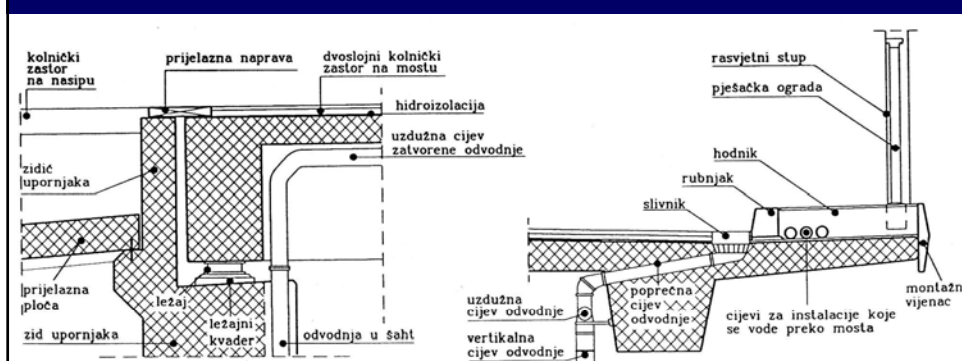


# OPREMA MOSTOVA

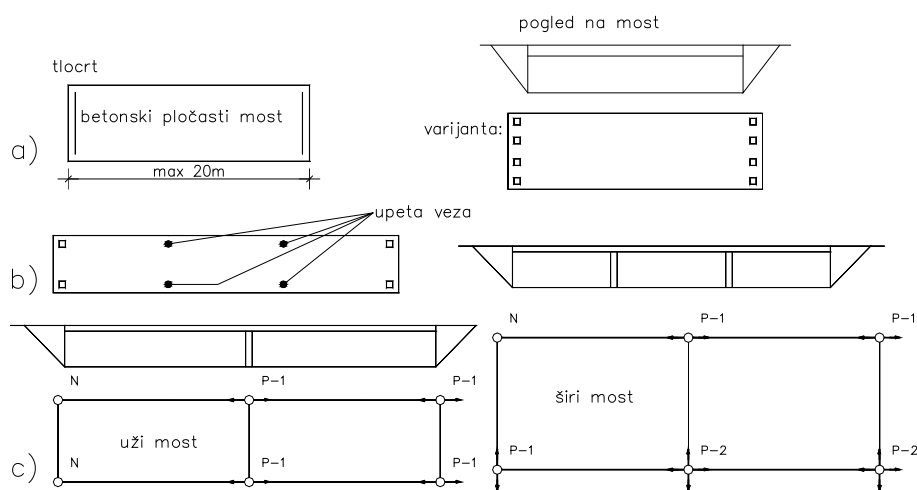
## Osnovni dijelovi



## Ležajevi

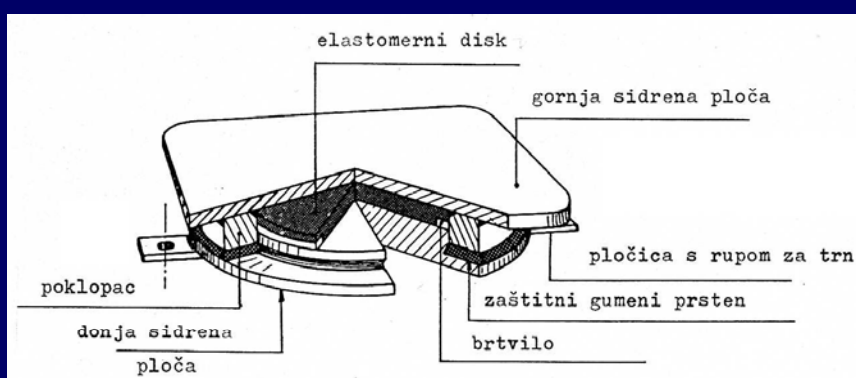
- Nepomični
- Pomični
- Elastomerni
- uzdužni i tlocrtni raspored ležajeva

