UNIVERSITY OF RIJEKA

LABORATORY EQUIPMENT CATALOGUE OF THE FACULTY OF CIVIL ENGINEERING (GRADRI)

Sveučilište u Rijeci
University of Rijeka

SVEUČILIŠTE U RIJECI
GRAĐEVINSKI FAKULTET

Europska unija
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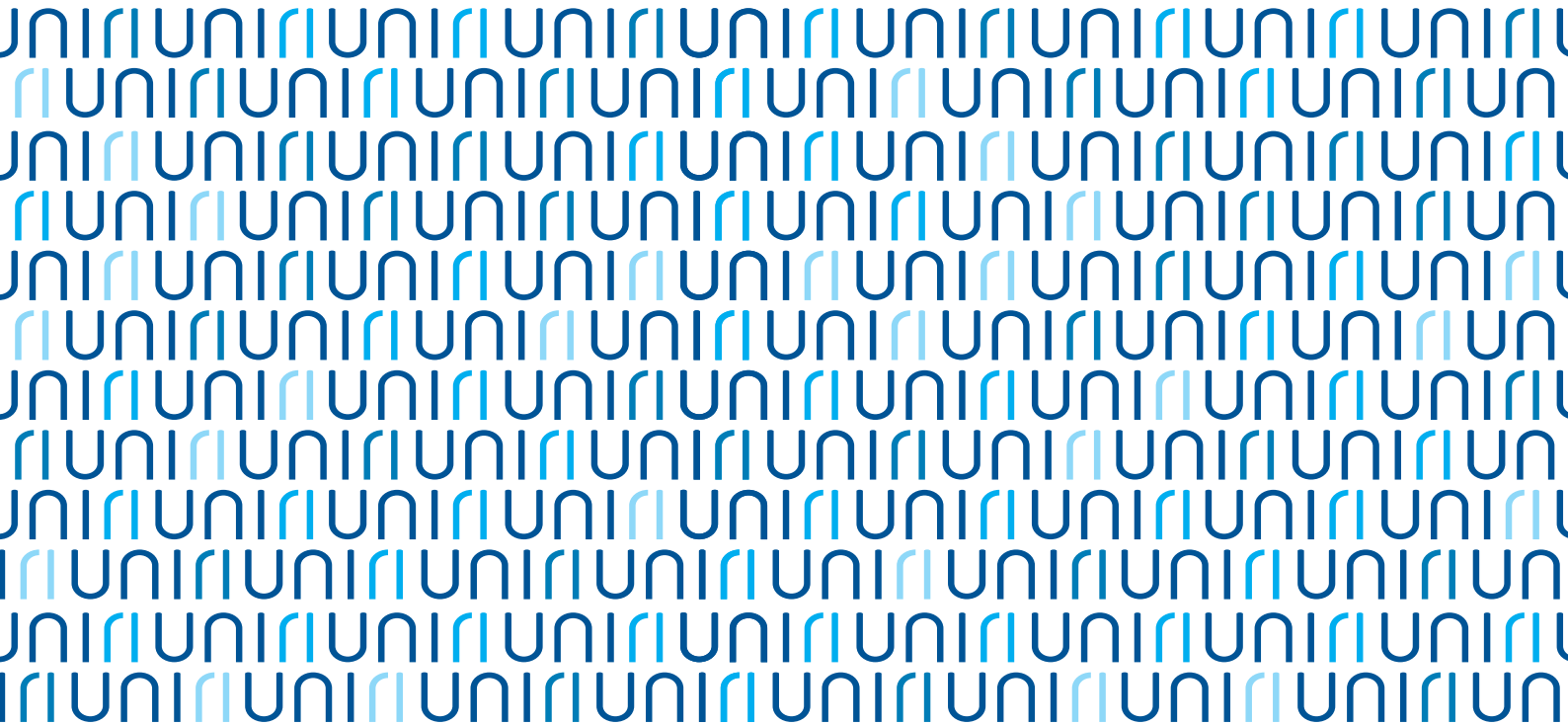


1

EQUIPMENT OF THE CONSTRUCTION LABORATORY

Instrument	**Single Girder Bridge Overhead Crane SPB INŽENJERING d.o.o. type JMD 5t/8,6m with Crane Runway**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Others**
Photograph	
Short description	Single girder bridge overhead crane SPB INŽENJERING d.o.o. type JMD 5t/8,583m with crane runway length 16 m
Main purpose	Lifting and transferring cargo.
Technical specification	■ Crane capacity 5 t ■ Crane span 8,583 m ■ Lifting height 7,28 m ■ Lifting speed 4/1,3 m/min ■ Trolley speed 20/6,7 m/min ■ Crane speed 20-5 m/min ■ Crane runway length 2 x 16 m
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Dragan Ribarić / dragan.ribaric@uniri.hr

Instrument	**Portable Hydraulic Device for Applying Force - MATEST S222-01, S226-1, C405-15, S224-21, S226-05, S226-06**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**
Photograph	
Short description	Portable hydraulic device for applying force - MATEST S222-01, S226-1, C405-15, S224-21, S226-05, S226-06
Main purpose	Portable hydraulic device for applying force.
Technical specification	■ Capacity 100 kN ■ Small hydraulic aggregate 12V DC
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Davor Grandić / dgrandic@uniri.hr

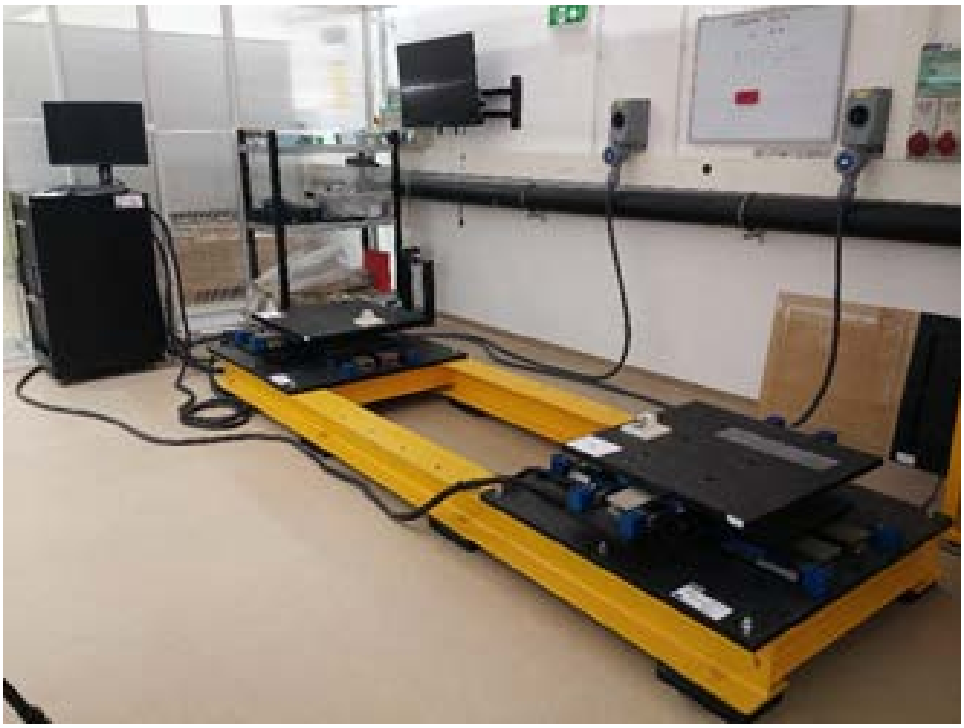
Instrument	**Optical Measuring System GOM mbH PONTOS 3D 4M**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Measuring Device**
Photograph	
Short description	Optical measuring system GOM mbH PONTOS 3D 4M: head with two cameras, cables, support, calibration object, lenses, laser pointer, LED lights, cases
Main purpose	System with two cameras for 3D non-contact optical measuring of deformations and strains. After the initial calibration, cameras are used to film the whole experiment. By tracking the surface of the experimental model, which has to be treated adequately beforehand, the positions of all the points on the surface of the model are obtained.
Technical specification	■ Filming speed up to 168 fps with resolution 2400x1728 piksels, or up to 1300 fps with resolution 2400x168 piksels ■ One pair of lenses with focal length 20 mm for measuring volumes from 125 x 90 mm^2 up to2150 x 1600 mm^2 ■ Calibration object for measuring volumes from 350 x 260 mm^2 up to 500 x 370 mm^2
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Gordan Jelenić / gordan.jelenic@uniri.hr

Instrument	**Equipment for Measuring Displacements NI SCXI-1000NI SCXI-1000, NI SCXI-1600, SCXI-1540, SCXI-1315, SCXI-1374, SCXI-1361**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Measuring Device**
Photograph	
Short description	Equipment for measuring displacements NI SCXI-1000NI SCXI-1000, NI SCXI-1600, SCXI-1540, SCXI-1315, SCXI-1374, SCXI-1361
Main purpose	Equipment for measuring displacements NI SCXI-1000.
Technical specification	■ 16-bits data acquisition module ■ 3x 8-channel LVDT input module
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Davor Grandić / dgrandic@uniri.hr

Instrument	**Cyclic Corrosion Test Chamber – Ascott CC1000ip**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**
Photograph	
Short description	Cyclic corrosion test chamber – Ascott CC1000ip
Main purpose	Cyclic corrosion test chamber designed for an accelerated test of material resistance on the impact of corrosion from atmosphere that contain a sodium chloride as a main component.
Technical specification	■ Chamber capacity: 1000l
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Davor Grandić / dgrandic@uniri.hr

Instrument	**System with Two Dual-axis Shaking Tables Quanser STI-III**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**

