

**The dependency of shrinkage value obtained by drying of aggregates on the petrographical composition**

Elaborated by	Building Testing and Research Institute, Studená 3, 826 34 Bratislava, branch Košice, Krmanova 5, 040 00 Košice
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### Comments to sheets of aggregates

Results of experiments performed within the Research and progress/advancement project : **The dependency of shrinkage value obtained by drying of aggregates on the petrographical composition** have been treated in reduced form of aggregates sheets. Each of aggregate locality has the separate aggregate list, which contains the following information:

- location
- display the aggregate specimen in scale 1:1
- composition of aggregates
- selected properties of aggregates
- strength in compression and modulus of elasticity used to determine the value of shrinkage obtained by drying

Under selection of localities producing aggregates the following matters were taken into account:

- presence of significant producers of aggregates,
- creation of the widest variability of aggregate types,
- proportional covering of the territory of Slovakia.

The fraction 8/16 or related fractions (8/11, 12.5/16) are generally displayed. The scale of the aggregate on the printed A4 sheet is 1:1.

A meaning of a term „basic mass“ also used in mineralogical description varies in dependence on the type of original rock and locality.

Andesite:

Vehec: hyalite sporadically slightly recrystallized, the smallish bars of plagioclases of largeness 0.05-0.1 mm are present.

Čierne Kľačany: hyalite, in the basic hyaline mass microliths 0.01 mm, spicules of plagioclase of largeness predominantly to 0,01 mm, wythern grains, accessory chlorite and apatit are present

Brehov: hyaline, smallish tables of plagioclases forming intersert structure with hypidiomorphic to idiomorphic grains of accessory magnetite. Clusters of carbonates - ankerite (to 0.2 mm) grains are present in the basic mass.

melaphyre

Sološnica hyaline

Dubina: fine-grained melaphyre formed by translucent outwards vulcanic glass, in which, smallish, thin bars of plagioclase to largeness 0.15 mm are present. The orientation of these bars shows up the fluidic structure.

Malužiná fine-grained recrystallized, formed by smallish grains of quartz and plagioclase. The diffused grains of hematite and rarely the thin strings of quartz occur in it.

Basalt

Čarnovce: hyaline or recrystallized, formed by vulcanic glass with smallish grains of olivine and plagioclase.

Dioritic porphyrite

Vyšná Šebastová: fine-grained, slightly recrystallized and vitrified. Sporadically smallish grains of minerals forming porphyric phenocrysts.

The selected properties of aggregates were tested using concrete specimens according to the Standard STN EN 1367-4 for testing the shrinkage value of aggregate by drying. The value of water-absorption for fraction 0/20 was stated by calculation from those obtained for fractions 0/4 and 4/20.

The tests of compressive strength and modulus of elasticity of concrete were accomplished on concrete specimens with the same composition as for concrete specimens used to determine the shrinkage values of aggregates.

The compressive strengths were obtained after 28 days of concrete hardening. The given values represent the mean value from three tests interpreted as cube strengths. The tests were realized on cubes (150x150x150 mm) and cylinders (150x300 mm and 100x200 mm). The cylindrical strength was transformed to cubic strength applying factors suggested by firm Proceq.

The values of modulus of elasticity represent the 28 day old concrete secant values determined for the cylindrical test specimen 150x300 mm. The values are the mean values from two tests measured on the cylinder 150x300 mm and cylinder 100 x200. The transformation was carried out using the size- factor suggested by firm Proceq.

The measured values can not be accepted as definite because the properties of aggregates vary during the production, so they are not invariable. However, values determined under the same testing conditions on the specimens with the identical weighted contents (only one amount of cement was used) and strictly regulated granularity curve of aggregates, form specific relation between mechanical properties of concrete and aggregates used in concrete mixture.

The presentation of results by aggregate sheets makes it possible to obtain basic review about influence of different types of aggregates on the important properties of concrete, which can be utilized whether for the design of concrete mixture or for the specification of calculation to guess the shrinkage caused deformation according to STN EN 1992-1-1.











**LOCALITY : POVAŽANY**



**MINERAL COMPOSITION :**  
 60% sandstone, 25% granite,  
 10% quartz

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,1  
 aggregate size 4/20 : 1,2  
 aggregate size 0/20 : 0,7

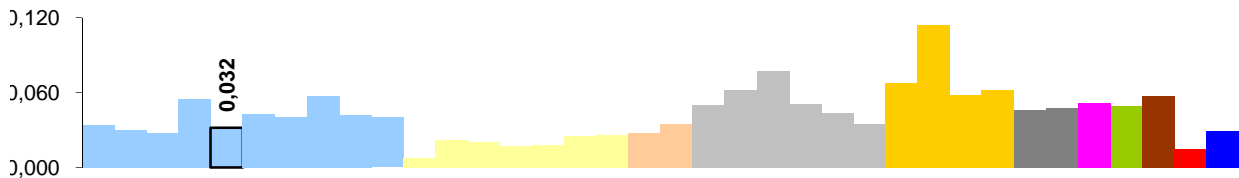
**SHAPE INDEX  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,45  
 aggregate size 4/20 : 2,64

**TVAROVÝ INDEX : 11 %**

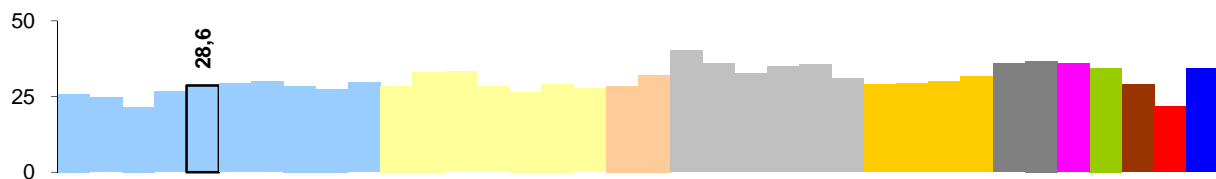


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

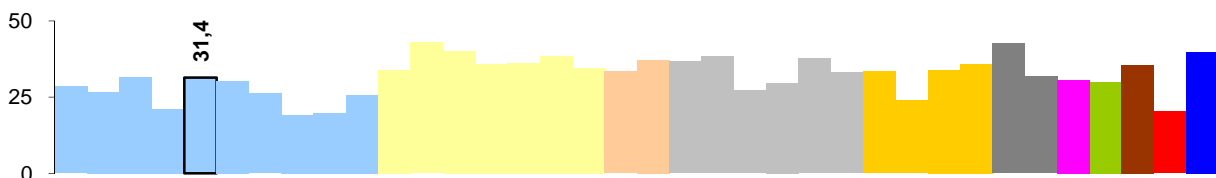
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | < **amphibolite** ^      ^      ^      > | < **baryte**      > | < **BF slag**      > | <

(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.



**LOCALITY : VRÚTKY - LIPOVEC**



**MINERAL COMPOSITION :**  
 65% quartz, 12% K-feldspar,  
 3% mica, 7% vulcanite,  
 1% limonite, 13% clayey filler

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,1  
 aggregate size 4/20 : 1,0  
 aggregate size 0/20 : 0,6

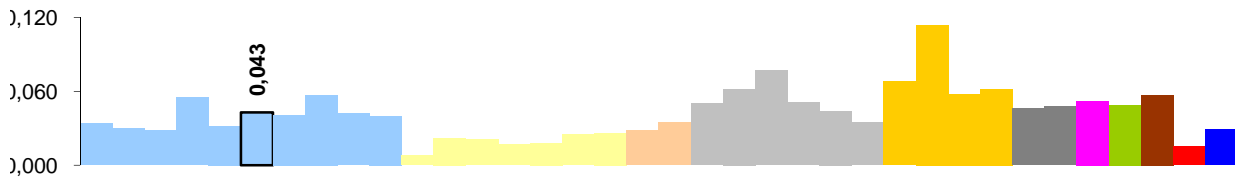
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,71  
 aggregate size 4/20 : 2,67

**SHAPE INDEX : 10 %**

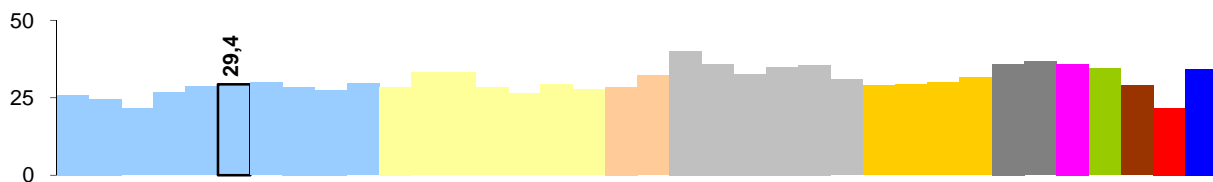


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | <      **amphibolite**      **baryte**      **BF slag**      > | <

(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.





