



## Annex 4 Methodology of determining categories of individual line sections

For determining charges of running of trains, three line categories must be established because of differences in quality of certain sectors of the infrastructure (quality criteria of the infrastructure):

- lines of category I
- lines of category II
- lines of category III

Categorisation of certain open line infrastructure sections is based on categorisation parameters showed by the table. Parameters must be taken into consideration with weighting values as follows.

	<b>Categorisation parameters</b>	<b>Weight value (% <math>\alpha_i</math>)</b>	<b>Factors defining service quality</b>
Track parameters	Track speed (km/h) ( $\alpha_1$ )	15	Reduced speed applicable on the section because of permanent signal warning to slow down
	Axle load (ton) ( $\alpha_2$ )	15	Axle load permitted on the track section
	Number of tracks ( $\alpha_3$ )	15	One / two / more
	Electrification ( $\alpha_4$ )	10	yes / no
Parameters of signalling and communication	Station signalling and safety installation ( $\alpha_5$ )	5	Type of station signalling and safety installation used on the track section
	Line signalling and safety installation ( $\alpha_6$ )	5	Type of line signalling and safety installation used on the track section
	Ground-train radio ( $\alpha_7$ )	5	GSM-R/ yes/ no
	Train protection ( $\alpha_8$ )	5	Train protection system used on the track section
Traffic parameters	Number of blocks ( $\alpha_9$ )	5	Number of blocks on the track section
	Type of traffic control ( $\alpha_{10}$ )	10	Type of traffic control on the track section
Economical parameters	Capacity utilisation ( $\alpha_{11}$ )	10	Shows marketability, exploitation of the track section (number of allocated train paths)

### **Criteria defining the service quality of railway lines**

After determining categorisation parameters characterizing the quality of the track section, the sections have to be ranked as a line of category I, or II or III as follows. Scales and quality multiplier values ( $\beta_j$ ) belonging to certain categorisation parameters can be seen below under the same title.

Quality value of the track section (open line index):

$$S_z = \sum_{i,j=1}^{12} (\alpha_i \times \beta_j)$$

- If  $S_z \geq 0,7$ , the line section belongs to category I.
- If  $0,7 > S_z \geq 0,4$ , the line section belongs to category II
- If  $S_z < 0,4$ , the line section belongs to category III.

### **Quality multiplier values ( $\beta_j$ ) belonging to categorisation parameters characteristic of the individual track section**

#### 1. Track speed ( $\beta_1$ )

Maximum speed applicable on the track section	$\beta_s$
$s < 20$ km/h	0 %
$20$ km/h $\leq s < 40$ km/h	20 %
$40$ km/h $\leq s < 60$ km/h	40 %
$60$ km/h $\leq s < 80$ km/h	60 %
$80$ km/h $\leq s < 100$ km/h	70 %
$100$ km/h $\leq s < 120$ km/h	80 %
$120$ km/h $\leq s$	100 %

#### 2. Axle load ( $\beta_2$ )

$\beta_2$  = maximum axle load applicable on the track section / 22,5 (ton)  $\times$  100%

#### 3. State of electrification ( $\beta_3$ )

$\beta_3$  = 100%, if the section is electrified, in other cases  $\beta_3$  = 0%

#### 4. Number of tracks ( $\beta_4$ )

$\beta_4$  = 100%, if the section is a double track or multiple-track section, in any other case

$\beta_4$  = 0%

5. Type of line signalling and safety installation ( $\beta_5$ )

*The following quality multiplier can be applied depending on the type of line signalling and safety installation used on the given line section:*

Type of line signalling and safety installation	$\beta_5$
No, V reporting	0
SH	40
EB, SH ell., RPB, Sz ell., SIEMBA	90
AUTV, ZG 62	100

Abbreviations of the above tables stand for:

V reporting	train reporting safety equipment
SH	Siemens & Halske type block system
EB	Contra flow-run safety equipment
SH ell.	Siemens & Halske type block system with contra-flow-run support
RPB	Slovak contra-flow-run safety equipment
Sz ell.	Soviet contra-flow-run safety equipment
SIEMBA	Siemens electronic contra-flow-run safety equipment
AUTV	automatic block with train protection
ZG 62	Alcatel contra-flow-run safety equipment

6. Type of station signalling and safety installation ( $\beta_6$ )

The following quality multiplier can be applied depending on the type of station signalling and safety installation used on the given line section:

Type of station signalling and safety installation	$\beta_6$
No installation or EÁ	0
NBJF	15
KA, KAE	25
KR	35
ER, SH, FM, VES, INT-VES	80
FOND, INT, D55, KA69, SZKA, WSSB, D70V, ESTW-ELEKTRA-D55, KSW-90	90
D67, D70, SZT, ELEKTRA, SIMIS	100

Abbreviations of the above tables stand for:

EÁ	Other station and branching-off equipment
NBJF	Not interlocked protective signal equipment
KA	Point lock key-identifier equipment
KAE	Single-centre point lock key-identifier equipment
KR	Point lock key-fastening equipment
ER	Control-locking safety equipment
SH	Siemens-Halske route protection equipment
FM	Light-signal mechanical equipment
VES	Electro-dynamic safety equipment
INT-VES	Integra and electro-dynamic safety equipment
FOND	Dinamo-55-type relay-dependent safety equipment without sensation of track occupation
INT	Integra single-centre relay-dependent safety equipment
D55	Dominó 55 type relay-dependent safety equipment
KA69	KA69 small station relay-dependent safety equipment
SZKA	Soviet small station safety equipment
WSSB	NDK small station relay-dependent safety equipment
D70V	Dominó 70 type, train-route relay-dependent safety equipment (no shunting route)

ESTW-ELEKTRA-D55	Alcatel type electronic and Dominó 55 type safety equipment
KSW-90	Alcatel type small station relay-dependent equipment
D67	Dominó 67 type shunting route relay-dependent equipment
D70	Dominó 70 type, shunting route relay-dependent equipment
SZT	Soviet type safety equipment
ELEKTRA	Alcatel electronic safety equipment
SIMIS	Siemens electronic safety equipment

7. Ground train radio ( $\beta_7$ )

$\beta_7 = 100\%$ , if GSM-R system is in operation on the track section. If ground train radio is in operation,  $\beta_7 = 60\%$ , in any other case  $\beta_7 = 0\%$ .

8. Train protection ( $\beta_8$ )

The following quality multipliers can be applied depending on the type of train protection system used on the given track section:

Type of train protection system working on the track section	$\beta_8$
No protection system	0 %
Indusi, EVM	60 %
automatic block system (AUTV)	80 %
ETCS	100 %

9. Number of blocks ( $\beta_9$ )

Track section can be modelled by the number of blocks on a 1,5 km long section. (Standard length of a block is 1,5 km)

Method of calculation of the parameter value: Number of blocks on the track section / (length of the track section (km) / 1,5) \* 100. If the value is higher than 100%, the maximum value shall be used concerning the parameter.

10. Types of line traffic control ( $\beta_{10}$ )

Type of line traffic control	$\beta_{10}$
Operation controlled	30 %
MEFI, MERÁFI	50 %
KÖFE	70 %
Remote controlled, KÖFI	100 %

11. Capacity utilisation ( $\beta_{11}$ )

Value of capacity-utilisation shall be defined on the basis of the daily average number of allocated train paths resulting from data issued two years in advance of the entry into force of the Networks Statement for the given timetable year.

Daily Average number of allocated train paths	$\beta_{11}$
0-10	30 %
11-20	50 %
21-30	70 %
31-50	80 %
51-	100 %