Photograph



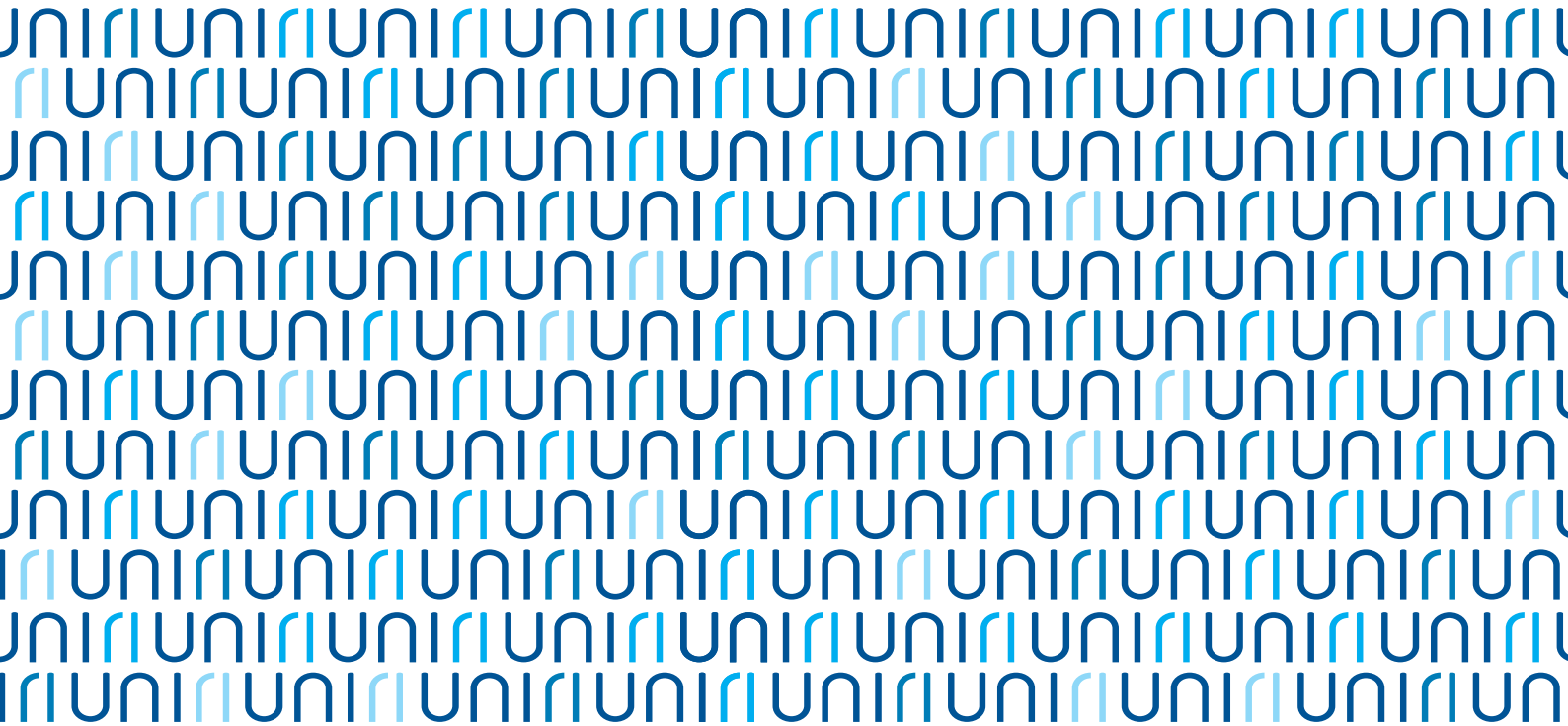
Short description	System of two biaxial shaking tables Quanser STI-III actuated by electromagnet motors (control unit, hardware + software)
Main purpose	Used for model experiments with dynamic excitation (such as earthquake, harmonic excitation and other). Two shaking tables can be used independently in two experiments at the same time, or together in a way that the model is sitting on both tables. When the tables are used together, the mass of the model can be greater, while the excitation can be the same on both of the tables (synchronous excitation) or different (asynchronous excitation).
Technical specification	■ Dimensions of each platform 625 x 625 mm ■ Each platform can move along 15 cm in each direction, span of work frequencies is from 0 up to 20 Hz ■ Maximum load on each platform is 130 kg with 1g acceleration in each of the two directions ■ With no load each platform can go up to 2,8 g of acceleration in x direction and 4,5 g in y direction ■ The distance between the two platforms can be from 1 m up to 2,5 m
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Gordan Jelenić / gordan.jelenic@uniri.hr

Instrument	**Portable Phased Array Ultrasonic Flaw Detector for Steel PHASOR XS**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Measuring Device**
Photograph	
Short description	Portable phased array ultrasonic flaw detector for steel (LCD, probes, cables, software) PHASOR XS
Main purpose	Portable phased array ultrasonic flaw detector and thickness gauge work in Conventional and Phased array modes.
Technical specification	■ Conventional mode: DAC and (DGS) AVG ■ Phased array mode: TOPView, Overlay TCG, Fullsector scan ■ VGA full-colour display
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Mladen Bulić / mbulic@uniri.hr

Instrument	**Portable Combined Hardness Tester for Steel MIC 20 TFT**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**
Photograph	
Short description	Portable combined hardness tester for steel MIC 20 TFT (two sets of probe, cables, software)
Main purpose	The MIC 20 supports the quasi-static hardness testing according to the UCI method (Vickers prism) and dynamic hardness testing according to the rebound method
Technical specification	■ UCI Method: Probe 98 N (10 kgf) (Vickers prism) ■ Rebound Method: rebound impact device, Tungsten-Carbide Metal Tip, Ø=3 mm
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Mladen Bulić / mbulic@uniri.hr

Instrument	**Steel Load Frame with Two Eervo-hydraulic Testing Actuators Zwick Roell Capacity 500kN and 250 kN**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**
Photograph	
Short description	Dimension of steel load frame 5,0 x 3,6 m, has the possibility of extending to 7,0 m in the longitudinal direction and to 6,0 m in height. Capacity of actuators are 500 kN and 250 kN. Actuators have been specially designed for dynamic material testing for determining the fatigue strength of material and components of structure. The entire system is controlled via a computer program Cubus.
Main purpose	The main purpose of the actuator is to provide precise static and dynamic testing of prefabricated elements and various components of civil engineer structure and other types of structures. The possibility of testing with displacement and force control.
Technical specification	■ Possibility of cyclic test with a frequency up to 10 Hz with a possible cylinder displacement of 250 mm and power of the hydraulic pump 95 kW.
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Mladen Bulić/ mbulic@uniri.hr

Instrument	**Universal Tension-compression Test Machine with Temperature Chamber**
Laboratory affiliation	**Construction Laboratory**
Equipment category	**Testing Device**
Photograph	
Short description	Universal tension-compression testing machine Zwick Z 600E with capacity 600 kN and electro-mechanical drive. Testing machine consists of two work-spaces. The upper workspace is primarily designed for tensile tests, while the lower working space is designed for compression and bending tests.
Main purpose	The main purpose of the test machine is monotonic static test. In addition, low-cyclic tests up to 0.5 Hz are also possible. Experiments on the testing machine can be performed with the force control, displacement control, and the strain control (with extensometers).
Technical specification	■ Speed of test for displacement control mode 0,001 do 320 mm/min ■ Specimen fixing - hydraulic jaws (600 kN), pneumatic jaws (10 kN) and mechanical jaws (10 kN). ■ Tools and specimen grips for the steel testing of round and rectangular cross sections, wood testing and plastic testing
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Željko Smolčić/ zeljko.smolcic@uniri.hr



2

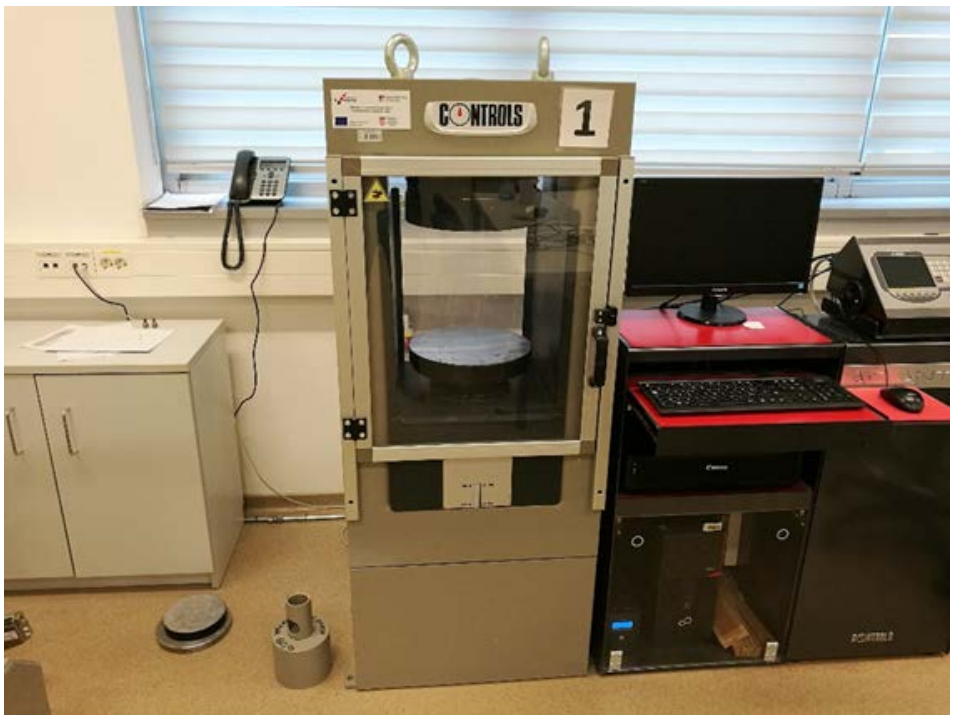
EQUIPMENT OF THE MATERIALS LABORATORY

Instrument	**Climatic Chamber**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Preparation of specimens**
Photograph	
Short description	A multipurpose climatic chamber suitable for testing various construction materials such as aggregates, cement, concrete, bricks, blocks, asphalt etc. It has monobloc stainless steel cabinet with shelves capable of holding heavy specimens. It is designed to condition the air circulating in the cabinet. The temperature is controlled by a sensor which is movable inside the cabinet area and can also be located inside the test sample. During test data can be monitored. Chamber is equipped with software for data transfer to a computer.
Main purpose	Simulation of thermal and weathering properties: freezing and thawing cycles, wetting and drying cycles.
Technical specification	■ Capacity 520 l ■ Function controller: cycle programmer for 50 programs and 1000 segments ■ Digitally controlled temperature range from -25°C to +70°C ■ Digitally controlled humidity range from 10% to 95% ■ Internal air circulation ■ Shelves loading capacity: 4 shelves, 60 kg each ■ Programmable
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	Doc.dr.sc. Silvija Mrakovčić / silvija.mrakovcic@gradri.uniri.hr