**LOCALITY : PALÚDZKA - LIPTOVSKÁ MARA**



**MINERAL COMPOSITION :**  
 52% granodiorite, 5% aplite,  
 20% sandstone, 5% quartzite,  
 18% limestone

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,1  
 aggregate size 4/20 : 0,9  
 aggregate size 0/20 : 0,6

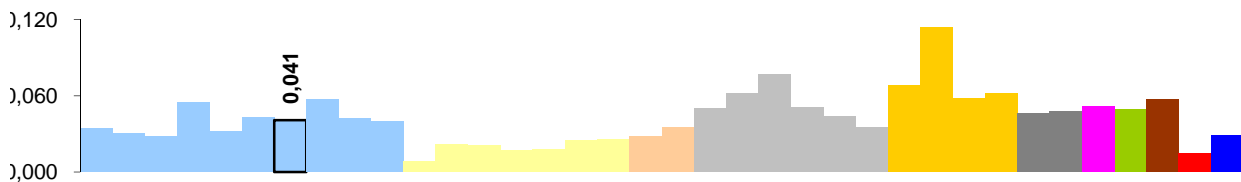
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,51  
 aggregate size 4/20 : 2,56

**SHAPE INDEX : 22 %**

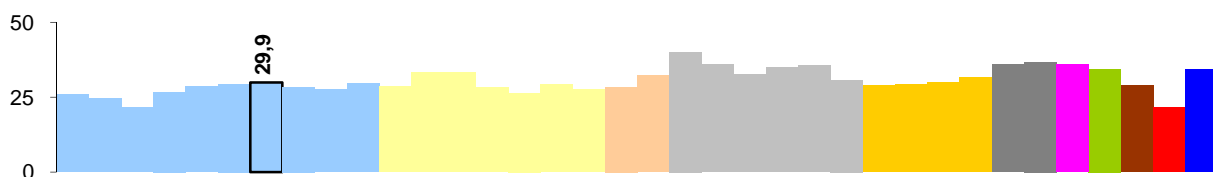


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



|< **GRAVELS** > |< **SEDIMENTARY ROCKS** >|< **IGNEOUS ROCKS** >|< **amphibolite** ^ ^ ^ **baryte** **BF slag**

(limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.



**LOCALITY : BATIZOVCE**



**MINERAL COMPOSITION :**  
 37% quartz, 50% plagioclase,  
 11% biotite, 2% muscovite,  
 0,1% magnetite, 0,1% apatite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,3  
 aggregate size 4/20 : 1,1  
 aggregate size 0/20 : 0,8

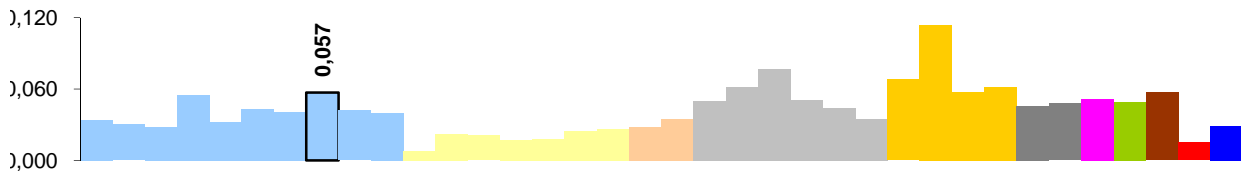
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,62  
 aggregate size 4/20 : 2,65

**SHAPE INDEX : 9 %**

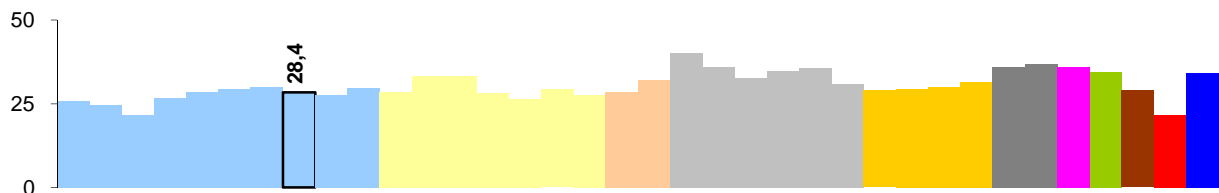


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

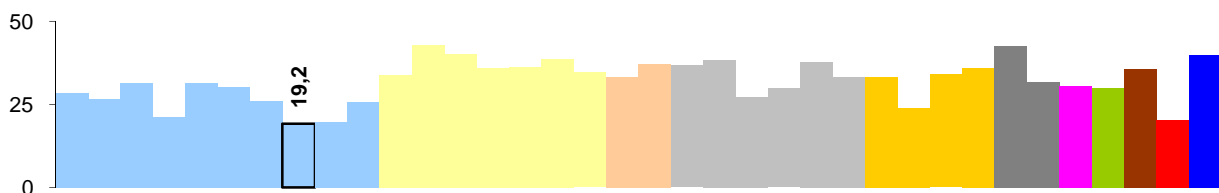
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | <      **amphibolite**      **baryte**      **BF slag**      > | <

(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.







**LOCALITY : GEČA - ČAŇA**



**MINERAL COMPOSITION :**  
 7% amphibolite, 36% gneiss,  
 10% granitoid, 17% quartz,  
 20% calcite and dolomite,  
 10% sandstone

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,4  
 aggregate size 4/20 : 1,2  
 aggregate size 0/20 : 0,9

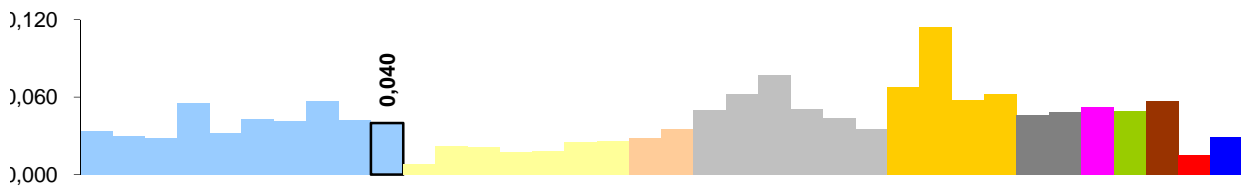
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,63  
 aggregate size 4/20 : 2,69

**SHAPE INDEX : 16 %**

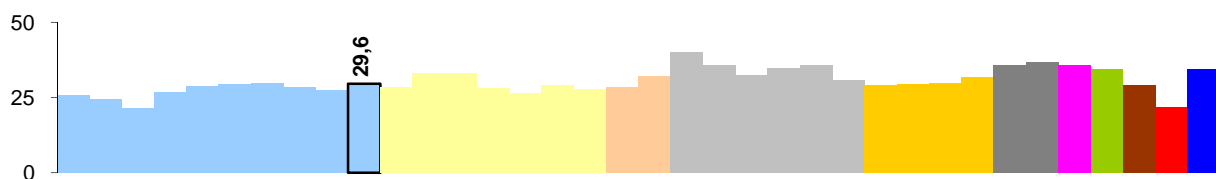


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

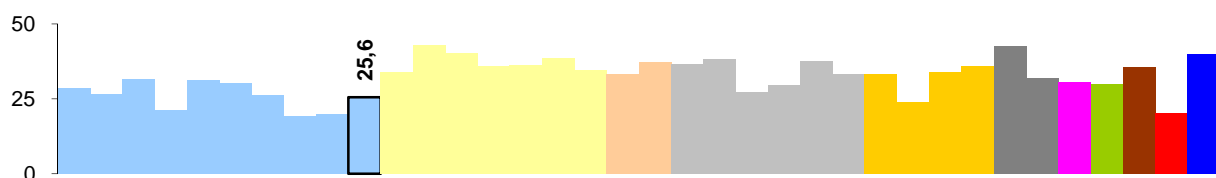
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATICKÝ MODUL PRUŽNOSTI BETÓNU V TLAKU PODĽA STN ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | <      **amphibolite**      **baryte**      **BF slag**      > | <

(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

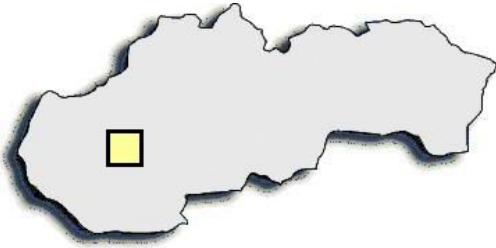
Note: Composition of concrete according to EN 1367-4, table 1.