## Ležajevi

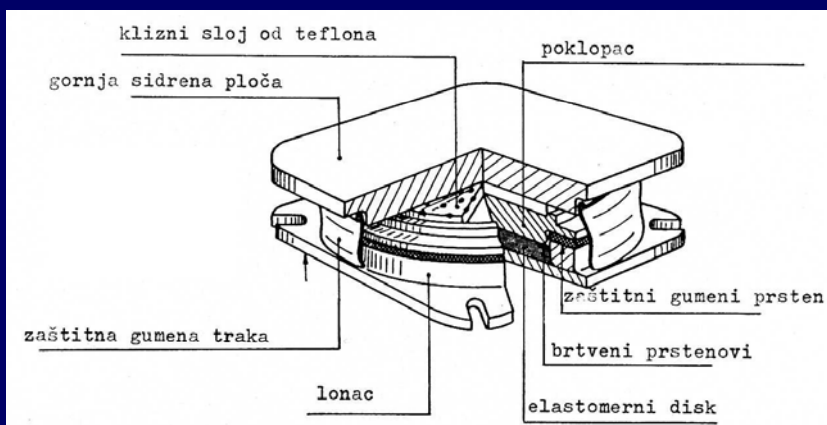


| Znak | Tip ležaja                              | Primjer vrste ležaja                                                                  | Vrsta pomaka      |                      |                      |                     |
|------|-----------------------------------------|---------------------------------------------------------------------------------------|-------------------|----------------------|----------------------|---------------------|
|      |                                         |                                                                                       | Općenito          | Smjer X              | Smjer Y              | Smjer Z             |
|      | deformabilni ležaj                      | elastomerni ležaj (EL)                                                                | dvoosno pomičan   | deformabilni         | deformabilni         | približno nepomičan |
|      |                                         | EL s konstrukcijom za sprečavanje pomaka u jednom smjeru                              | jednoosno pomičan | deformabilni         | nepomičan            |                     |
|      |                                         | EL s konstrukcijom za sprečavanje pomaka u oba smjera                                 | nepomičan         | nepomičan            | nepomičan            |                     |
|      | točkasti zakretni ležaj                 | nepomični: a) čelični točkasti zakretni, b) kalotni (sferni) ležaj, c) lončasti ležaj | nepomičan         | nepomičan            | nepomičan            | nepomičan           |
|      |                                         | jednosmjerno pomični ležaji pod a), b), c)                                            | jednoosno pomičan | klizni ili valjkasti | nepomičan            |                     |
|      |                                         | dvosmjerno pomični ležaji pod a), b), c)                                              | dvoosno pomičan   | klizni ili valjkasti | klizni ili valjkasti |                     |
|      |                                         | čelični linijski zakretni ležaj; betonski zglobovi                                    | nepomičan         | nepomičan            | nepomičan            |                     |
|      | linijski zakretni ležaj                 | valjkasti ležaj; jednosmjerno pomičan linijski zakretni ležaj                         | jednoosno pomičan | klizni ili valjkasti | nepomičan            | nepomičan           |
|      |                                         | ležaj s vodicama                                                                      | jednoosno pomičan | klizni               | nepomičan            |                     |
|      | ležaj za preuzimanje horizontalnih sila | nepomični točkasti ležaj                                                              | nepomičan         | nepomičan            | nepomičan            | klizni              |

