
Web: www.kjtech.cz

Switzerland
Geiger CyTec Systems AG
Steinhausstraße 40
CH-3150 Schwarzenburg
Tel.: (+41) 31 734 24 24
Fax: (+41) 31 734 24 25
Mail: info@geigercytec.com

Hungary
Working KFT
Budai Nagy Antal út 8
HU-2400 Donaújváros
Tel.: (+36) 25 513 300
Mail: workingkft@invitel.hu

USA
CyTec Systems USA
Tel.: (+1) 833-CYTECUS
Mail: info@cytec-systems.com
Web: www.cytec-systems.com

East & Central USA
K&A Engineering, LLC
Port Saint Lucie, FL 34986
Tel.: (+1) 772.485.0822
Mail: sales@kandaengineering.com
Web: www.kandaengineering.com

Western USA
CNC Matters
2871 E via martens
Anaheim, CA 92806
Tel.: (+1) 855.426.2435
Mail: cncmatters@gmail.com
Web: www.cncmatters.com

Central & South America
K&A Ingenieria CA
Ofic 01-04.CC Quisqueya
Calle Las Flores c/Rondon
Cagua, Aragua - Venezuela
Tel.: (+58) 414 395 6238
Mail: ventas@kandaengineering.com
Web: www.kandaengineering.com

Brazil
Schütte Brasil
Máquinas e Equipamentos
Avenida Indianópolis
3220 Indianópolis
04062-003 São Paulo-SP
Tel.: (+55) 11 5071-1808
Mail:
schuette.brasil@schuettebrasil.com

China
CyTec Systems China Ltd.
301-2-10, Yilong International
community 3, Changyuan,
453400 Xinxiang, Henan
Tel.: (+86) 373/8821619
Fax.: (+86) 373/8821619
Web: www.cytec.cn

Taiwan
Easymore Industrial Co., Ltd.
No. 284, Daye Rd., Nantun Dist.
Taichung City 40848, Taiwan
Gyeonggi-do, Korea
Tel.: (+886) 4 2310 0909
Fax.: (+886) 4 2328 7433
Mail: info@easymore.com.tw
Web: www.easymore.com.tw

CyTec Zylindertechnik GmbH
Steffensrott 1 • D-52428 Jülich • Tel.: (+49) 2461 / 6808-0 • Fax: (+49) 2461 / 6808-758
E-mail: info@cytec.de • http:// www.cytec.de • www.cytec.blog