Instrument	**Water Permeability Device**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Durability Test Equipment**
Photograph	
Short description	The water permeability device consists of a robust steel frame with clamping system incorporating the hydraulic circuit, valves, gauge to check the water pressure and measuring transparent burettes mounted on top of the tester. The clamping system can accept cube or prismatic specimens up to 200 mm side and cylinders up to 300 mm height. It is supplied complete with gaskets for 150 mm cube specimens. It has to be fit with a suitable air compressor, max. working pressure 10 bar.
Main purpose	To determine the depth of penetration of water under pressure in the cube and prismatic concrete specimens according to standard HRN EN 12390-8.
Technical specification	■ Number of test positions: 6 ■ Supplied with gaskets for 150 mm cube specimens ■ Max. working pressure: 1000 kPa ■ Net weight: 155 kg ■ Operating temperature: + 10 to + 40°C
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	Doc.dr.sc. Silvija Mrakovčić / silvija.mrakovcic@gradri.uniri.hr

Instrument	**Chloride Ion Penetration Meter Device**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Durability Test Equipment**
Photograph	
Short description	Chloride penetration meter is used for measuring the electrical resistance of concrete against the penetration of chloride according to the standard methods. The test device is equipped with 4 independent channels and 4 test cells suitable to perform tests on up to 4 specimens. Equipped with vacuum saturation apparatus necessary to fully saturate the specimen with water.
Main purpose	To determine resistance of concrete to the penetration of chloride ions according to ASTM C1202 standard. The measurement data derived from this test methods can be used to estimate the chloride diffusion coefficient of concrete in service life predictions and structure design, as well as durability-based quality control of concrete.
Technical specification	■ Testing up to 4 specimens ■ Every channel is independent ■ Programmable test duration ■ Adjustable measuring rate starting from 1 minute ■ Measurement and record of the test temperature during the whole test ■ Unlimited data storage on SD card ■ Accuracy: +/-0.1V, +/-1mA
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	Doc.dr.sc. Silvija Mrakovčić / silvija.mrakovcic@gradri.uniri.hr

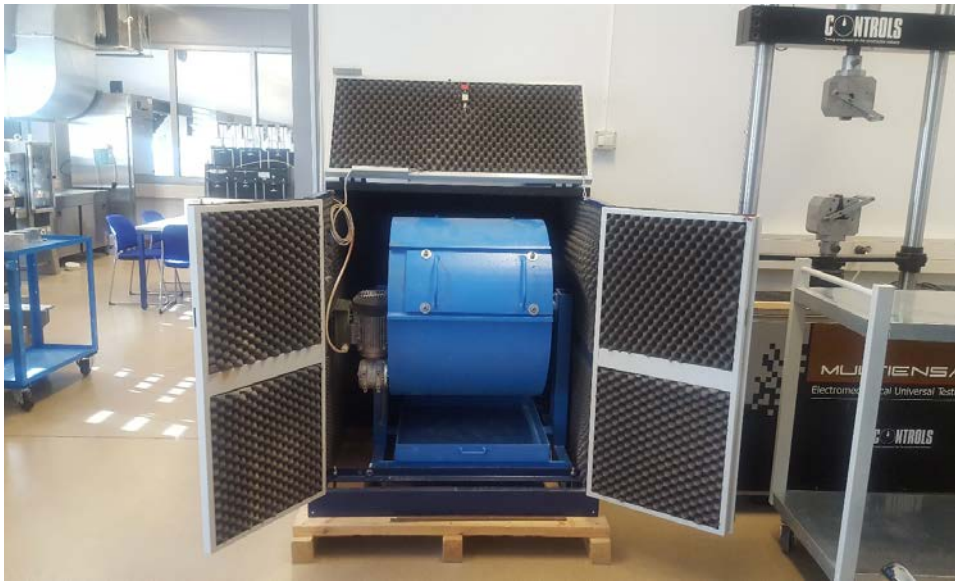
Instrument	**Oxigen Permeameter Device. Cembureau Method**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Durability Test Equipment**
Photograph	
Short description	The oxigen permeameter device consist of aluminium permeability cell used to house the test sample; rubber sleeve used to prevent oxygen permeation along the lateral face of the sample; air chamber to keep the rubber sleeve well attached to the sample and wall panel. Wall panel is supplied with 3 flow meters, bubble type, used to measure oxygen flow; 1 digital pressure gauge complete with pressure transducer; 1 high precision flow control valve to control the input pressure and 1 distribution panel with valves to activate the flow meters. The devices is fitted with a suitable air compressor.
Main purpose	To determine permeability of the cast and cored cylindrical concrete specimens 150 mm diameter, 50 mm high to oxygen by the Cambureau method. The test result is the mean specific coefficient of oxygen permeability.
Technical specification	■ Panel (l × d × h) 700 x 1100 x 120 mm, mass 14 kg ■ Cell (d × h) 345 × 80 mm, mass 19 kg ■ High precision pressure regulator ■ Digital readout unit and pressure transducer ■ Permeability cell for specimens 150 mm diameter, 50 mm height
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	Doc.dr.sc. Silvija Mrakovčić / silvija.mrakovcic@gradri.uniri.hr

Instrument	**Compression Testing Frame - 3000 kN capacity**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Test Machine**
Photograph	
Short description	The servo-hydraulic compression frame 3000 kN capacity can be used to perform various building material tests. It is suitable for testing cubes up to 200 mm and cylinders up to diameter 160 x 320 mm. The frame is completed with suitable distance pieces conforming to the specimen size .
Main purpose	The test machine is used for compression tests on concrete cubes, cylinders and blocks according to the standards EN 12390-4 and EN 772-1.
Technical specification	■ Capacity: 3000 kN ■ Calibration accuracy: class 1 ■ Platens diameter: 300 mm ■ Ram travel: 50 mm ■ Max. vertical daylight: 350 mm ■ Horizontal daylight: 370 mm ■ Power supply: 230 V 1 ph 50 Hz 750 W
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	dr.sc. Natalija Bede / natalija.bede@gradri.uniri.hr

Instrument	**Universal Testing Flexure Frame - 300 kN capacity**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Test Machine**
Photograph	
Short description	The servo-hydraulic flexure test machine has C-shaped open structure for loading specimen and high stiffness closed structure during the test. It is connected to control console capable of applying load in displacement and strain rate control. The test machine is supplied with displacement transducer for measurement of crack opening (CMOD according to EN 14651), accessories for measurement of beam deflection and toughness, for energy absorption test on square (EN 14488-5) or round slabs, for kerb slabs and accessories for compression tests.
Main purpose	The test machine can be used for testing in flexure various building materials (three- or four-point bending tests), deformability tests, CMOD tests, energy absorption tests and ductility index.
Technical specification	■ Max. load: 300 kN ■ Calibration accuracy: class 1 ■ Load sensor: strain gage load cell ■ Rate: load, displacement and strain rate ■ Max. vertical daylight without accessories: 546 mm ■ Distance between accessory lower rollers: adjustable from 80 to 1500 mm ■ Distance between accessory upper rollers: adjustable from 80 to 500 mm ■ Piston travel: 110 mm
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	dr.sc. Natalija Bede / natalija.bede@gradri.uniri.hr

Instrument	**Le Chatelier Water Bathe**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Preparation of specimens**
Photograph	
Short description	The internal chamber and the insulated exterior case of the bath are manufactured from stainless steel. It has timer which is used to set the time for reaching the boiling point in 30 minutes by using two heater units. The bath is supplied complete with a 12 place Le Chatelier mould rack.
Main purpose	For the determination of the soundness of cement paste, fly ash for concrete and lime. Le Chatelier Water Bath is used with Le Chatelier moulds for the determination of the soundness of cement paste according to HRN EN 196-3.
Technical specification	■ Capacity 10 l ■ Timer for automatic heating ■ Raise the water temperature from 20 ± 2°C to boiling point in 30 ± 5 min ■ Maintain the water at boiling point for 3 hours ± 5 min. ■ Supplied complete with a 12 place Le Chatelier mould rack ■ Mains supply: 230V, 50 - 60 Hz, 1ph
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	dr.sc. Natalija Bede / natalija.bede@gradri.uniri.hr

Instrument	**Motor Operated Flow Table**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Test Machine**
Photograph	
Short description	The machine consists of motorized flow table and automatic digital counter. Motor operated model conrorming to EN standards is driven by a motor speed reducer. The number of drops is set on the counter and the machine stops automatically at the end of the cycle. The flow table is manufactured from stainless steel and has a 300 mm diameter table. The conical mould is made of brass and has dimensions of 100 mm base diameter x 70 mm top diameter x 60 mm height. This model is supplied complete with tamper and the filling hopper.
Main purpose	To determine the consistency of mortar, building lime and cement specimens conforming to HRN EN 459-2 and HRN EN 1015-3.
Technical specification	■ Motorized with counter ■ Table diameter: 300 mm ■ Height of drop: 10 mm ■ Conical flow mould (base × diameter × height) 100 mm × 70 mm × 60 mm ■ Power: 180 W
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	dr.sc. Natalija Bede / natalija.bede@gradri.uniri.hr