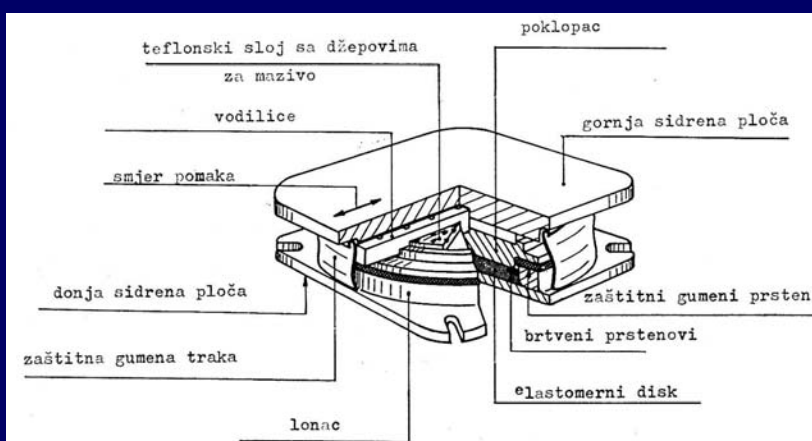
## Standardni nepokretni lončasti ležaj



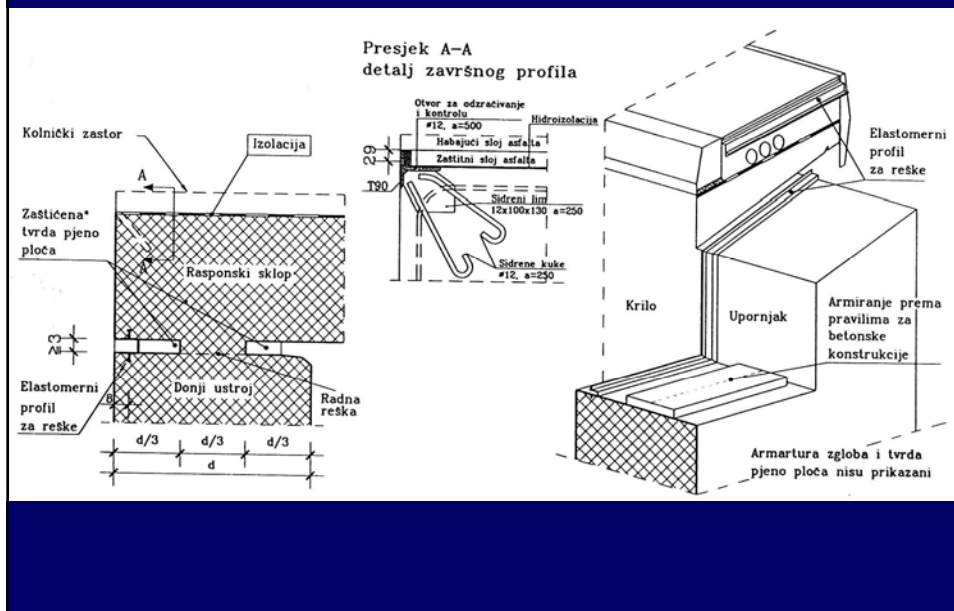
## Svestrano pokretni lončasti ležaj



## Jednosmjerno pokretni lončasti ležaj



## Betonski zglob



## Elastomerni ležaji

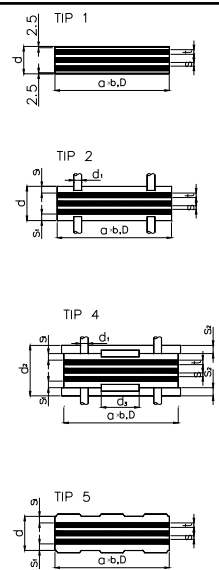
| Podtip armiranog elastičnog ležaja | Neusidreni                           | Usidreni                                                   |                                                                    |
|------------------------------------|--------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------|
| Svestrano elastično pomični        | <br>armirani elastomerni ležaj (AEL) | <br>usidreni AEL                                           |                                                                    |
| Sa spriječenim elastičnim pomacima |                                      | <br>jednostrano pomični                                    | <br>nepomični                                                      |
| Klizni                             | <br>svestrano pomični                | <br>poprečno nepomični, uzdužno elastično i klizno pomični | <br>poprečno elastično pomični, uzdužno elastično i klizno pomični |

\* min  $\geq 5.0$  N/mm<sup>2</sup> (unverankert) \* min  $\geq 5.0$  N/mm<sup>2</sup> (verankert)

