REFERENCE FILE FORM: MAPEI Polska Sp. z o.o. **DATE:** 08-2010
REFERENCE NUMBER:
Checked by (initials and date): Marketing: Technical Ass: The Management:

NAME OF BUILDING INTERVENTION: CRACOW'S HIGH SCHOOL OF BANKING AND MANAGEMENT
YEAR / PERIOD OF CONSTRUCTION: 2009

YEAR / PERIOD OF MAPEI INTERVENTION: SEPTEMBER 2009
INTERVENTION BY MAPEI: STRENGTHENING CONCRETE CEILINGS' STRUCTURE WITH MAPEI FRP SYSTEM
DESIGNER: STANISŁAW KARCZMARCZYK, PHD ENG.
CUSTOMER: ARMA - POLAND
SITE MANAGER: PIOTR WISŁOCKI
MAIN CONTRACTOR: OMEGA LTD. - POLAND
LAYING COMPANY: OMEGA LTD. - POLAND
MAPEI DISTRIBUTOR: ARMA - POLAND
MAPEI COORDINATOR: JERZY SIWEK, KRZYSZTOF POGAN
PHOTOS: YES (N°: 4)
DESCRIPTION: YES

MAPEI PRODUCTS	MATERIAL INSTALLED	SUBSTRATE	QUANTITY OF PRODUCT	SURFACE	INSIDE/ OUTSIDE	NEW / RENOVATION	PRODUCT LINE
	DO NOT COMPLETE FOR BUILDING PRODUCTS						
CARBOPLATE E200/50/1,4			500 m		INSIDE	NEW	BUILDING LINE (FRP)
ADESILEX PG1			166,5 kg		INSIDE	NEW	BUILDING LINE (FRP)
MAPEWRAP C UNI-AX 300/30			500 m		INSIDE	NEW	BUILDING LINE (FRP)
MAPEWRAP PRIMER 1			44 kg		INSIDE	NEW	BUILDING LINE (FRP)
MAPEWRAP 11			120 kg		INSIDE	NEW	BUILDING LINE (FRP)
MAPEWRAP 31			225 kg		INSIDE	NEW	BUILDING LINE (FRP)
PLANITOP 430			1250 kg		INSIDE	NEW	BUILDING LINE

A/ PRIVATE (PRYWATNE)
- [ ] Commercial centre
- [ ] Bank
- [ ] Hotel
- [ ] Restaurant
- [ ] Car show room
- [ ] Other:

B/ PUBLIC (PUBLICZNE)
- [ ] Church
- [ ] Hospital
- [x] School
- [ ] Museum
- [ ] Library
- [ ] Other:

C/ INDUSTRIAL (PRZEMYSŁOWE)
- [ ] Warehous
- [ ] Storage
- [ ] Factory
- [ ] Office
- [ ] Other:

D/ TRANSPORT
- [ ] Airport
- [ ] Railway
- [ ] Metro
- [ ] Road
- [ ] Tunnel
- [ ] Bridge
- [ ] Ship
- [ ] Other:

E/ RESIDENTIAL (REZYDENCJE)
- [ ] Apartment / Flat
- [ ] House
- [ ] Apartment / Bldg
- [ ] Other:

F/ SPORT
- [ ] Pool
- [ ] Track
- [ ] Stadium
- [ ] Gym
- [ ] Other:

Reinforcement of the slab floors with the FRP SYSTEM

Mapei intervention in the Cracow's High School of Banking and Management.

MAPEI PRODUCTS

- ***ADESILEX PG1***
- ***CARBOPLATE E200/50/1,4***
- ***MAPEWRAP 11***
- ***MAPEWRAP 31***
- ***MAPEWRAP C UNI-AX 300/30***
- ***MAPEWRAP PRIMER 1***
- ***PLANITOP 430***

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Fot. 1. Repair mortar PLANITOP 430 on concrete beams

Fot. 2. CARBOPLATE installed on concrete beams

The building which hosts the High School of Banking and Management in Cracow had been raised in the 70s' of the past century. The main construction is based on the beam-and-slab floors with spans of 9 and 15 meters leaning on the brick walls. Because of the building's long-term exploitation, planned change of its operational functions and expected heavy loading it was necessary to reinforce the slab floors above the ground and first floor.