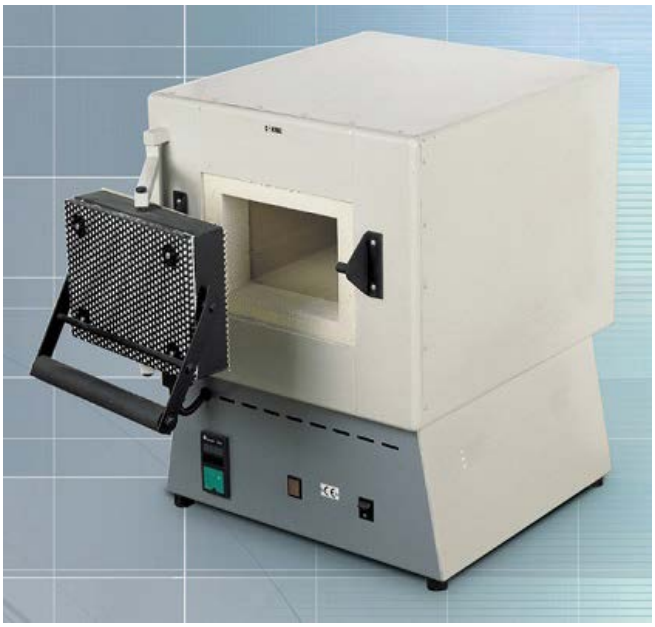
Instrument	**Los Angeles Abrasion Machine**
Laboratory affiliation	**Laboratory for Materials**
Equipment category	**Test Machine**
Photograph	
Short description	The machine consists of an electronic control unit and a rolled steel drum having an inside diameter of 711 mm and internal length of 508 mm. The drum is rotated by a speed reducer driven by an electric motor at a speed of 31 to 33 r.p.m. The machine is equipped with an automatic counter. It is possible to set 2 different test procedures: the required number of revolutions of the drum or the total working time. It is supplied with set of 12 abrasive charges conforming to EN standards. The machine is upgraded with the noise reduction and safety cabinet.
Main purpose	The Los Angeles abrasion machine is widely used for testing coarse aggregates resistance to abrasion. It can be used for determination of the particle loss (abrasion) of porous asphalt mixtures and the determination of the resistance of a bituminous mixtures or pavement to aviation fuel.
Technical specification	■ High stiffness welded steel frame ■ Graphic display and membrane keyboard ■ Power: 740 W ■ Weight approx.: 350 kg ■ Dimensions approx.: 1005 mm x 820 mm x 950 mm
Additional information	http://www.controls-group.com
Source of funding	The Development of Research Infrastructure at the University of Rijeka Campus (EFRR)
Contacts	dr.sc. Natalija Bede / natalija.bede@gradri.uniri.hr

3

EQUIPMENT OF THE GEOTECHNICAL LABORATORY

Instrument	**Soil Extruder**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Device for sample preparation**
Photograph	

Short description	The machine consist of a movable table and a hydraulic piston which can be adjusted either in horizontal or vertical position.
Main purpose	Extruding samples from proctor moulds and borehole samplers .
Technical specification	■ Power: 750 W ■ Max. load: 60 kN ■ Max. ram stroke: 900 mm ■ Max. working ram speed: 6 mm/sec. ■ Max. external diameter of sample tubes: 160 mm ■ Overall dimensions: ■ Horizontal working position (lxwxh): 2730x409x1180 mm ■ Vertical working position (lxwxh): 1025x409x1080 mm without accessories
Additional information	http://www.controls-group.com/eng/soil-testing-equipment/soil-extruder-motor-operated.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

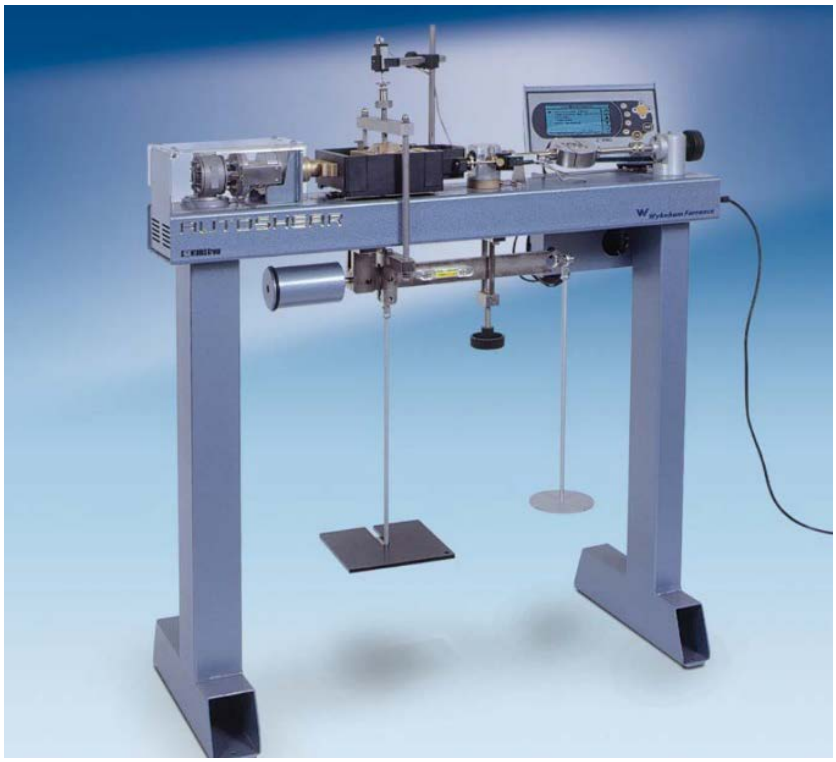
Instrument	**Muffle furnace**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Other**
Photograph	
Short description	Muffle furnace used for cobustion of organic materials.
Main purpose	Main purposed to determine the amount of residual mineral matter in the binder extract.
Technical specification	■ Max. temperature: 1100°C ■ Power: 3.9 kW ■ Chamber dimensions (lxwxh): 210x320x145 mm ■ Outside dimensions: 510x750x660 mm ■ Weight approx: 89 kg
Additional information	http://www.controls-group.com/eng/asphaltbituminous-mixture-testing-equipment/muffle-furnace-for-incineration.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Laboratory oven**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Other**
Photograph	
Short description	Machine used for drying material. It consists of three grid shelves, cooling fan and temperature gauge.
Main purpose	Drying of samples.
Technical specification	■ Nominal capacity: 250 l ■ Max. temperature: 200 °C ■ Power: 2100 W ■ Internal dimension: 554x660x700 mm ■ External dimensions: 951x1056x970 mm ■ Number of grid shelves: 3 ■ Weight approx.: 130 kg
Additional information	http://www.controls-group.com/eng/general-lab-testing-equipment/laboratory-ovens.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Laboratory crusher**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Production device**
Photograph	
Short description	Device used for crushing coarse material into finer size.
Main purpose	Crushing of materials.
Technical specification	■ Jaw opening: 100 x 60 mm ■ Jaw crushing adjustment: 2 to 18 mm ■ Capacity: 100 to 400 kg/h ■ Power: 736 W ■ Dimensions: 885 x 390 x 1169 mm (w x d x h) ■ Weight approx.: 135 kg
Additional information	http://www.controls-group.com/eng/aggregates-testing-equipment/laboratory-crusher.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Fiac Air compressor**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Other**
Photograph	
Short description	Machine consists of compressor, tank for condensed air and dessicator.
Main purpose	Supply of compressed air to other testing equipment in the laboratory.
Technical specification	■ Engine power: 15 HS ■ Tank capacity: 500 l ■ Noise: 65 dB ■ Dimensions (wxdxh): 2040 x 630 x 1430 mm ■ Weight approx.: 390 kg ■ Max. pressure: 13 bars
Additional information	http://www.fiac.it/wwwfiac/main.php?p=wi_pag08_b_01e
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