|                                          |                   |                   | min $\geq 5.0$ N/mm <sup>2</sup><br>(unverankert) |                                |                       | min $\geq 5.0$ N/mm <sup>2</sup> (verankert) * |                                |                  |                              |                                |                  |                              |                                           |       |  |  |
|------------------------------------------|-------------------|-------------------|---------------------------------------------------|--------------------------------|-----------------------|------------------------------------------------|--------------------------------|------------------|------------------------------|--------------------------------|------------------|------------------------------|-------------------------------------------|-------|--|--|
| 1                                        | 2                 | 3                 | 4                                                 | 5                              | 6                     | 7                                              | 8                              | 9                | 10                           | 11                             | 12               | 13                           |                                           |       |  |  |
| Breite Längs-<br>Durchmesser<br>a b<br>D | zul.<br>Last<br>N | E-<br>Modul<br>Ei | Zahl<br>der<br>Schicht<br>Typ 1                   | zul.<br>Ver-<br>schöb<br>Typ 1 | Einbau-<br>dicke<br>d | Elasto-<br>mer<br>dicke<br>T                   | zul.<br>Ver-<br>schöb<br>Typ 2 | Einbaudicke<br>d | Elasto-<br>mer<br>dicke<br>T | zul.<br>Ver-<br>schöb<br>Typ 4 | Einbaudicke<br>d | Elasto-<br>mer<br>dicke<br>T | Dicken-<br>typ 2<br>und<br>Typ 4<br>k=100 |       |  |  |
| mm                                       | mm                | N/mm <sup>2</sup> | n                                                 | mm                             | mm                    | mm                                             | n                              | mm               | mm                           | mm                             | mm               | mm                           | mm                                        | Stück |  |  |
| Ø 300<br>300 x 400                       | 0.88<br>1.80      | 527<br>630        | 1                                                 | (9.1)                          | (19)                  | (13)                                           | —                              | —                | —                            | —                              | —                | —                            | —                                         | 2     |  |  |
|                                          |                   |                   | 2                                                 | (14.7)                         | (30)                  | (21)                                           | (11.2)                         | (48)             | (79)                         | (39)                           | (16)             | —                            | —                                         |       |  |  |
|                                          |                   |                   | 3                                                 | 20.3                           | 41                    | 29                                             | 16.8                           | (60)             | (90)                         | (50)                           | (24)             | —                            | —                                         |       |  |  |
|                                          |                   |                   | 4                                                 | 25.9                           | 52                    | 37                                             | 22.4                           | 71               | 101                          | 61                             | 32               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 5                                                 | 31.5                           | 63                    | 45                                             | 28.0                           | 82               | 112                          | 72                             | 40               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 6                                                 | 37.1                           | 74                    | 53                                             | 33.6                           | 93               | 123                          | 83                             | 48               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 7                                                 | 42.5                           | 85                    | 61                                             | 39.2                           | 104              | 134                          | 94                             | 56               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 8                                                 | 46.2                           | 96                    | 69                                             | 44.0                           | 115              | 145                          | 105                            | 64               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 9                                                 | 49.5                           | 107                   | 77                                             | 47.5                           | 126              | 156                          | 116                            | 72               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 10                                                | 52.4                           | 118                   | 85                                             | 50.7                           | 137              | 167                          | 127                            | 80               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 11                                                | —                              | —                     | —                                              | 53.4                           | 148              | 178                          | 138                            | 88               | —                            | —                                         |       |  |  |
| Ø 350<br>350 x 450                       | 1.20<br>3.80      | —                 | 1                                                 | (11.2)                         | (24)                  | (16)                                           | —                              | —                | —                            | —                              | —                | —                            | 2                                         |       |  |  |
|                                          |                   |                   | 2                                                 | (18.9)                         | (39)                  | (27)                                           | (15.4)                         | (56)             | (86)                         | (46)                           | (22)             | —                            | —                                         |       |  |  |
|                                          |                   |                   | 3                                                 | 26.6                           | 54                    | 38                                             | 23.1                           | 71               | 101                          | 61                             | 33               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 4                                                 | 34.3                           | 69                    | 49                                             | 30.8                           | 86               | 116                          | 76                             | 44               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 5                                                 | 42.0                           | 84                    | 60                                             | 38.5                           | 101              | 131                          | 91                             | 55               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 6                                                 | 49.5                           | 99                    | 71                                             | 46.2                           | 116              | 146                          | 106                            | 66               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 7                                                 | 54.6                           | 114                   | 82                                             | 52.4                           | 131              | 161                          | 121                            | 77               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 8                                                 | 59.0                           | 129                   | 93                                             | 57.1                           | 146              | 176                          | 136                            | 88               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 9                                                 | 62.7                           | 144                   | 104                                            | 61.1                           | 161              | 191                          | 151                            | 99               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 10                                                | —                              | —                     | —                                              | —                              | —                | —                            | —                              | —                | —                            | —                                         |       |  |  |
|                                          |                   |                   | 11                                                | —                              | —                     | —                                              | —                              | —                | —                            | —                              | —                | —                            | —                                         |       |  |  |
| 350 x 450                                | 2.36<br>520       | —                 | 1                                                 | (11.2)                         | (24)                  | (16)                                           | —                              | —                | —                            | —                              | —                | —                            | 3                                         |       |  |  |
|                                          |                   |                   | 2                                                 | (18.9)                         | (39)                  | (27)                                           | (15.4)                         | (56)             | (86)                         | (46)                           | (22)             | —                            | —                                         |       |  |  |
|                                          |                   |                   | 3                                                 | 26.6                           | 54                    | 38                                             | 23.1                           | 71               | 101                          | 61                             | 33               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 4                                                 | 34.3                           | 69                    | 49                                             | 30.8                           | 86               | 116                          | 76                             | 44               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 5                                                 | 42.0                           | 84                    | 60                                             | 38.5                           | 101              | 131                          | 91                             | 55               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 6                                                 | 49.5                           | 99                    | 71                                             | 46.2                           | 116              | 146                          | 106                            | 66               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 7                                                 | 54.6                           | 114                   | 82                                             | 52.4                           | 131              | 161                          | 121                            | 77               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 8                                                 | 59.0                           | 129                   | 93                                             | 57.1                           | 146              | 176                          | 136                            | 88               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 9                                                 | 62.7                           | 144                   | 104                                            | 61.1                           | 161              | 191                          | 151                            | 99               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 10                                                | —                              | —                     | —                                              | —                              | —                | —                            | —                              | —                | —                            | —                                         |       |  |  |
|                                          |                   |                   | 11                                                | —                              | —                     | —                                              | —                              | —                | —                            | —                              | —                | —                            | —                                         |       |  |  |
| Ø 400<br>400 x 500                       | 1.89<br>3.00      | 495<br>670        | 1                                                 | (11.2)                         | (24)                  | (16)                                           | —                              | —                | —                            | —                              | —                | —                            | 2                                         |       |  |  |
|                                          |                   |                   | 2                                                 | (18.9)                         | (39)                  | (27)                                           | (15.4)                         | (56)             | (86)                         | (46)                           | (22)             | —                            | —                                         |       |  |  |
|                                          |                   |                   | 3                                                 | 26.6                           | 54                    | 38                                             | 23.1                           | 71               | 101                          | 61                             | 33               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 4                                                 | 34.3                           | 69                    | 49                                             | 30.8                           | 86               | 116                          | 76                             | 44               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 5                                                 | 42.0                           | 84                    | 60                                             | 38.5                           | 101              | 131                          | 91                             | 55               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 6                                                 | 49.5                           | 99                    | 71                                             | 46.2                           | 116              | 146                          | 106                            | 66               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 7                                                 | 57.0                           | 114                   | 82                                             | 53.9                           | 141              | 181                          | 121                            | 77               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 8                                                 | 62.1                           | 129                   | 93                                             | 59.8                           | 156              | 196                          | 136                            | 88               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 9                                                 | 66.6                           | 144                   | 104                                            | 64.6                           | 171              | 211                          | 151                            | 99               | —                            | —                                         |       |  |  |
|                                          |                   |                   | 10                                                | 70.4                           | 159                   | 115                                            | 68.8                           | 186              | 226                          | 166                            | 110              | —                            | —                                         |       |  |  |
|                                          |                   |                   | 11                                                | —                              | —                     | —                                              | 72.3                           | 201              | 241                          | 181                            | 121              | —                            | —                                         |       |  |  |