The correct calculation and material selection (for the reinforcement with the carbon fiber tapes and plates) were executed by PhD. Eng Stanisław Kaczmarczyk, academic research worker of Technical University of Cracow, urban static researcher with many years of experience in the field. In order to indicate proper materials the Mapei Building Line Technical Advisors got involved in this process. Relying on the company experience, the designer was convinced to use CARBOPLATE tapes and MAPEWRAP carbon fiber plates. Additionally, it was decided to include in this project PLANITOP 430, the mortar for restoring concrete, which - thanks to its thixotropic properties, easy application and proper parameters - is clearly standing out from competitors' products. Another meaningful element was the choice of the main contractor. Enterprise of Technical Services OMEGA from Cracow was entrusted with this task. This company prides itself with a huge experience in realization of projects of concrete constructions' reinforcement in FRP system (as for example the Jagiellonian Library in Cracow). Simultaneously for a long time now it collaborates closely with the team of MAPEI Building Line Technical Advisors, executing together such projects like repair of outflow channel and the mobile supports of the steel pipelines in the Power Plant in Żarnowiec or repair of the reinforced concrete construction in the slag discharge zone of Mittal Steel's steel mill in Cracow. Up to now the works done by OMEGA with the use of MAPEI solutions pleased the investors, while the employees praised the easy application of the single products.

The system of the reinforcement of the School's slab floors included the reprofilation of the existing beams with the use of the repairing mortar PLANITOP 430 and inserting on their bottom surfaces the CARBOPLATE E200/50/1,4 carbon fiber tapes (50 mm wide, 1,4 mm thick and with 200 GPa modulus of elasticity). The 100 mm wide beams had one tape pasted, while the 300 mm wide ones had two.
The zones surrounding the supports of the beams ought to be reinforced against the shear stress by pasting on the 2100-mm-long sections on every wall the MAPEWRAP C UNI-AX 300/30 carbon fiber plates, in the way that allows the plate to cover both sides of the beams as well as their bottom surface. The direction of inserting the working fibers of the plate was perpendicular to the longitudinal axis of the beams.
For CARBOPLATE tapes insertion ADESILEX PG1 adhesive was used, which is characterized by easy application and very good adhesion to the support and the tape itself – both features highly appreciated by the OMEGA employees. Those parameters had in fact a huge impact on the inserting process itself, because thanks to them the tapes adhere perfectly to the support and no extra supports are necessary. Having primed the substrate with MAPEWRAP PRIMER 1, the initial smoothing of the surface prior to the carbon fiber plates insertion was executed with the resin based MAPEWRAP 11 product, then for the plates lamination the epoxy based resin MAPEWRAP 31 was used.

The use of MAPEI's FRP system allowed for the necessary slab floors reinforcement (essential for changing the building's destination from the bank premises to the lecture rooms) without the necessity of lifting the floor level of each storey to repair (the latter would have been unavoidable if it had been decided to overbuild the new floor on the old one, meant as a trench shoring). Thanks to FRP system application, the access to the lecture rooms of High School of Banking and Management in Cracow is extremely easy also for the disabled persons.

Fot. 3. Application of MAPEWRAP C UNI-AX 300/30

Mapei Products: the products mentioned in this article belong to the "Building Speciality Line". Mapei products for the protection and repair of concrete surfaces and structures comply with EN 1504 standards and have been awarded the CE mark in compliance with EN 1504 standards. The technical data sheets are available at the web site: www.mapei.pl

ADESILEX PG1 - Thixotropic, two-component epoxy adhesive for structural bonding.
CARBOPLATE - A range of pultrused carbon fibre plates pre-impregnated in epoxy resin, protected by a double film of plastic, with high resistance and flexibility, for plating prestressed reinforced concrete conglomerate and steel structures.
MAPEWRAP 11 - Normal setting thixotropic epoxy putty for levelling concrete or reinforced concrete structures that need to be repaired or reinforced by bonding with MapeWrap fabric.
MAPEWRAP 31- Medium viscosity epoxy resin for impregnation, during application, of MapeWrap fabric using the "dry system".
MAPEWRAP C UNI-AX - High strength uni-directional continuous carbon fibre fabric characterised by high (230,000 N/mm2) and very high (390,000 N/mm2) modulus of elasticity and high tensile strength, suitable for repairing reinforced concrete structures damaged by physical-mechanical action, for confinement of axial loaded concrete elements or concrete elements subjected to compressive and bending stress and for seismic strengthening in earthquake areas.
MAPEWRAP PRIMER 1 - Two-component super-fluid solvent-free product based on epoxy resins, specific for the preparation of concrete surfaces that need to be repaired or reinforced by bonding with MapeWrap fabric and Carboplate carbon plates.
PLANITOP 430 - Fine-grained, thixotropic, fibre-reinforced, controlled-shrinkage, medium-strength (30 MPa) mortar for restoring concrete.