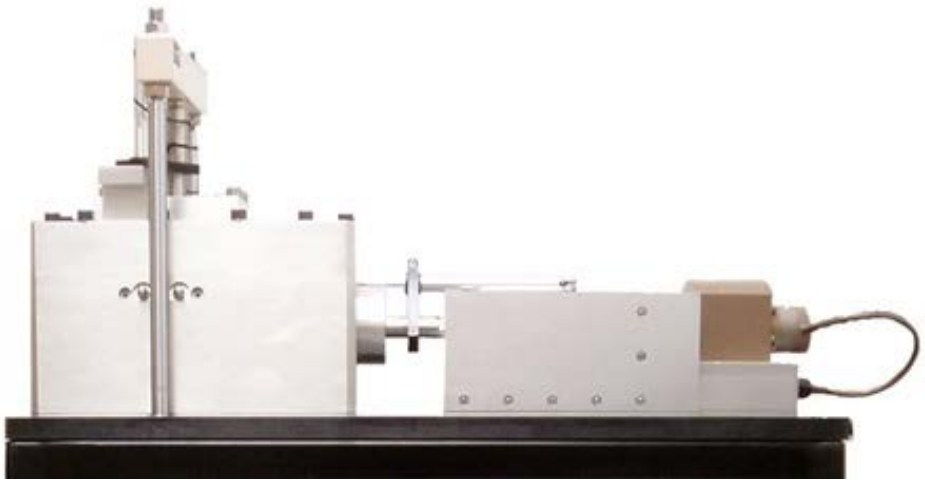
Instrument	**Trinocular microscope, Sole-Mark**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Other**
Photograph	
Short description	Microscope with a digital camera and an USB cable. It can be used in combination with a computer.
Main purpose	Enlargment and analysis of small objects. The possibility of taking Photographs using adapter and digital camera.
Technical specification	■ Digital camera: 5.5 MP ■ Zoom range: 0.67x – 4.5x (enlargment factor: 6,71:1) ■ Max. Enlargment: 45X ■ Base dimensions: 270x210x30 mm ■ Column dimensions: height 315 mm, diameter 32 mm ■ Weight: 4 kg
Additional information	http://www.optikamicroscopes.com
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Direct and residual shear testing machine**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	The device consists of electromotor, measuring cell, two LVDT and weights for vertical load.
Main purpose	Determination of shear strength of sands and fine grain materials.
Technical specification	■ Test speed: from 0.00001 to 9.99999 mm/min ■ Maximum shear force: 5000 N ■ Maximum vertical load: 500 N or 5000 N using 10:1 cantilever device ■ Maximum horizontal travel: 20 mm ■ Digital display: LCD 4 rows of 20 symbols. ■ Sample type size: 60 and 100 mm^2, 50; 60; 63,5 i 100 mm diametrically. ■ Power supply: 110-220 V, 50-60 Hz, 1 ph , 100 W ■ Dimensions: 953x387x1180 mm
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/digital-shear-testing-machine.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Oedometer, front loading**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Additional parts of the machine are: moulds for samples with all the parts (cap, ring, porous stone, screws), weights, LVDT for measuring vertical displacement and burette for measuring permeability coefficient.
Main purpose	Determination of compressibility of soil.
Technical specification	■ Three hanger positions:: 9:1, 10:1, 11:1 ■ Max. load (using 11:1 beam ratio): 1848 kg; ■ Sample diameter: 50 mm; ■ Overall dimensions: 500x200x750 mm; ■ Weight approx.: 21 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/oedometers-front-loading.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Compactor Proctor**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Device for sample preparation**
Photograph	
Short description	Additional parts of the device are: rammer and two moulds for samples of diameter 100 and 150 mm.
Main purpose	Determination of compaction and optimum moisture of materials.
Technical specification	■ Main purposed for moulds of diameter 100-102 mm and 150-152,4 mm ■ Rammer drop height: 300, 305, 450 i 457 mm ■ Number of blows per minute: 30 ■ Power: 740 W ■ Overall dimensions: 521x403x1438 mm ■ Weight approx.: 140 kg
Additional information	http://www.controls-group.com/eng/soil-testing-equipment/autoproctor-automatic-proctor_cbr-compactor.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Multispeed press CBR**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	Press used for CBR testing and determination of uniaxial strength of soil samples. It is used in combination with the Proctor rammer. It consists of adapters for CBR and uniaxial strength, LVDT, measuring cell and an USB for dana transfer.
Main purpose	CBR (California Bearing Ratio) and uniaxial strength of soils.
Technical specification	■ Maximum capacity: 50 kN ■ Test speed: from 0.05 to 51 mm/min or from 1 N/sec to 1000 N/sec ■ Power: DC motor 750 W ■ Sampling frequency: 50 Hz ■ Horizontal cleareance (distance between columns): 270 mm ■ Maximum vertical clearance: 730 mm ■ Platen travel: 100 mm ■ Dimensions: 392x495x1213 mm
Additional information	http://www.controls-group.com/eng/universal-testers-_-steel-re_bars-testing-equipment/uniframe-compact-automatic-stand_alone-universal-compressionflexural-tester.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**GDS back pressured shear box**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Device consists of external hydraulic unit for controlling the pressure in the chamber, central control unit, servo pump for obtaining internal strain in the sample and bender elements.
Main purpose	Determination of shear strength of soil in saturated and unsaturated conditions. Possibility of measuring very small strains (10E-5) while using bender elements.
Technical specification	■ Sample size: 100 x 100 mm ■ Max. normal and shear stress: 10 kN ■ Power supply: 110-240 V, 50-60 Hz, 1 ph ■ Max. vertical displacement: 15 mm ■ Max. horizontal displacement: 25 mm ■ Dimensions (L x W): 850 x 350 mm
Additional information	http://www.gdsinstruments.com/gds-products//gds-back-pressured-shear-box
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Automatic oedometer ACE**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Additional parts of the device are: mould for sample with all the parts (cap, ring, porous stone, screws) and LVDT for measuring vertical displacement and burette for measuring permeability coefficient.
Main purpose	Determination of compressibility of soil under automatic pressure control.
Technical specification	■ Maximum vertical force: 15 kN ■ Displacement transducer: 10 mm maximum travel ■ Maximum air pressure supply: 10 bar. ■ Specimen size: diameter from 50.47 to 112.80 mm ■ Measurement accuracy: ±1 % ■ Overall dimensions: 280x300x600mm (w x d x h) ■ Weight approx.: 25 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/ace-_-automatic-computerized-oedometer.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Triaxial apparatus**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Triaxial cell. Consists of: LVDT, measuring cell, pressure transducers. Triaxial cell can be changed depending on the sample size. Possibility of using benders and on-sample transducers.
Main purpose	Determination of strength of soils (fine-grained and coarse-grained) under triaxial state of stress.
Technical specification	■ Soil sample size diameter: 38, 50, 70 and 100 mm ■ Test speed: from 0.00001 to 99.99999 mm/min ■ Maximum compression force: 50 kN ■ Maximum tensile force: 5 kN ■ Vertical clearance: from 335 to 1100 mm ■ Max. horizontal clearance: 364 mm ■ Platen diameter: 158 mm ■ Platen travel: 100 mm
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/triaxial-load-frame-tritech.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
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Instrument	**Triaxial cell for unsaturated soils**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Other**
Photograph	
Short description	Triaxial cell with double walls and 25 kN measuring cell.
Main purpose	Research of unsaturated soil behavior.
Technical specification	■ Soil sample diameter: 70 mm ■ Maximum working pressure: 2000 kPa ■ Maximum cell height: 690 mm ■ Cell diameter (with valves) : 478 mm ■ Weight approx.: 30 kg ■ Number of inlet ports: 6
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/double-wall-triaxial-cells-for-unsaturated-tests.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
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Instrument	**Resonant column**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Device for testing resonant characteristics of fine grained soil. Pedastel for 50mm sample, LVDT, brass and steel calibration rod
Main purpose	Determination of small strain and soil resonance. Torsional shear test and torsional soil behaviour.
Technical specification	■ Maximum torque: 1.2 Nm ■ Maximum torque: 1.2 Nm ■ Maximum angular deformation: 10° ■ Maximum cell and back pressure: 1 MPa. ■ Two electro-pneumatic converters for cell and back pressure ■ Excitation frequency: Dynamic (RC) 1-300 Hz; Cyclic (TS) from 0 to 50 Hz maximum ■ Dimension: Control Box 51x45 x 35 cm (h x w x d); Cell 55 cm x 27 cm (h x diam.) ■ Weight: approx 50 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/resonant-column.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
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Instrument	**Dynamic cyclic triaxial system**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	Contains: cell for triaxial test with dynamical/cyclic load, LVDT, measuring cell and pressure transducers. Depending on the sample size, triaxial cell can be changed. Possibility of testing samples of diameter: 38, 50 and 70 mm. Can simulate earthquake accelerations.
Main purpose	Research of cyclic and dynamic soil characteristics under medium and large axial cyclic shear deformations.
Technical specification	■ Dynamic load capacity: ±5 kN or ±14 kN ■ Static load capacity: 50 kN or 100 kN ■ Nominal operating frequency: to 10 Hz (depending on the type of test) ■ Max. diameter sample: 150 mm ■ Max. cell and back pressure: 1000 kPa
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/dynamic-triaxial-systems-1000-kpa.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

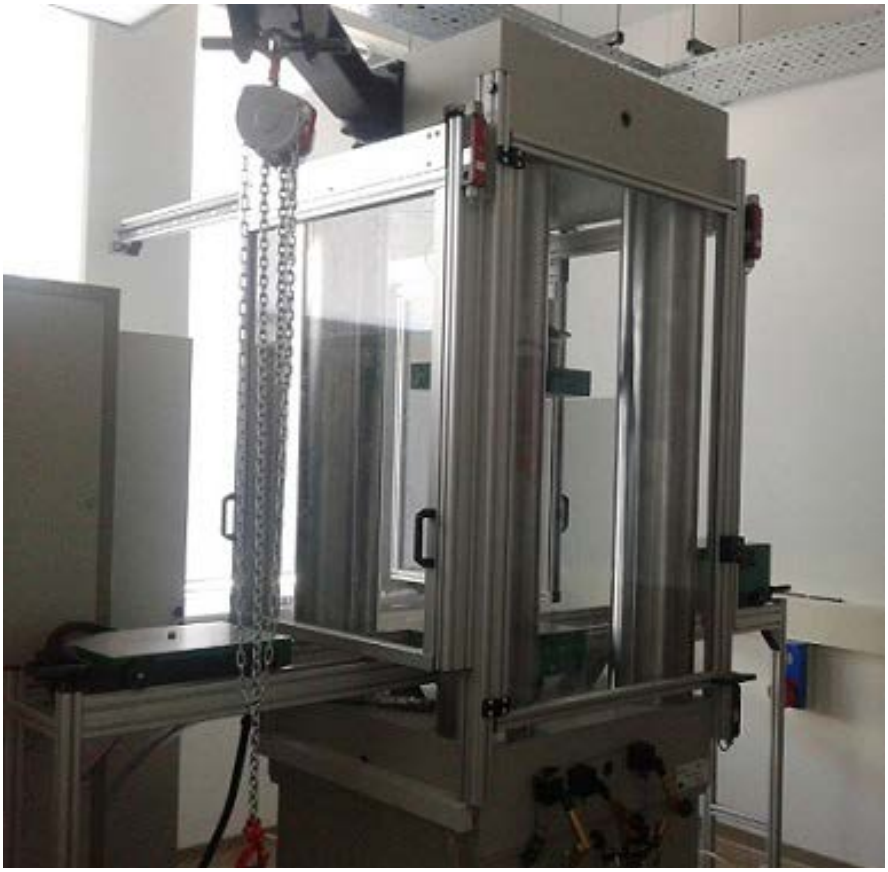
Instrument	**Continuous consolidation cell CRS**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Inner cell contains sample, outer cell used for loading, ring for sample preparation, LVDT with pressure transducers.
Main purpose	Determination of soil compressibility under constant rate of strain.
Technical specification	■ Sample dimensions: 25.4 mm height x 63.5 mm diameter. ■ Maximum pressure: 800 kPa ■ Maximum load: 50 kN ■ Dimensions: 240x410 mm (h) ■ Weight approx.: 10 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/continuous-consolidation-cell-crs.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Hidraulic oedometer, Hydrocon**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	