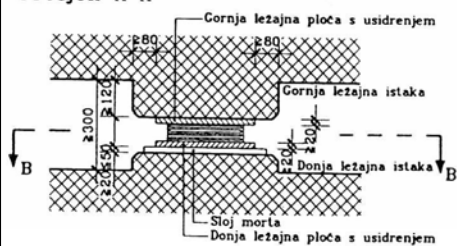
ležaji

i ležaji

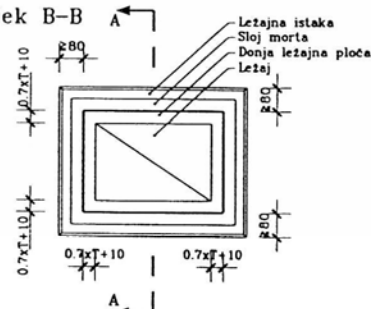


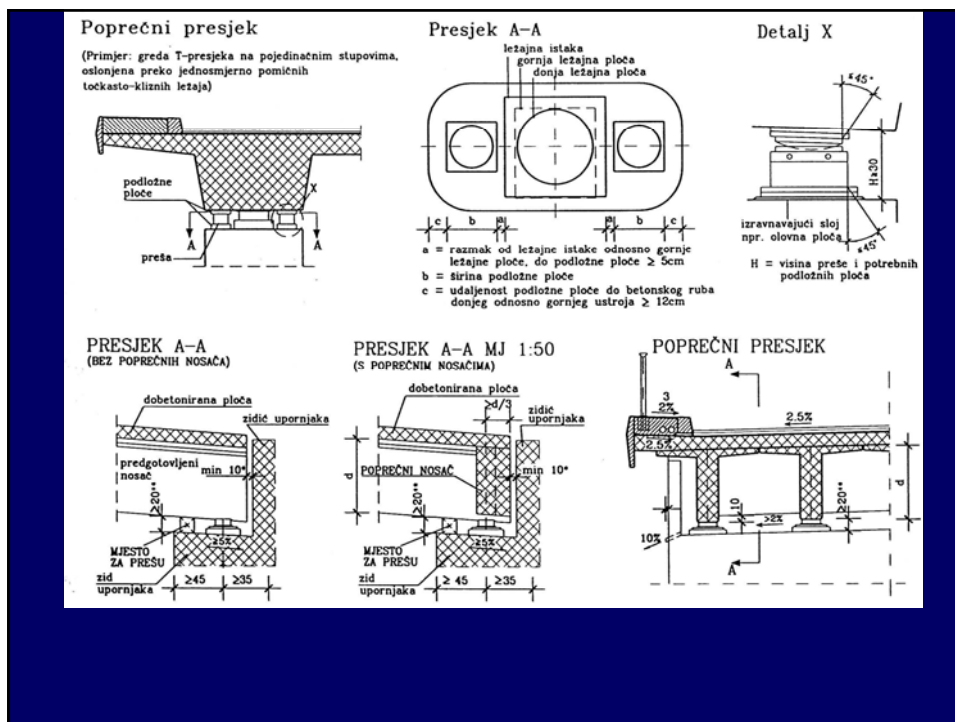
## Uređenje oko ležaja mosta kada se sklop izvodi na mjestu