# LIMESTONE

## LOCALITY : ŽÍRANY



**MINERAL COMPOSITION :**  
93% calcite, 4% dolomite

**WATER ABSORPTION (%)**  
aggregate size 0/4 : 0,4  
aggregate size 4/20 : 0,4  
aggregate size 0/20 : 0,4

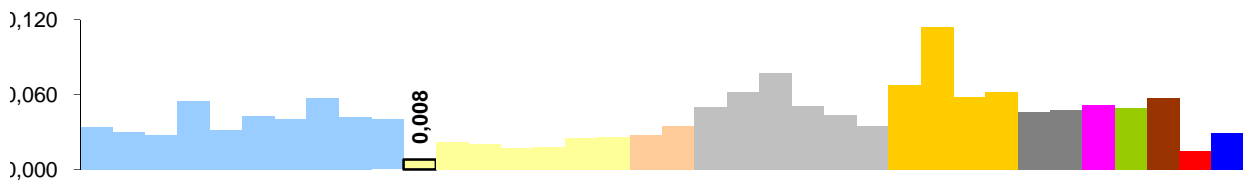
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
aggregate size 0/4 : 2,74  
aggregate size 4/20 : 2,70

**SHAPE INDEX : 4 %**

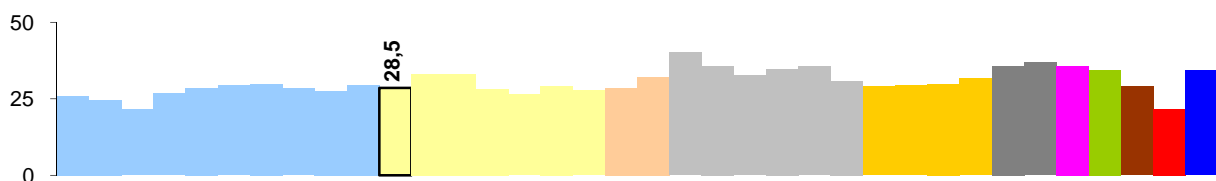


### COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :

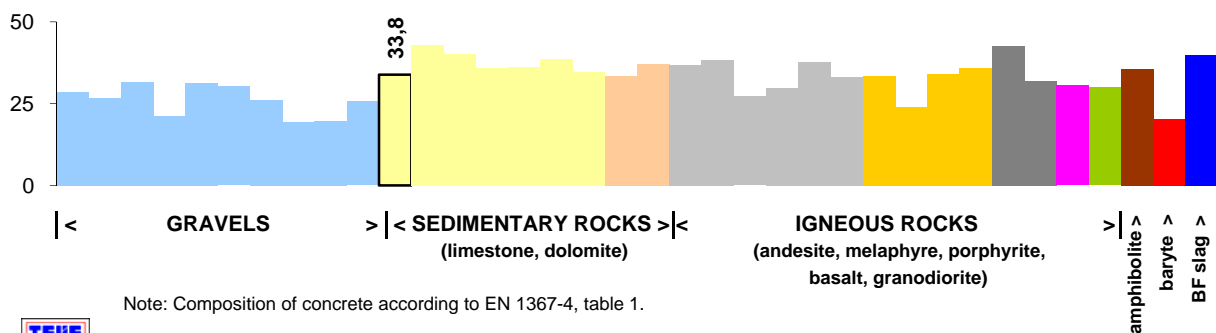
#### DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)



#### COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)



#### STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)



Note: Composition of concrete according to EN 1367-4, table 1.





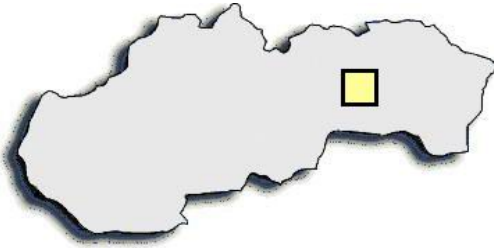








**LOCALITY : OLCNAVA**



**MINERAL COMPOSITION :**  
 100% calcite,  
 occasional limonite and pyrite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,5  
 aggregate size 4/20 : 0,5  
 aggregate size 0/20 : 0,5

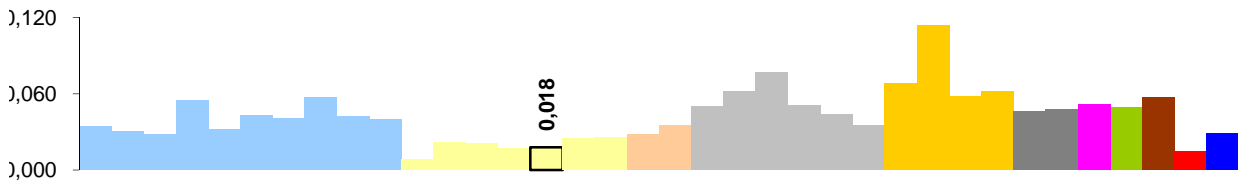
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,62  
 aggregate size 4/20 : 2,70

**SHAPE INDEX : 5 %**

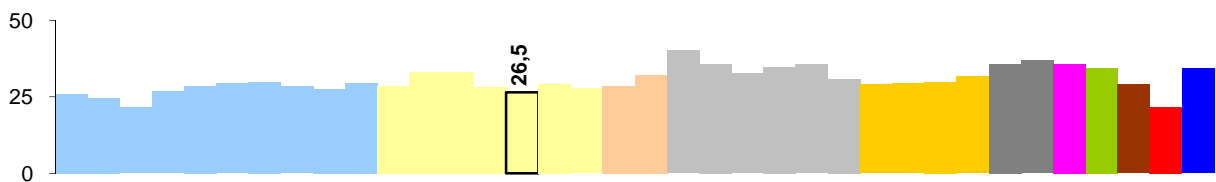


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

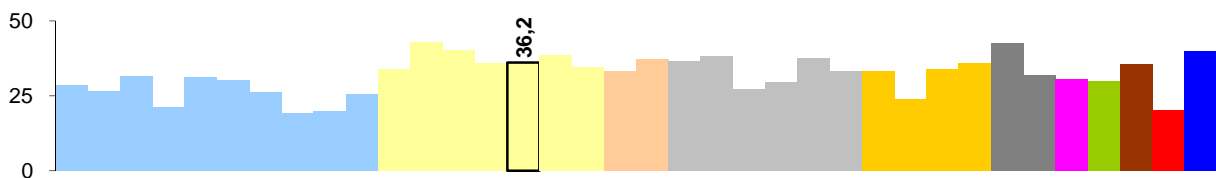
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | < **amphibolite**      **baryte**      **BF slag**      > | <

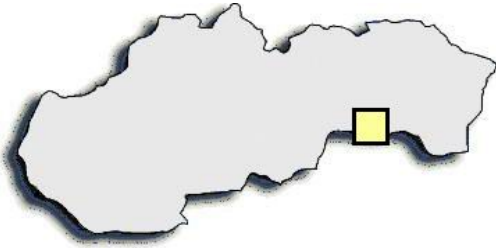
(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.