Short description	Cell used for measuring compressibility and retention curve. Contains ring for specimen preparation, LVDT and pressure tranducers.
Main purpose	Determination of soil compressibility under saturated and unsaturated conditions. Possibility of water and air pressure control.
Technical specification	■ Sample diameter: 100 mm ■ Maximum working pressure: 3500 kPa ■ Dimensions (diameter x h): 260x450 mm ■ Weight approx.: 10 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/hydraulic-consolidation-cell.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Large Shear apparatus**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	

Short description	Machine used for direct shear of samples dimensions 30 x 30 cm. LVDT: horizontal and vertical, shear platen used for better grip sample.
Main purpose	Determination of shear strength of coarse-grained soil.
Technical specification	■ Sample size: 300 x 300 mm ■ Shear and vertical force: 100 kN ■ Test speed: from 0 to 11.00000 mm/min ■ Maximum travel: 75 mm ■ Steps of consolidation: up to 50 ■ Power: 2000 W ■ Overall dimensions (wxdxh): 1470x758x1570 mm ■ Weight approx.: 800 kg
Additional information	http://www.controls-group.com/eng/soil-mechanics-testing-equipment/large-shear-testing-machine.php
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Universal press for rock testing**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	Hydraulic unit, triaxial cell, sample stand, sample deformation gauges, uniaxial strength and tensile strength adapters.
Main purpose	Determination of uniaxial, triaxial and tensile strengths of rocks.
Technical specification	■ Maximum load: 2000 kN ■ Sample size diameters: 57, 82 and 102 mm ■ Piston stroke: 50 mm ■ Distance between columns: 400 mm ■ Dimensions of upper and lower pressure plate: 320x420x75 mm ■ Overall dimensions: 2700x1900x2670 (h) mm ■ Power supply: 2,5 kVA 50 Hz 3x400+N+PE ■ Weight: 11000 kg
Additional information	http://www.formtest.de/en/
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
Contacts	Doc.dr.sc. Vedran Jagodnik, mag.ing.aedif (vedran.jagodnik@gradri.uniri.hr)

Instrument	**Jaws for testing tensile strength**
Laboratory affiliation	**Geotechnical laboratory**
Equipment category	**Test device**
Photograph	
Short description	The device consists of two parts, one comprising a movable part on the spring. The entire device is placed under the rock press.
Main purpose	Determination of tensile strength of rocks. Used in the combination with Universal press for rock testing (I/N 4986)
Additional information	http://www.formtest.de/en/
Source of funding	The equipment has been procured within the framework of the Project “The Development of Research Infrastructure at the University of Rijeka Campus”, co-financed by the European Regional Development Fund (ERDF).
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4

EQUIPMENT OF THE LABORATORY OF TRANSPORTATION ENGINEERING

Instrument	**Controls water bath**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for conditioning specimens**
Photograph	
Short description	Circulating water bath with digital termoregulator.
Main purpose	Conditioning of specimens before testing.
Technical specification	■ Capacity 110 litres, ■ Temperature range: ambient to testing to 95 °C, ■ Resolution 0,1 °C, ■ Accuracy ÷0,5 °C, ■ Continuous recirculation.
Additional information	http://www.mag-commerce.com/zastupnistva/kompresori/klipni-kompresori/fiac-new-whisper-ab-360/
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
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Instrument	**Inko water bath**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for conditioning specimens**
Photograph	
Short description	Circulating water bath with digital termoregulator..
Main purpose	Conditioning of specimens before testing.
Technical specification	■ Capacity 160 litres, ■ Resolution 0,1 °C , ■ Continuous recirculation, ■ Connection to water supply system for cooling.
Additional information	http://inko.hr/hr/home
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
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Instrument	**Alfametal mixer LM-75 with electrical heating**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for preparation**
Photograph	
Short description	Mixer with heaters for heating materijal.
Main purpose	Laboratory preparation bitumen mixes conforming HRN EN 12697-35.
Technical specification	■ Mixer volume 75 litres, ■ Mixer capacity 30 litres, ■ Minimal capacity 6 litres, ■ Mixing speed 56 rpm.
Additional information	http://www.alfametal.hr/
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
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Instrument	**Memmert laboratoty oven UF260,glass door**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for conditioning specimens**
Photograph	
Short description	Ventilating laboratory oven with glass door.
Main purpose	Drying and conditioning of samples.
Technical specification	■ Volume 256 litres, ■ Temperature range + 10 °C to 300 °C, ■ Ventilation regulation in 10 steps, ■ Adjustment of pre-heated fresh air admixture by air flap control in 10 steps, ■ Two stainless steel grids, ■ Glass soor.
Additional information	https://www.memmert.com/products/heating-drying-ovens/universal-oven/UF260/
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Memmert laboratoty oven UF260**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for conditioning specimens**
Photograph	
Short description	Ventilating laboratory oven.
Main purpose	Drying and conditioning of samples.
Technical specification	■ Volume 256 litres, ■ Temperature range + 10 °C to 300 °C, ■ Ventilation regulation in 10 steps, ■ Adjustment of pre-heated fresh air admixture by air flap control in 10 steps, ■ Two stainless steel grids.
Additional information	https://www.memmert.com/products/heating-drying-ovens/universal-oven/UF260/
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Memmert compressor cooled incubator ICP110**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for conditioning specimens**
Photograph	
Short description	Movable conditioning chamber with four locable castors.
Main purpose	Conditioning of samples.
Technical specification	■ Volume 108 litres, ■ Working temperature range od -12 °C do 60 °C, ■ Adjustment of pre-heated fresh air admixture by air flap control in 10 steps, ■ Two stainless steel grids.
Additional information	https://www.memmert.com/products/incubators/compressor-cooled-incubator/ICP110/
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Trailer mounted falling weight deflectometer-GRONTMIJ Primax 1500**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Measuring device**
Photograph	
Short description	Trailer mounted mobile device for defection measurement. On bord generator for power supply. PC computer for dana collection programme.
Main purpose	Measuring pavement deflection with impact loading.
Technical specification	■ Load range to 150 kN, ■ Beam with 9 geophones, ■ Temperature sensors (air, pavement surface, pavement layers), ■ PC computer with data collection software.
Additional information	http://www.pavement-consultants.com/falling-weight-deflectometers/primax-fwd-roads.aspx
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Lightweight deflectometer**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Measuring device**
Photograph	

Short description	Portable device for deflection measurement. Loading plate 100 nad 300 mm diameter. One integrated and two additional geophones. Device for wireless data acquisition system.
Main purpose	Deflection measurement of in situ materials.
Technical specification	■ Drop weight 10 kg, ■ Additional drop weight 5 kg, ■ Automatic dana collection integrated in measuring device, ■ Wirelss and cable tranfer of stored data.
Additional information	http://www.pavement-consultants.com/media/5691/PRIMA100_LWD__product_sheet_.pdf
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
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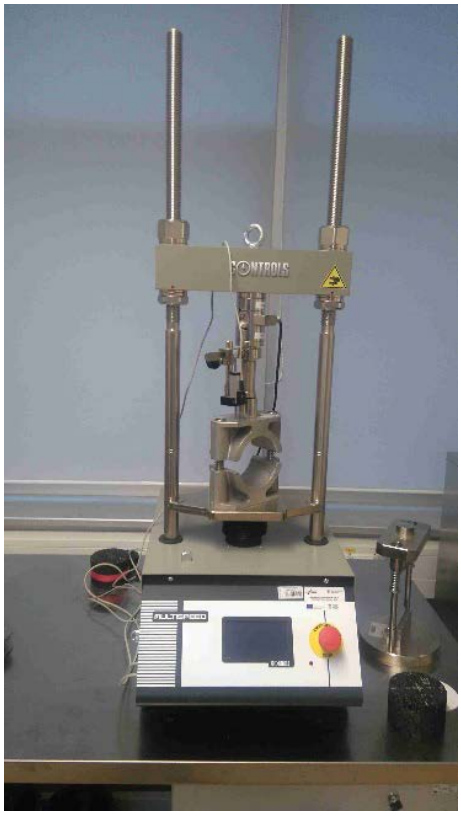
Instrument	**PC controlled gyratory compactor**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for sample preparation**
Photograph	
Short description	Gyratory compactor for preparation of samples in cylindical mould 100 and 150 mm dia. Electrical extruder.
Main purpose	Sample preparation according to HRN EN 12697-31.
Technical specification	■ Internal angle of gyration adjustable from 0 to 3°, ■ Internal angle of gyration preset to 0,82°, ■ Measuring shear resistance during compaction.
Additional information	http://www.controls-group.com/eng/asphaltbituminous-mixture-testing-equipment/pavelab-gyrocomp-research-gyratory-compactor.ph
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Automatic electro mechanical slab compactor**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Device for sample preparation**
Photograph	
Short description	Slab compactor for sample preparation.
Main purpose	Sample preparation according to HRN EN 12697-33.
Technical specification	■ Vertical force to 30 kN, ■ Vertical force control to 30 kN and trolley speed up to10 cycles in minute.
Additional information	http://www.controls-group.com/eng/asphaltbituminous-mixture-testing-equipment/standard-asphalt-slab-roller-compactor-procomp.p
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Automatic electro-mechanical compression tester min. capacity 50 kN**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Compression tester with load cells of 2,5 and 50 kN. Test set for stability and indirect tensile test.
Main purpose	Testing samples according to HRN EN 12697-23 and HRN EN 12697-34.
Technical specification	■ Test speed from 0,1 to 50 mm/min, ■ Two testing load cells 2,5 kN and 50 kN, ■ Data storage in MS Office.
Additional information	http://www.controls-group.com/eng/asphaltbituminous-mixture-testing-equipment/multispeed-automatic-universal-tester-with-touch-screen-digital-speed-control-and-data-acquisition_.php
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Double wheel tracker**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Device for testing plastic deformations (rutting) of asphalt pavements. Moulds for testing samples prepared by slab compactor, gyratory compactor and field drilled pavement specimens.
Main purpose	Testing samples according to HRN EN 12697-22 procedure B.
Technical specification	■ Testing temperature from ambient to 70 °C, ■ Possibility for testing in water, ■ Data storage in MS Office.
Additional information	http://www.controls-group.com/eng/asphaltbituminous-mixture-testing-equipment/pavelab-dwt-double-wheel-tracker-en-version.php
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Dynamic device for asphalt stiffness and fatigue testing**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Dynamic device for asphalt stiffness and fatigue testing. Moulds for fatigue and stiffness testing on cylindrical and prismatic samples. PC with monitor.
Main purpose	Testing samples according to HRN EN 12697-24 and HRN EN 12697-26
Technical specification	■ Testing temperature adjustable from -25 to 60 °C, ■ Servo-hydraulic frame capacity to 30 kN, ■ Dimensions of prismatic samples to 70x70x400, ■ Diametar of cylindrical samples 100 or 150 mm.
Additional information	http://www.controls-group.com/eng/special-lists/superpave-bitumen-mixes-fundamental-properties-determination_32
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