Presjek A-A

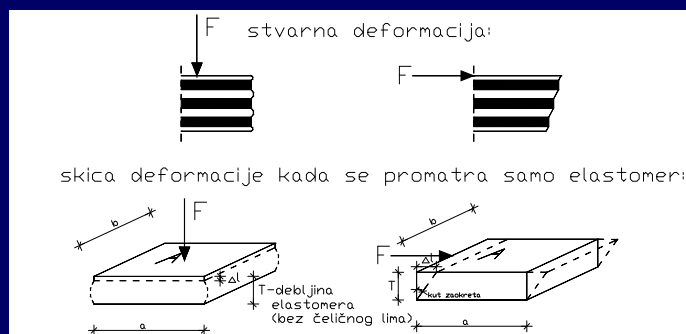


Presjek B-B





## Deformiranje elastomernog ležaja



Vertikalna krutost

$$F = \sigma \cdot A = \varepsilon \cdot E \cdot A = \frac{\Delta l}{T} \cdot E \cdot A$$

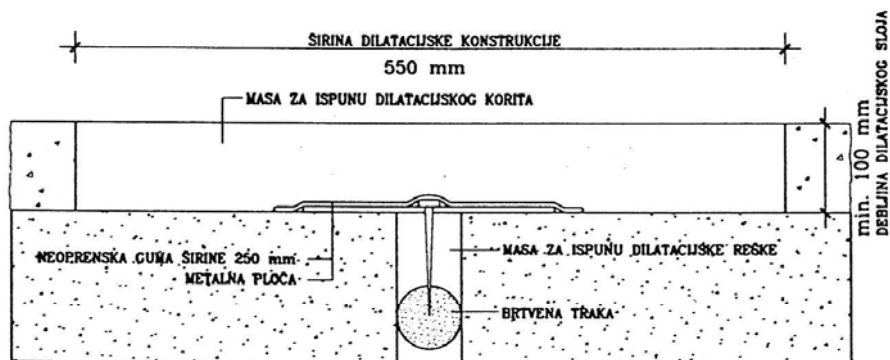
$$\Delta l = 1 \Rightarrow F \rightarrow \text{krutost} \Rightarrow k_v = \frac{E \cdot A}{T}$$

Horizontalna krutost

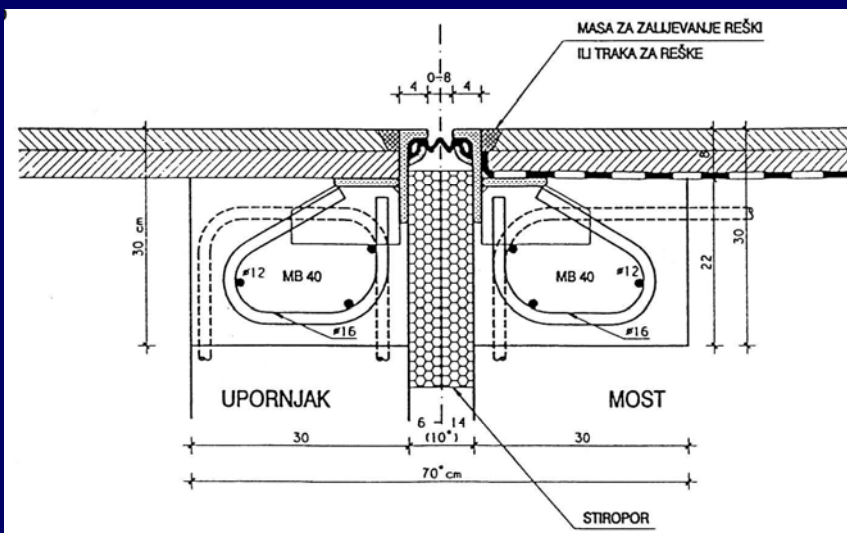
$$F = \tau \cdot A = \gamma \cdot G \cdot A = \frac{\Delta l}{T} \cdot G \cdot A$$

$$\Delta l = 1 \Rightarrow F \rightarrow \text{krutost} \Rightarrow k_p = \frac{G \cdot A}{T}$$