# LIMESTONE

## LOCALITY : VČELÁRE



**MINERAL COMPOSITION :**  
 100% calcite,  
 occasional hematite and limonite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 1,3  
 aggregate size 4/20 : 0,2  
 aggregate size 0/20 : 0,7

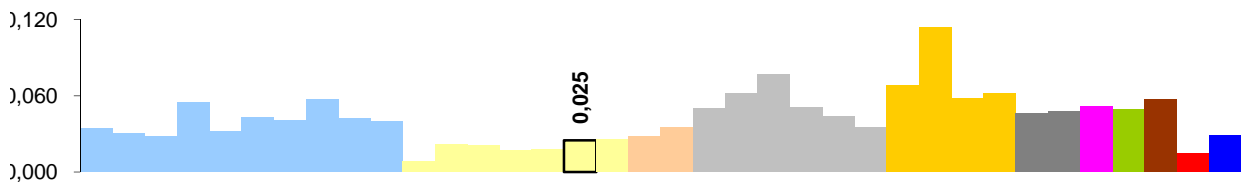
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,69  
 aggregate size 4/20 : 2,71

**SHAPE INDEX : 17 %**

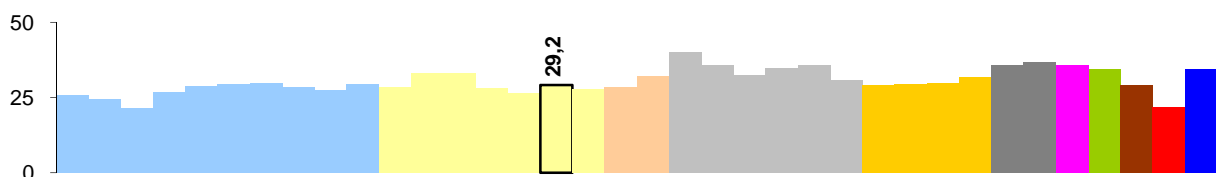


### COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :

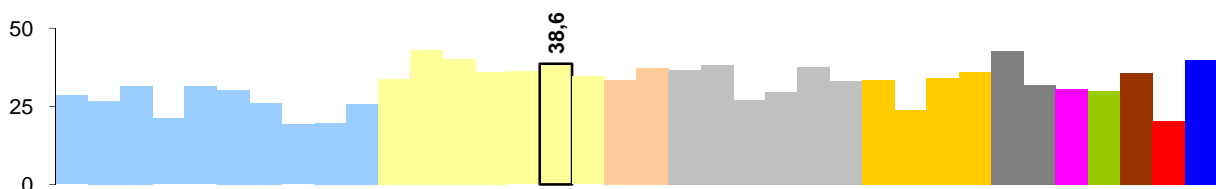
#### DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)



#### COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)



#### STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)



|<    GRAVELS    > |< SEDIMENTARY ROCKS >|<    IGNEOUS ROCKS    >|<    amphibolite ^    baryte ^    BF slag ^

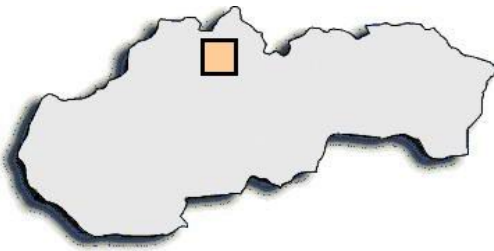
(limestone, dolomite)    (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.





**LOCALITY : RUŽOMBEROK**



**MINERAL COMPOSITION :**  
100% dolomite

**WATER ABSORPTION (%)**  
aggregate size 0/4 : 0,5  
aggregate size 4/20 : 0,6  
aggregate size 0/20 : 0,5

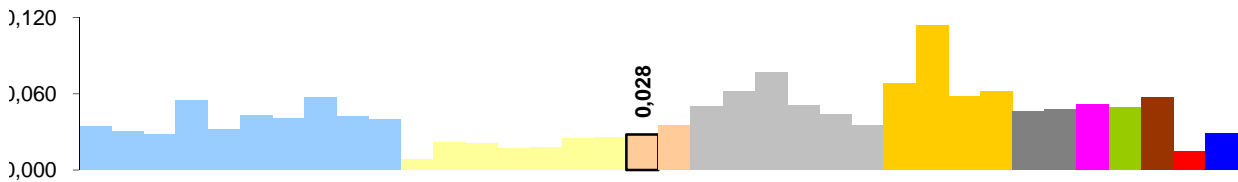
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
aggregate size 0/4 : 2,59  
aggregate size 4/20 : 2,61

**SHAPE INDEX : 18 %**

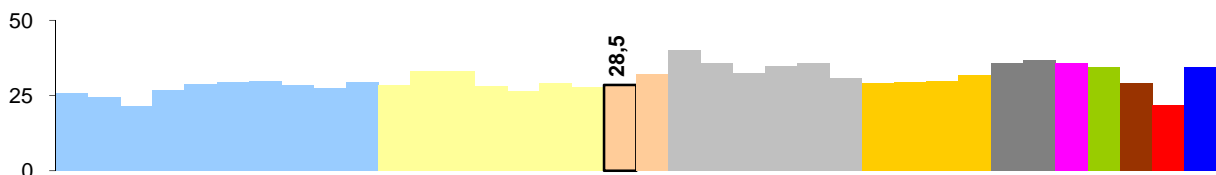


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

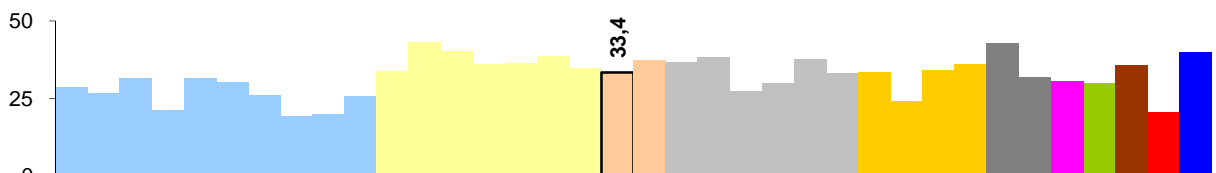
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



| <      **GRAVELS**      > | < **SEDIMENTARY ROCKS** > | <      **IGNEOUS ROCKS**      > | < **amphibolite**      **baryte**      **BF slag**      > | <

(limestone, dolomite)      (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.





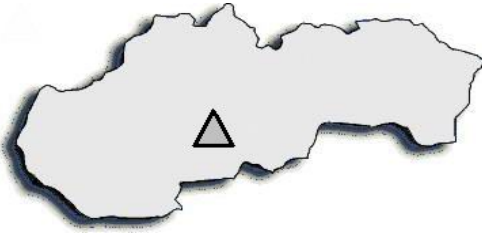








**LOCALITY : NOT SPECIFIED**



**MINERAL COMPOSITION :**  
 43% basic mass,  
 38% plagioclase, 10% pyroxenite,  
 0,9% ore minerals

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 3,7  
 aggregate size 4/20 : 3,8  
 aggregate size 0/20 : 3,8

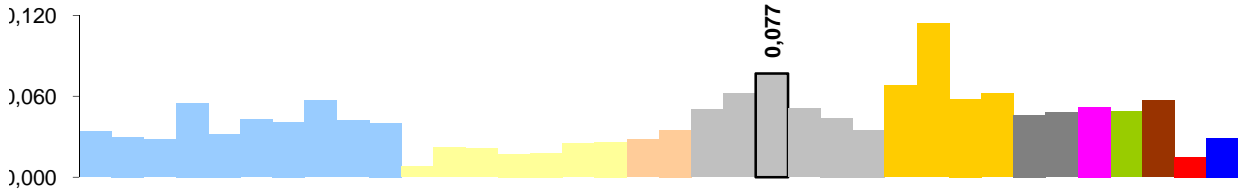
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,57  
 aggregate size 4/20 : 2,60

**SHAPE INDEX : 18 %**

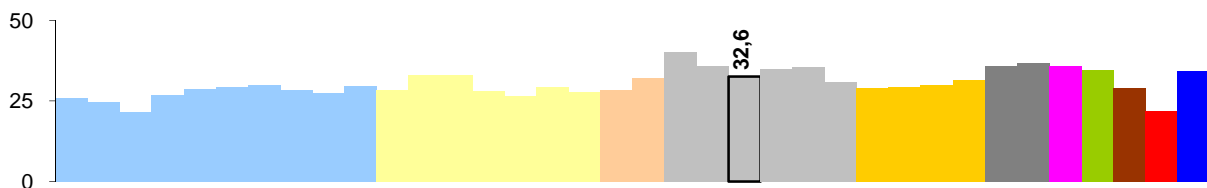


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

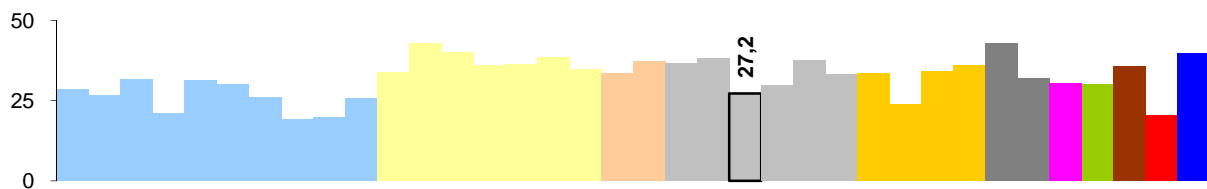
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS (andesite, melaphyre, porphyrite, basalt, granodiorite) > | > amphibolite ^ baryte ^ BF slag ^

Note: Composition of concrete according to EN 1367-4, table 1.