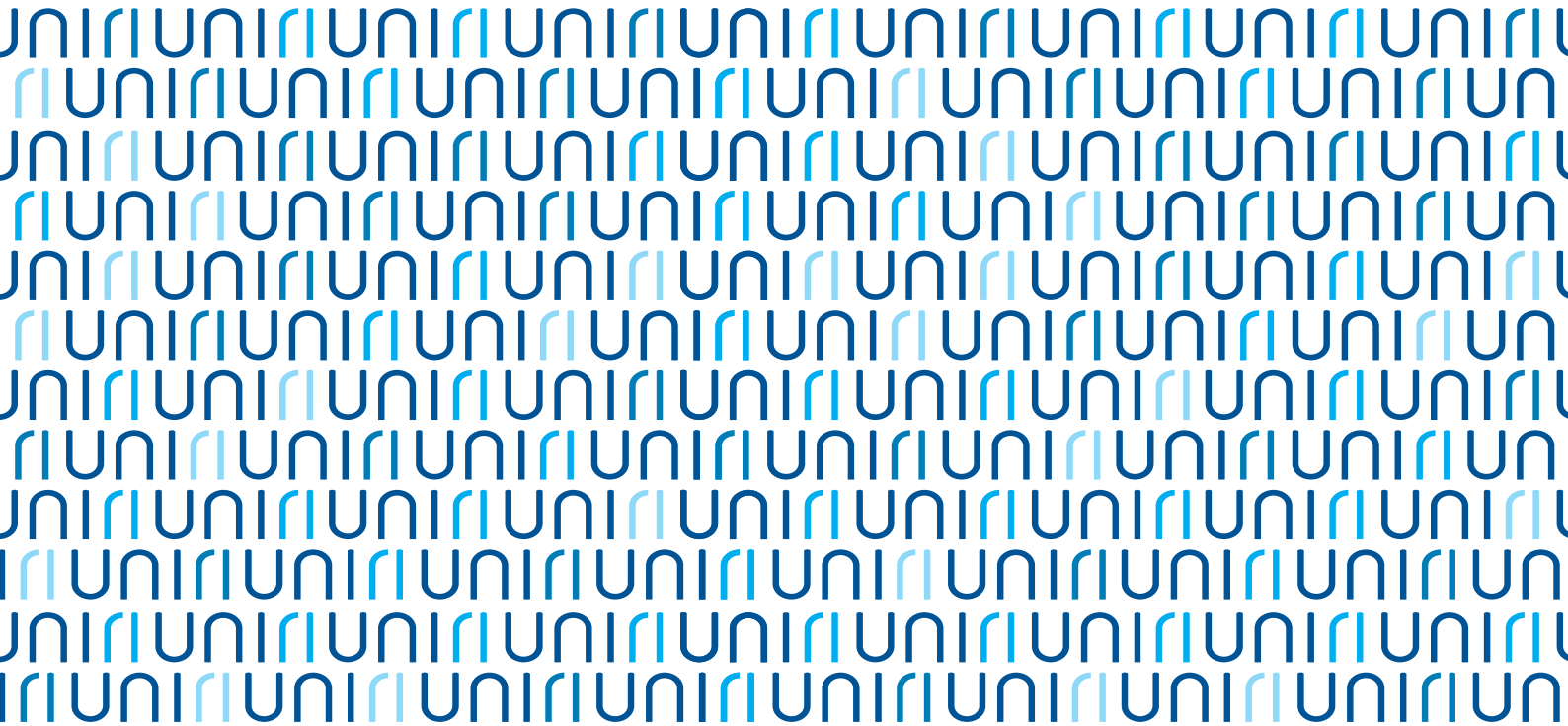
Instrument	**Laser profiler- beam with 5 laser measurement sensors ARRB HAWKEYE 2000**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Five laser measurement sensors with accelerometer on a front mounted beam.
Main purpose	Testing of longitudinal road profile, rut depth, and pavement surface texture (macrotexture).
Technical specification	■ Adjustable recording rate, ■ Survey speed from 20 km/h to 110 km/h, ■ Longitudinal profile accuracy ±0,5 mm, ■ Transverse profile accuracy ±0,5 mm, ■ Operating temperature from 0 to 40 °C.
Additional information	https://www.arrb.com.au/Equipment-services/Hawkeye-2000-Series.aspx
Source of funding	"Research Infrastructure for Campus-based Laboratories at the University of Rijeka" project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**Digital imaging system ARRB HAWKEYE 2000**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Video camera in waterproof enclosure connected with laser profiler measurement system.
Main purpose	Imaginig captures during laser profile measurement to enable accurate inventory recording, condition and measurement.
Technical specification	■ Lens type 3,8 mm to 13 mm, ■ 3x optical zoom, ■ Angle of view from 80 to 28°, ■ Resolution 1600x1200 pixels, ■ Picture size 1600x1184 pixels.
Additional information	https://www.arrb.com.au/Equipment-services/Hawkeye-2000-Series.aspx
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**GPS system ARRB HAWKEYE 2000**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	GPS antenna integrated with GPS Acquire Manager system.
Main purpose	Recording GPS positions during laser profile measurement to enable the referencing measurement dana against GPS coordinates.
Technical specification	■ High performance recivers tracks up to 12 satellites, ■ Operating temperature from -30 to 85 °C, ■ Acquisition speed 15 sec (hot weather), 45 sec (cold weather), ■ Accuracy 5 m, ■ Format NMEA 0183 version 2.0 ASCII.
Additional information	https://www.arrb.com.au/Equipment-services/Hawkeye-2000-Series.aspx
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**PC with data acquisition software “Onlooker live” and office based anaysis software “Processing toolkit”**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**PC for data processing and analysis**
Photograph	
Short description	PC with own power supply. Software package for collection data (Onlookcr Live) and processing and analysis of data (Prosessing Toolkit).
Main purpose	Data aquisition during measurement nad processing and analysis of measurement dana from laser profiler.
Technical specification	■ Data processing according to: World Bank Technical Paper 46-Class1, ISO 13473,TRL Lab Rep. 639, AASHTO PP37, AASHTO PP38.
Additional information	https://www.arrb.com.au/Equipment-services/Hawkeye-2000-Series.aspx
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr

Instrument	**GEORADAR-IDS RIS-HI PAVE- PC computer with application**
Laboratory affiliation	**Laboratory for transportation engineering**
Equipment category	**Testing device**
Photograph	
Short description	Antenna 2 GHz and dual frequency antenna 400-900 MHz. High speed survey wheel for distance measurement, mechanical frame to install system on vehicle and PC for data aquisition.
Main purpose	Ground Penetrating Radar for non destructive imaging of pavement layers
Technical specification	■ Aquisition speed to 130 km/h, ■ High speed survey wheel for distance measurement, ■ PC for data aquisition, ■ Multi channel control unit DAD MCH Fast-Wave.
Additional information	http://idsgeoradar.com/products/ground-penetrating-radar/ris-hi-pave
Source of funding	“Research Infrastructure for Campus-based Laboratories at the University of Rijeka” project financed by ERDF
Contacts	Marijana Cuculić, dipl.ing.građ. / marijana.cuculic@gradri.uniri.hr