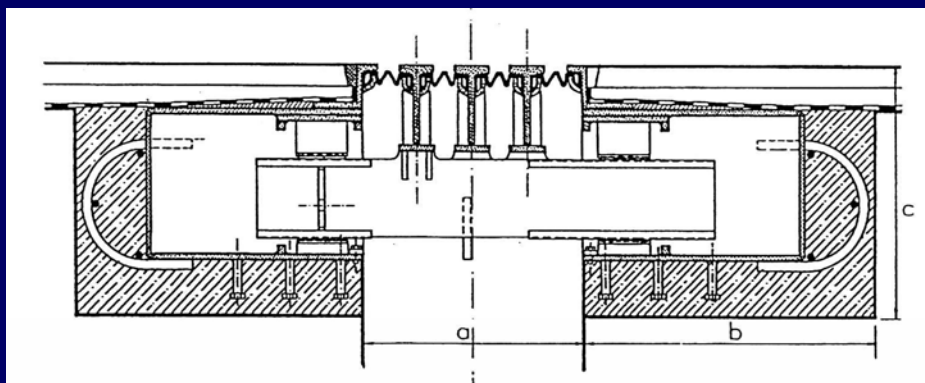
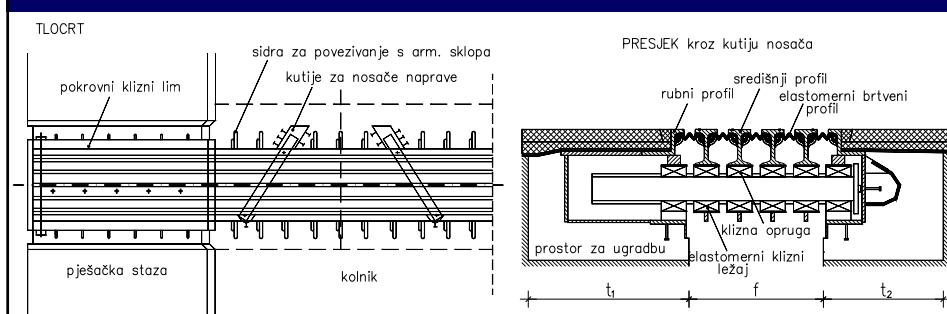
## Elastična prijelazna naprava



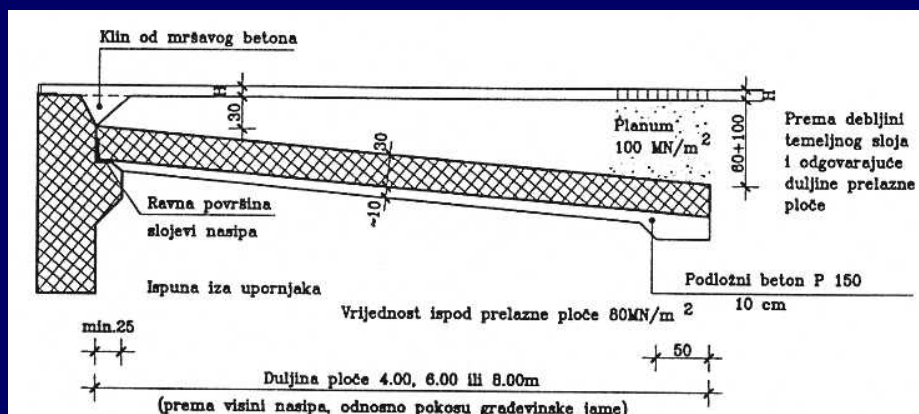
# KT-80



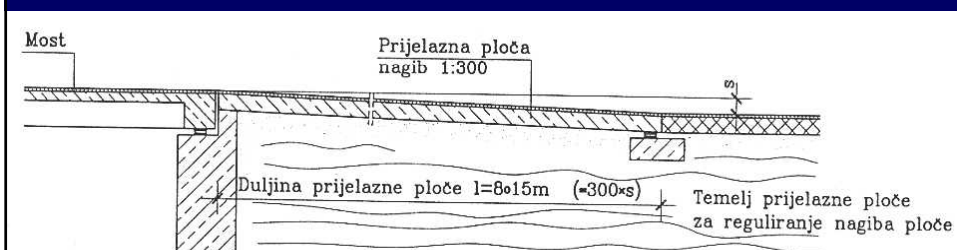
## KT-480

 $\pm 240\text{mm}$ 

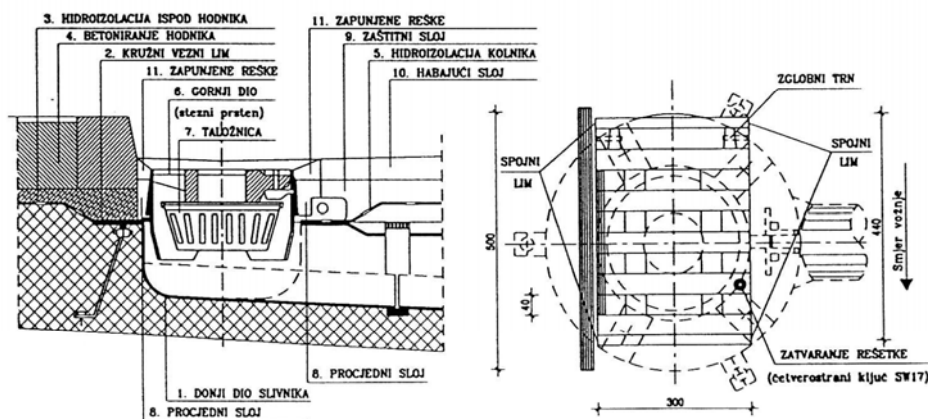
## Prijelazna ploča sa šljunčanim klinom