**LOCALITY : VECHEC**



**MINERAL COMPOSITION :**  
 43% basic mass,  
 42% plagioclase  
 (oligoclase - andesine),  
 15% klinopyroxen,  
 0,4% ore minerals

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,5  
 aggregate size 4/20 : 1,6  
 aggregate size 0/20 : 1,1

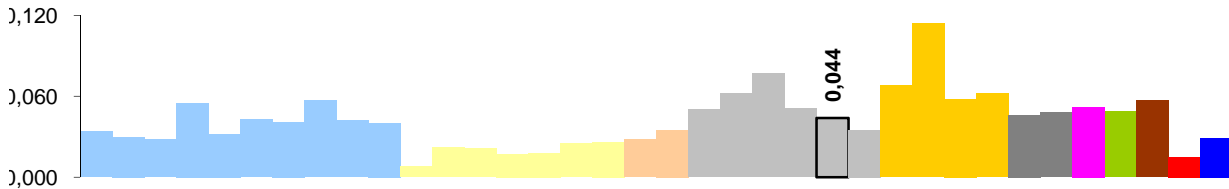
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,71  
 aggregate size 4/20 : 2,75

**SHAPE INDEX : 13 %**

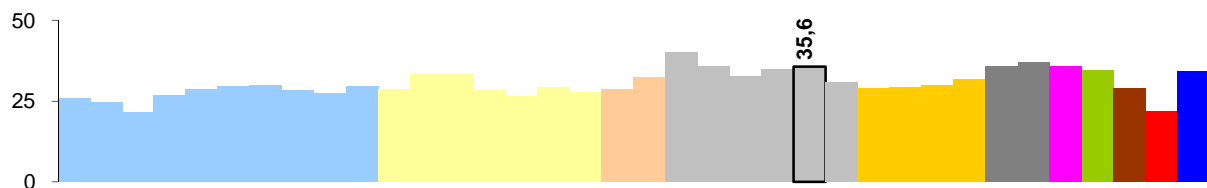


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

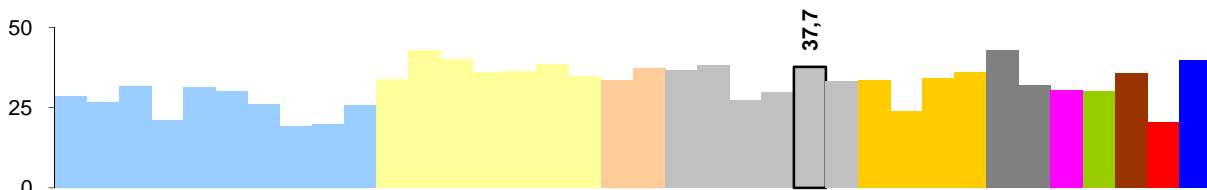
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS > | > amphibolite ^ baryte ^ BF slag ^  
 (limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.







LOCALITY : SOLOŠNICA



**MINERAL COMPOSITION :**  
 70% plagioclase, 20% klinopyroxen,  
 10% albite, chlorite, K-feldspar,  
 quartz, epidote, calcite, dolomite,  
 baryte

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 1,0  
 aggregate size 4/20 : 0,9  
 aggregate size 0/20 : 0,9

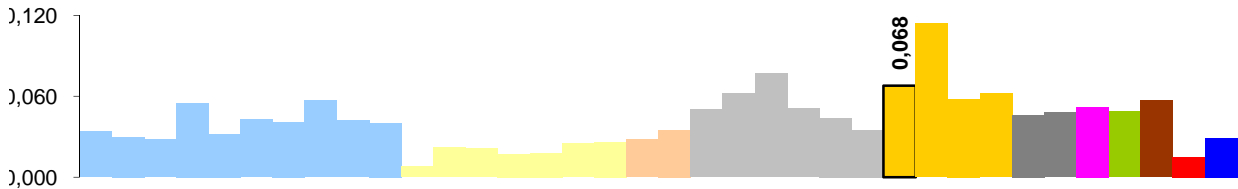
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,65  
 aggregate size 4/20 : 2,77

**SHAPE INDEX : 4 %**

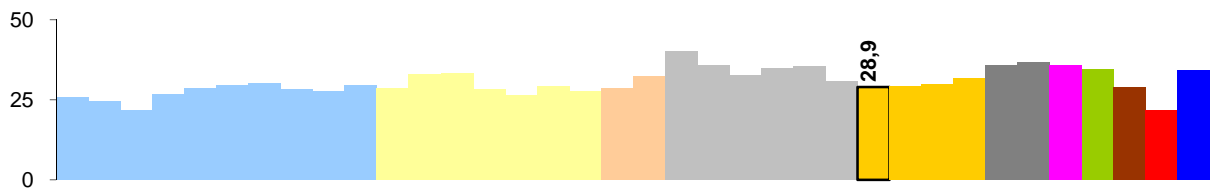


COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :

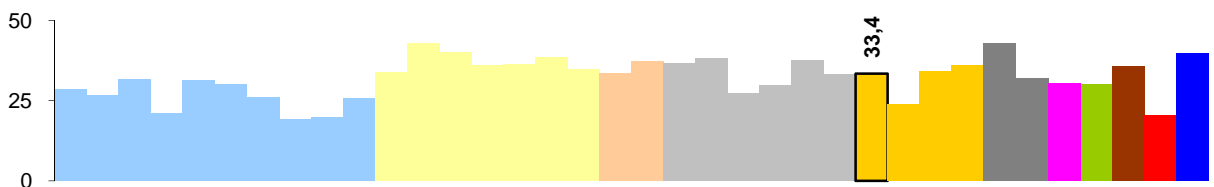
DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)



COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)



STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)



< GRAVELS > | < SEDIMENTARY ROCKS > | IGNEOUS ROCKS > |  
 (limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite) amphibolite ^ baryte ^ BF slag ^

Note: Composition of concrete according to EN 1367-4, table 1.





**LOCALITY : NOT SPECIFIED**



**MINERAL COMPOSITION :**  
 49% plagioclase, 16% volcanic glass,  
 14% klinopyroxen-augite,  
 12% sklo hypersthene, 8% olivine,  
 occasional magnetite, pyrite,  
 chalcopyrite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,2  
 aggregate size 4/20 : 1,3  
 aggregate size 0/20 : 0,8

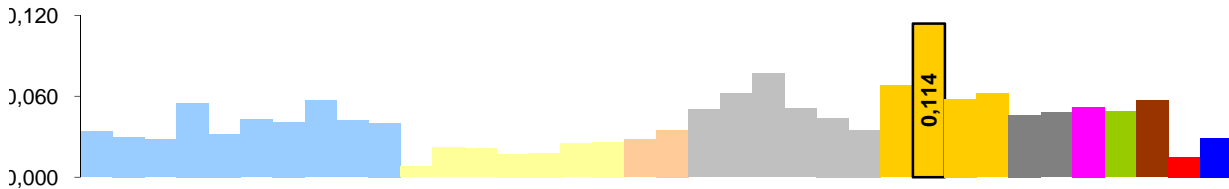
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,68  
 aggregate size 4/20 : 2,87

**SHAPE INDEX : 15 %**

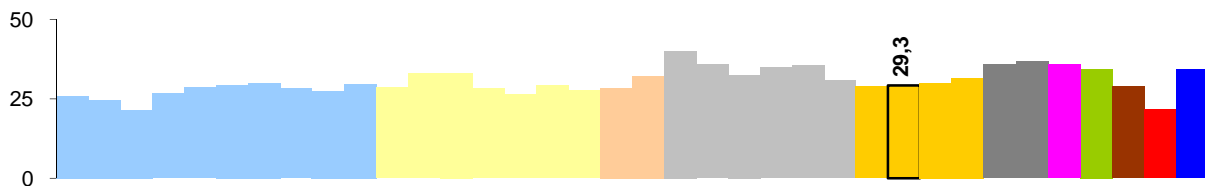


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

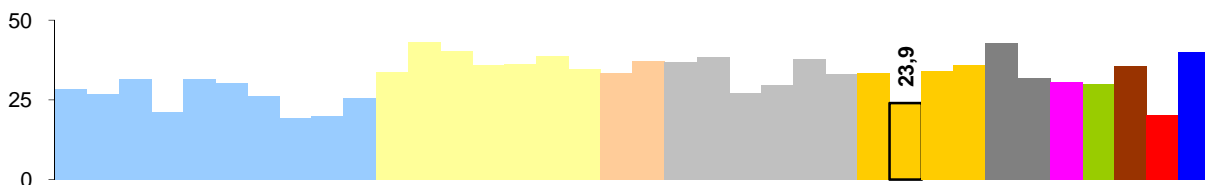
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS > | > amphibolite ^ baryte ^ BF slag ^  
 (limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.