5

EQUIPMENT OF THE HYDRAULIC LABORATORY

Instrument	**3D printer**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Samples preparation device, production device**
Photograph	
Short description	■ 3D printer Stratasys Connex 500 ■ Desktop computer Lenovo ThinkCentre ■ LCD LG 22M45, 2 pieces ■ UPS Riello Sentinel Pro ■ High pressure water cleaning apparatus for 3D models - Krumm
Main purpose	3D printing of physical models
Technical specification	■ Printing area 500 x 400 x 200 mm ■ PolyJet technology ■ The option of printing several different materials, 14 combination of materials within a single model ■ Resolution 600 DPI by XY, layer thickness 0.016 mm - 0.03 mm
Additional information	https://www.cati.com/3d-printing/objet-connex-printers/connex-500/
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Experimental flume – GUNT HM-162**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Test device, measuring device**
Photograph	
Short description	Experimental groove ■ Monochromatic wave generator ■ Pump for sediment transport ■ 50 piezometers ■ 10 thermometer range 0-50 C° ■ 4 moving carrier for measuring converters
Main purpose	Hydraulic testing of hydraulic structures and hydraulic processes
Technical specification	■ Cross section: 309 x 450 mm ■ Length: 12,5 m ■ Tilt range -0,5… + 2,5% ■ Maximum flow: 132 m^3/h ■ Electromagnetic flow meter ■ All parameters are controlled by computer
Additional information	http://www.gunt.de/en/products/hydraulics-for-civil-engineering/hydraulic-engineering/open-channel-flow/experimental-flume-309x450mm/070.16200/hm162/glct-1:pa-148:ca-179:pr-675
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Experimental pool with wave generator**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Test device, measuring device**
Photograph	
Short description	Experimental pool with a wave generator for testing of physical models of naval construction and deformation of waves. The experimental pool offers also the possibility of modeling ocean currents.
Main purpose	To study the interaction of water eaves and floating structures.
Technical specification	■ 600 x 300 x 40 cm ■ 6 blades with backwash sensors with the ability to generate rhythmic and nonrhytmic waves parallel to the generator or angled ■ Control of the wavelength generator by computer and specification of different spectrum of waves ■ The ability to model monochromatic waves to height of 0.25 m
Additional information	http://www4.edesign.co.uk/
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Pump (2 items)**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	Pump with non-contact flowmeter and multi-parameter interface that defines pump dynamics. All pump operation parameters are controlled by the computer.
Main purpose	The pump is used for water circulation in experiments carried out in the laboratory.
Technical specification	■ Flowrate range 9-21 m^3/h ■ Management of pump and meter data via computer ■ The increment of flow changes 0.1 l/min
Additional information	http://www.gunt.de/en/products/fluid-machinery/turbomachines/centrifugal-pumps/centrifugal-pump-standard-design/070.36511/hm365-11/glct-1:pa-148:ca-723:pr-865
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Wind tunnel**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Test device, measuring device**
Photograph	
Short description	Wind tunnel for testing aerodynamic characteristics of different physical models.
Main purpose	The wind tunnel is used to define the pressure fields over physical models in the test chamber. Data acquisition for velocity and pressure is conducted continuously on a computer.
Technical specification	■ Dimensions of the test chamber (width × height × length): 305 mm x 305 mm × 600 mm ■ Air speed: 0 to 40 m/s ■ Bus with 32 connecting places ■ 32 channels for pressure measurement ■ Scales for the measurement of lift and drag ■ Equipped with a variety of physical demonstration models ■ Visualization of the flow through the smoke generator
Additional information	https://www.tecquipment.com/subsonic-wind-tunnel
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Chamber for advanced hydrological studies**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Test device, measuring device**
Photograph	
Short description	The advanced hydrological test chamber is equipped with 8 nozzles that can be used to model various hydrological conditions.
Main purpose	The chamber has a sloping bottom and can be used to analyze surface erosion. It is equipped with two flow meters and the rainfall simulation nozzles are controlled by the computer so different rainfall conditions.
Technical specification	■ 8 nozzles into 4 groups by two jets ■ The flow through the nozzle 1-4,7 L/min ■ Maximum flow through pumps 1500 L/h ■ The water tank capacity 220 L ■ 19 meters: 300 mm WC ■ Dimensions: L x W x H: 2300 x 1100 x 1950 mm
Additional information	http://www.gunt.de/en/products/hydraulics-for-civil-engineering/hydraulic-engineering/seepage-flow/advanced-hydrological-investigations/070.14500/hm145/glct-1:pa-148:ca-181:pr-546
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

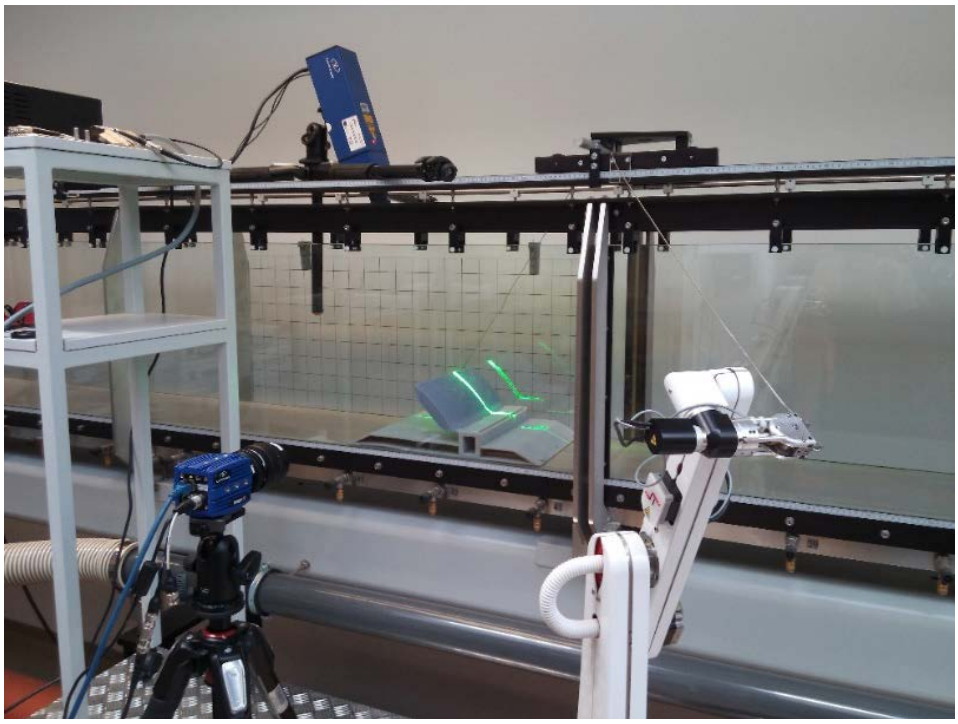
Instrument	**Vectrino profiler**
Laboratory affiliation	**Vectrino profiler**
Equipment category	**Vectrino profiler**
Photograph	
Short description	Vectrino profiler is used for measurement the velocity vector along a water column with length between of 0.5 m to 3 cm.
Main purpose	Vectrino profiler can be used in a laboratory environment, but also in-situ.
Technical specification	■ Speed range: increment of 0.1 m/s to maximum 3.0 m/s ■ Adaptive ping interval: once, once per second up to 1 / h ■ Accuracy: ± 1% measured ± 1 mm/s ■ Sampling time: 1-100 Hz ■ The minimum/maximum range: 20 mm up to 2 m ■ Embedded temperature sensor ranges from -4 °C to 32 °C ■ Resolution of the thermo sensor: 1 °C / 0.1 °C5
Additional information	http://www.nortek-as.com/en/products/velocimeters/vectrino-ii
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Vectrino (4 pieces)**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	The instrument is used to measure the velocity vector at a point in the flow space. The instrument works on the basis of ultrasonic technology, thereby significantly reducing the interaction with the measured field.
Main purpose	The measuring transducer can be used in a lab environment, but also in-situ.
Technical specification	■ Speed range: increment of 0.1 m/s to a maximum of 3.0 m/s ■ Adaptive ping interval: once, once a second to 1/h ■ Accuracy: ± 1 % of measured value ± 1 mm/s ■ Sampling time: 1-100 Hz
Additional information	http://www.nortek-as.com/en/products/velocimeters/vectrino-ii
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**Aquadopp profiler – ADCP 2MHz**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	ADCP allows measurements of characteristics of sea currents.
Main purpose	Intended for oceanography in shallow waters, < 100 m. It is used for monitoring port, research in rivers and lakes.
Technical specification	■ Operating frequency: 2.0 MHz ■ Range of measured profile: 4-10 m ■ Number of rays: 3 ■ Maximum sampling speed 1Hz ■ Sensors: temperature -4 °C to 30 °C, magnetometer (compass), pressure gauge 0-100 m
Additional information	http://www.nortek-as.com/en/products/current-profilers
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**AWAC - 1MHz (2 pieces)**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	Acoustic Waves and Currents (AWAC) is used for measuring the flow characteristics of sea currents and waves at depths up to 10 m.
Main purpose	The equipment is intended for in-situ studies of sea currents and waves.
Technical specification	■ Operating frequency: 1 MHz ■ Range of measured profile: 4-10 m ■ Number of rays: 4 ■ Modes: either alone or „online monitoring“ ■ Recording water currents: to 30 m ■ Recording of waves: maximum depth 35 m (1 MHz)
Additional information	http://www.nortek-as.com/en/products/wave-systems/awac
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**StreamPro ADCP - Compass**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	ADCP is designed for surface recording of flow characteristics in rivers and lakes.
Main purpose	The device is used to obtain the kinematic and geometric characteristics of the flow in rivers and lakes.
Technical specification	■ Frequency: 2 MHz ■ Measure the speed of the water to 3 m/s ■ Accuracy: +/- 1% ■ Resolution: 0.5 cm/s ■ The maximum number of cells by depth: 128 ■ The size of the load cells: 7-150 mm
Additional information	https://eiva.com/products/webshop/streampro-adcp-with-compass-and-tablet-pc
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr

Instrument	**PIV**
Laboratory affiliation	**Hydraulic laboratory**
Equipment category	**Measuring device**
Photograph	
Short description	The synchronized high-speed camera and laser assembly allows the reconstruction of the flow field in a flow plane.
Main purpose	The equipment offers the possibility of reconstructing the velocity field and all relevant kinematic flow parameters in the same plane (vorticity, circulation, turbulence intensity,..)
Technical specification	■ Camera: ImagerLX ■ Laser: Shuttered CW Laser ■ Timing Unit: PTU 9 (Programmable Timing Unit) ■ Optics: Sheet Optics (divergent) ■ Software: FlowMaster
Additional information	http://www.lavision.de/en/techniques/piv-ptv/
Source of funding	The development of research infrastructure on the Campus of the University of Rijeka (EFRR)
Contacts	Assoc. Prof. dr. sc. Vanja Travaš / vanja.travas@gradri.uniri.hr