## MELAPHYRE PORPHYRITE

**LOCALITY : LIPTOVSKÁ PORÚBKA - MALUŽINÁ**



**MINERAL COMPOSITION :**  
 72% basic mass,  
 25% plagioclase, 2% quartz,  
 1% ore minerals

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,3  
 aggregate size 4/20 : 0,6  
 aggregate size 0/20 : 0,5

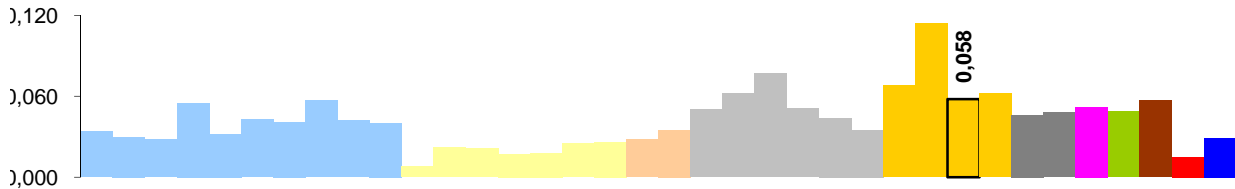
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,66  
 aggregate size 4/20 : 2,85

**SHAPE INDEX : 6 %**

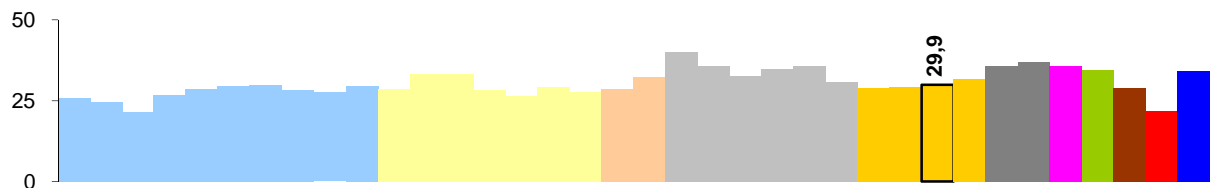


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

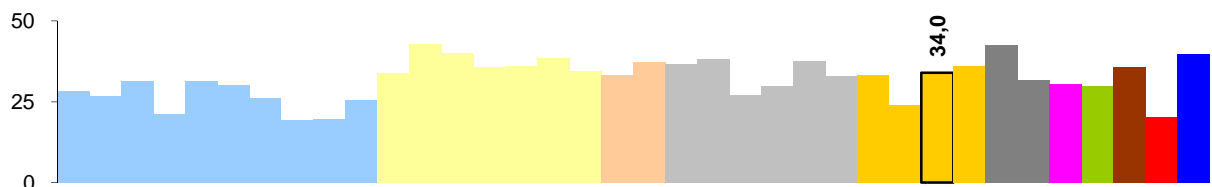
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | IGNEOUS ROCKS (andesite, melaphyre, porphyrite, basalt, granodiorite) | > amphibolite ^ baryte ^ BF slag ^

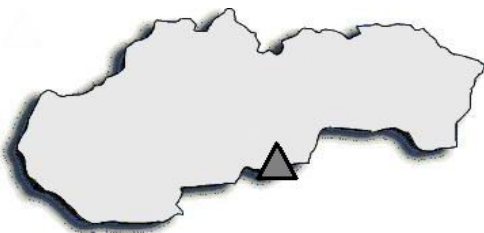
Note: Composition of concrete according to EN 1367-4, table 1.







**LOCALITY : HUSINÁ**



**MINERAL COMPOSITION :**  
 20% olivine, 30% plagioclase,  
 45% volcanic glass,  
 5% ore materials

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 1,7  
 aggregate size 4/20 : 1,7  
 aggregate size 0/20 : 1,7

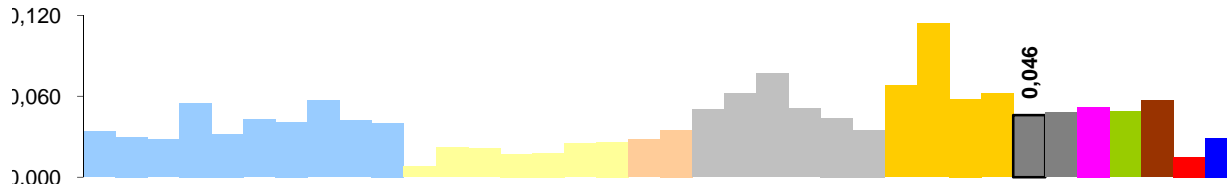
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,79  
 aggregate size 4/20 : 2,82

**SHAPE INDEX : 25 %**

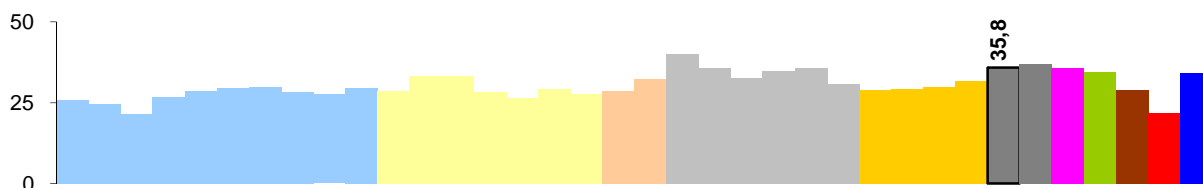


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

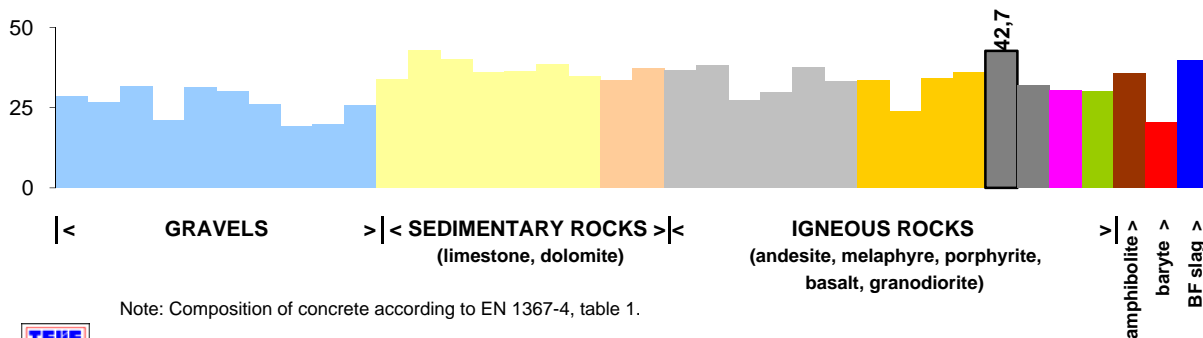
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



Note: Composition of concrete according to EN 1367-4, table 1.

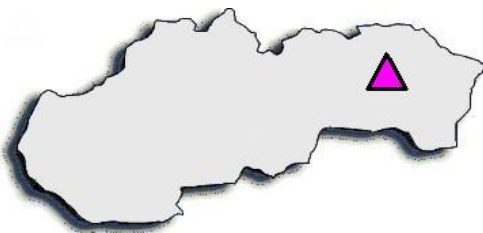






# DIORITIC PORPHYRITE

**LOCALITY : VYŠNÁ ŠEBASTOVÁ - MAGLOVEC**



**MINERAL COMPOSITION :**  
 45% basic mass,  
 41% plagioclase, 5% pyroxite,  
 8% amphibole, 1% ore materials

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 1,1  
 aggregate size 4/20 : 2,1  
 aggregate size 0/20 : 1,7

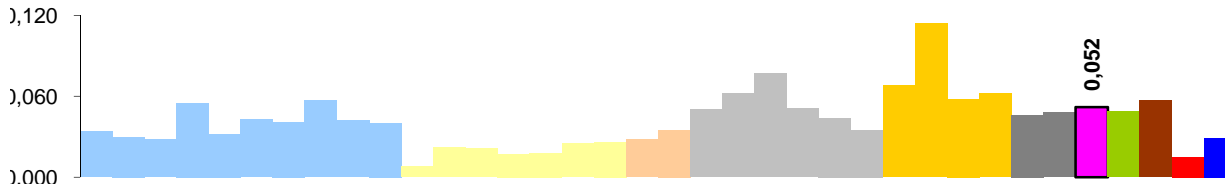
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,44  
 aggregate size 4/20 : 2,62

**SHAPE INDEX : 9 %**

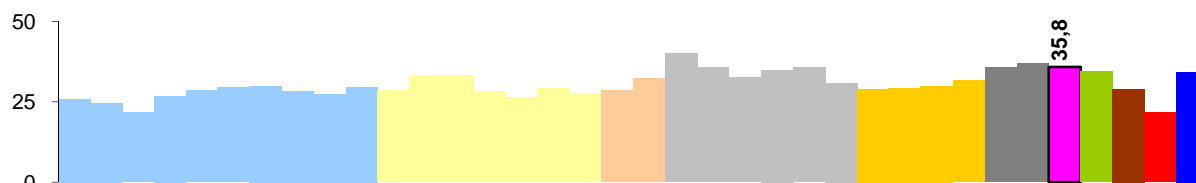


## COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :

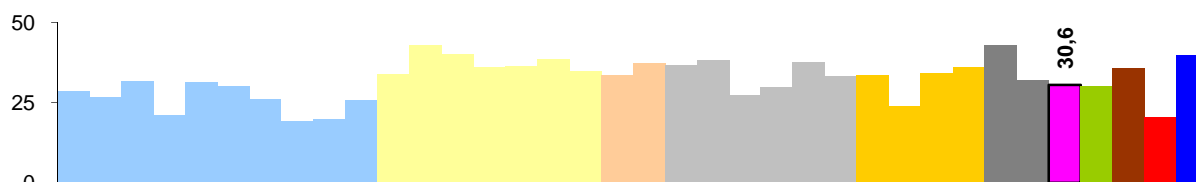
### DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)



### COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)



### STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS > | > amphibolite ^ baryte ^ BF slag ^  
 (limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.



## BIOTITIC GRANODIORITE

**LOCALITY : KOŠICE - HRADOVÁ**



**MINERAL COMPOSITION :**  
 25% quartz, 44% plagioclase,  
 15% biotite, 10% carbonate,  
 5% ore materials, 1% apatite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,1  
 aggregate size 4/20 : 0,7  
 aggregate size 0/20 : 0,5

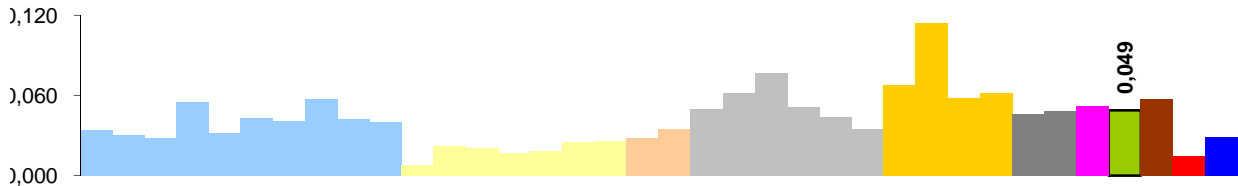
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,77  
 aggregate size 4/20 : 2,71

**SHAPE INDEX : 6 %**

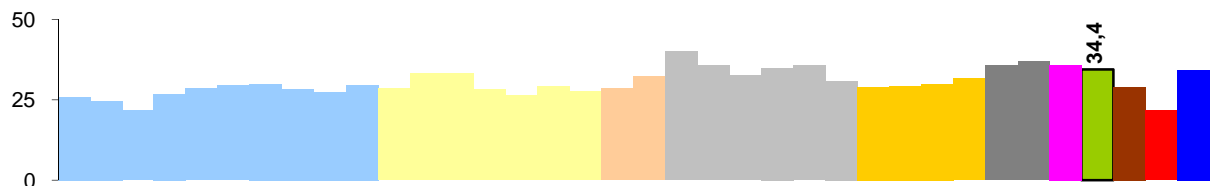


### COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :

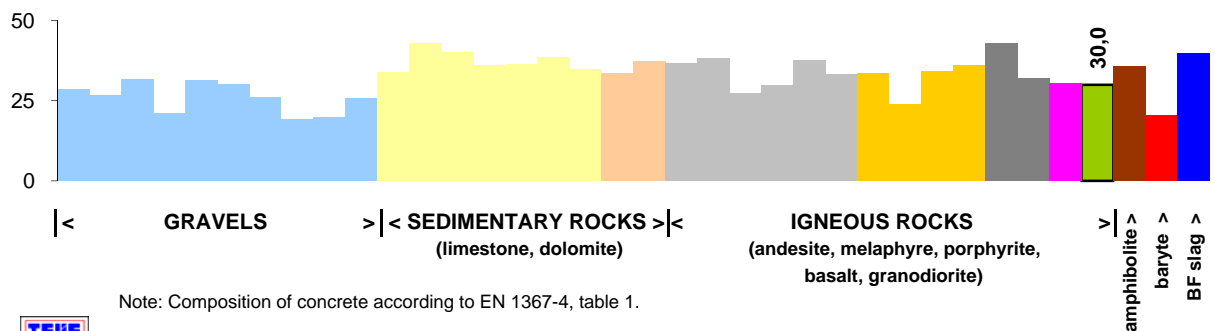
#### DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)



#### COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)



#### STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)



Note: Composition of concrete according to EN 1367-4, table 1.





**LOCALITY : VYŠNÝ KLÁTOV**



**MINERAL COMPOSITION :**  
 85% amphibolite, 10% plagioclase,  
 3% zoizit, 2% hematite and quartz

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,4  
 aggregate size 4/20 : 0,9  
 aggregate size 0/20 : 0,7

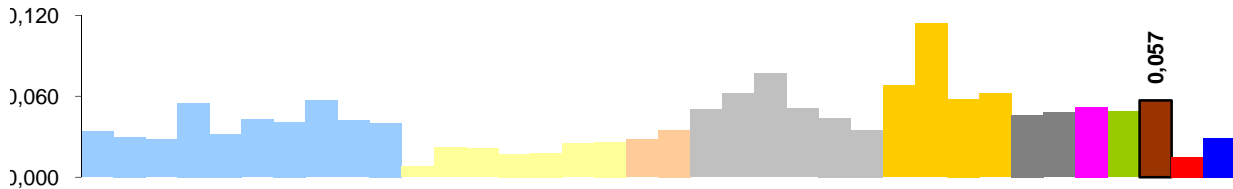
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,87  
 aggregate size 4/20 : 2,92

**SHAPE INDEX : 30 %**

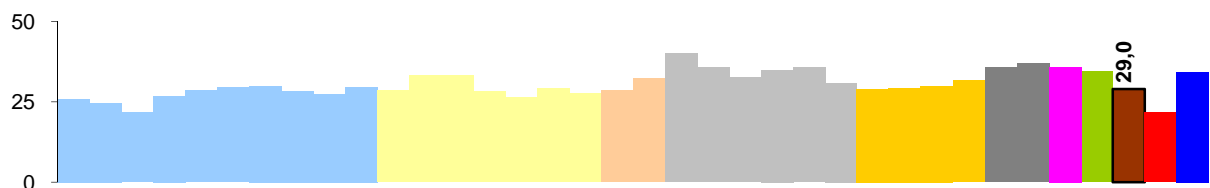


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

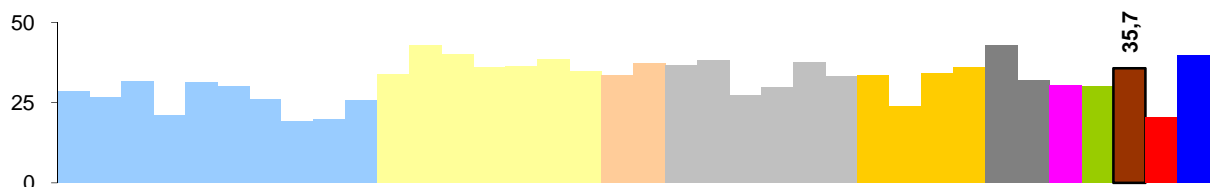
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS > | > amphibolite ^ baryte ^ BF slag ^

(limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.





**LOCALITY : PORÁČ I**



**MINERAL COMPOSITION :**  
 45 % baryte,  
 rest quartz, siderite, limonite

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 0,1  
 aggregate size 4/20 : 0,4  
 aggregate size 0/20 : 0,3

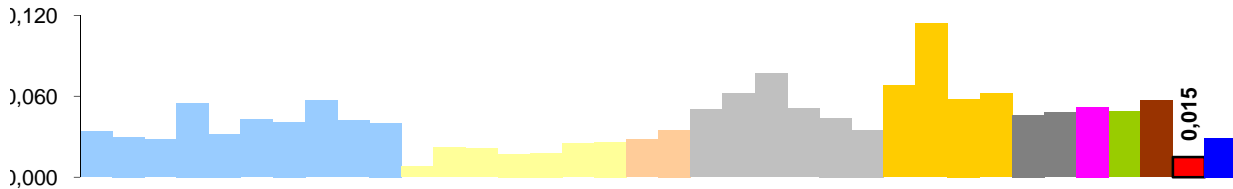
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg.m<sup>-3</sup>)**  
 aggregate size 0/4 : 3,58  
 aggregate size 4/20 : 3,83

**SHAPE INDEX : 8 %**

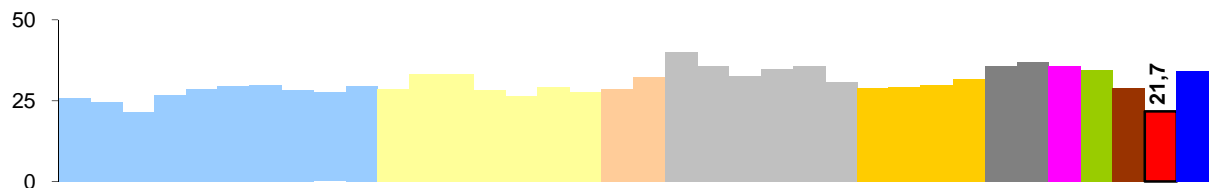


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

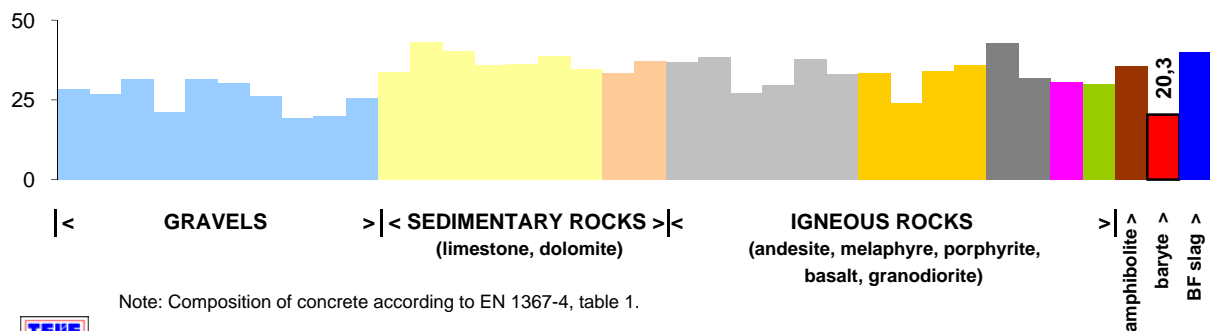
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**

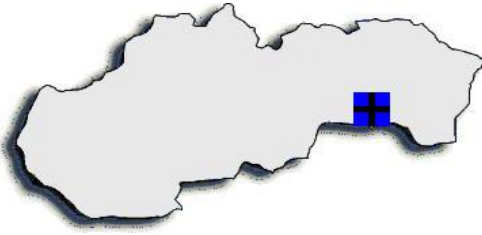


**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



Note: Composition of concrete according to EN 1367-4, table 1.

**LOCALITY : U.S. STEEL KOŠICE**



**CHEMICAL COMPOSITION :**  
 36% SiO<sub>2</sub>, 37% CaO, 12% MgO,  
 10% Al<sub>2</sub>O<sub>3</sub>, 1% FeO, 1% S

**WATER ABSORPTION (%)**  
 aggregate size 0/4 : 2,7  
 aggregate size 4/20 : 6,0  
 aggregate size 0/20 : 4,6

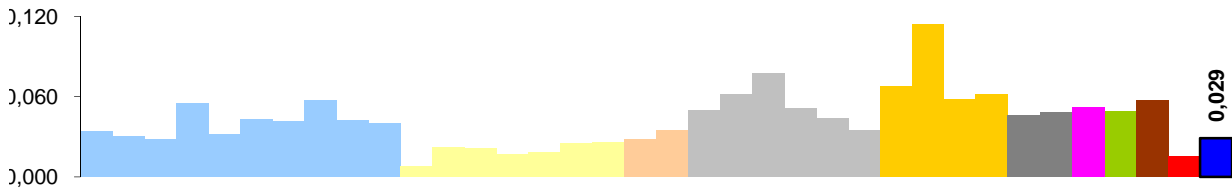
**PARTICLE DENSITY  $\rho_{ssd}$  (Mg·m<sup>-3</sup>)**  
 aggregate size 0/4 : 2,68  
 aggregate size 4/20 : 2,47

**SHAPE INDEX : 6 %**

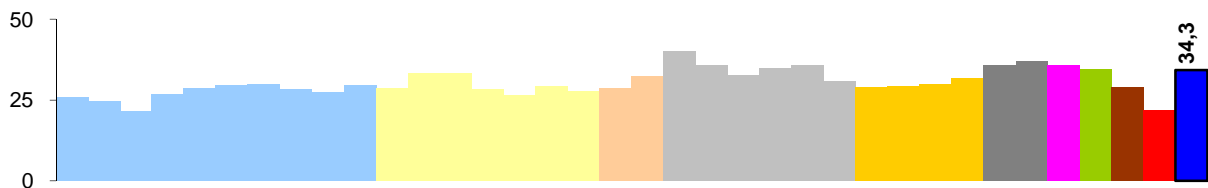


**COMPARISON OF SELECTED PROPERTIES WITH OTHER LOCALITIES :**

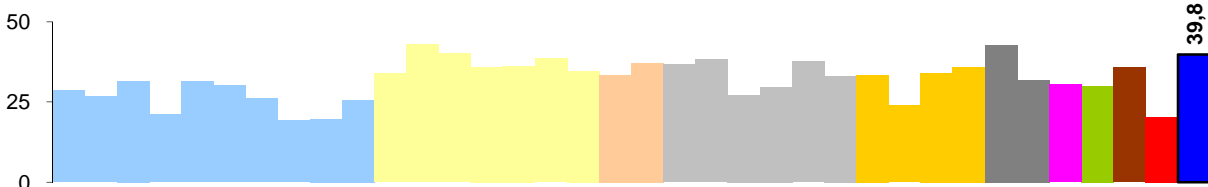
**DRYING SHRINKAGE OF AGGREGATE ACCORDING TO EN 1367-4 (%)**



**COMPRESSIVE STRENGTH OF CONCRETE ACCORDING TO EN 12390-3 (MPa)**



**STATIC MODULUS OF ELASTICITY OF CONCRETE IN COMPRESSION ACC. TO ISO 6784 (GPa)**



< GRAVELS > | < SEDIMENTARY ROCKS > | < IGNEOUS ROCKS > | > amphibolite ^ baryte ^ BF slag ^  
 (limestone, dolomite) (andesite, melaphyre, porphyrite, basalt, granodiorite)

Note: Composition of concrete according to EN 1367-4, table 1.