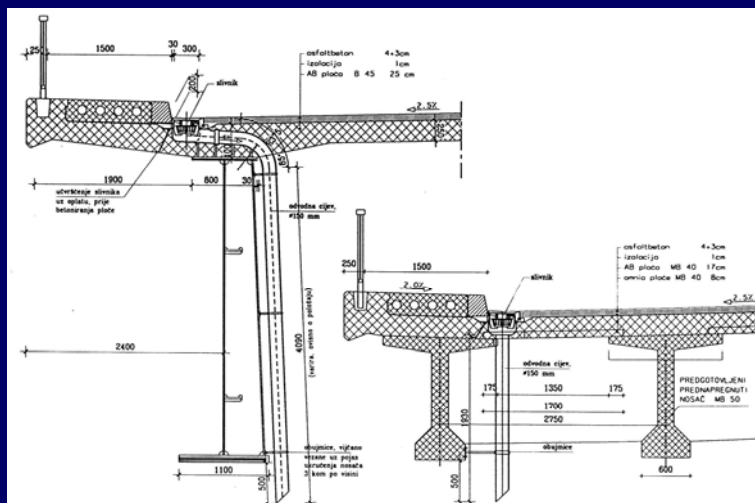
## Prijelazna ploča neposredno ispod zastora



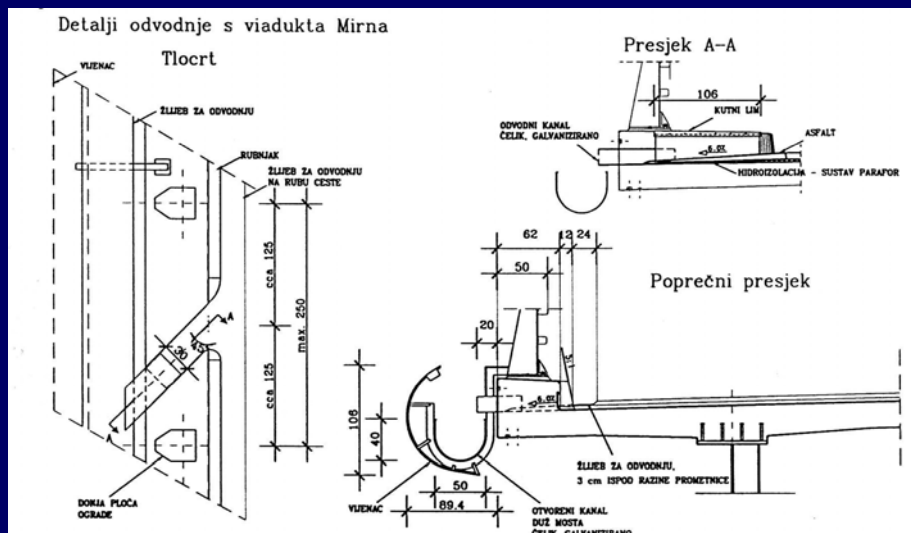
## Slivnik s ispustom sa strane



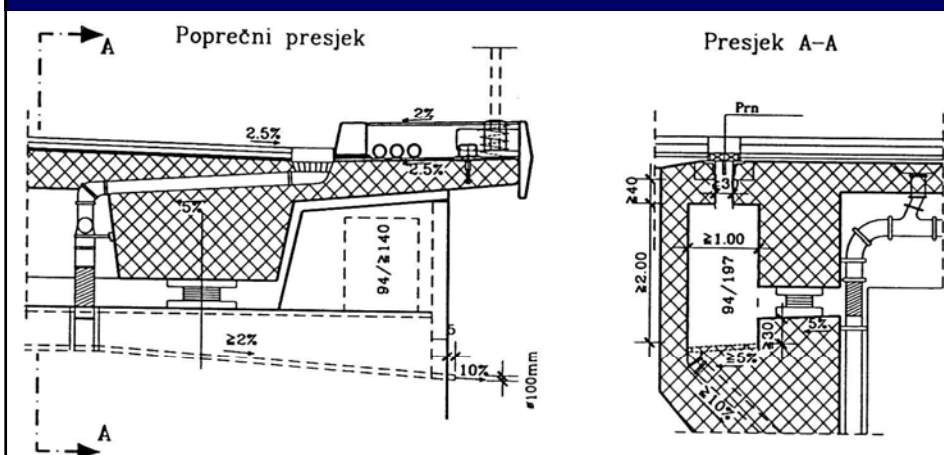
# Otvorena odvodnja mosta preko Drave kod Belišča



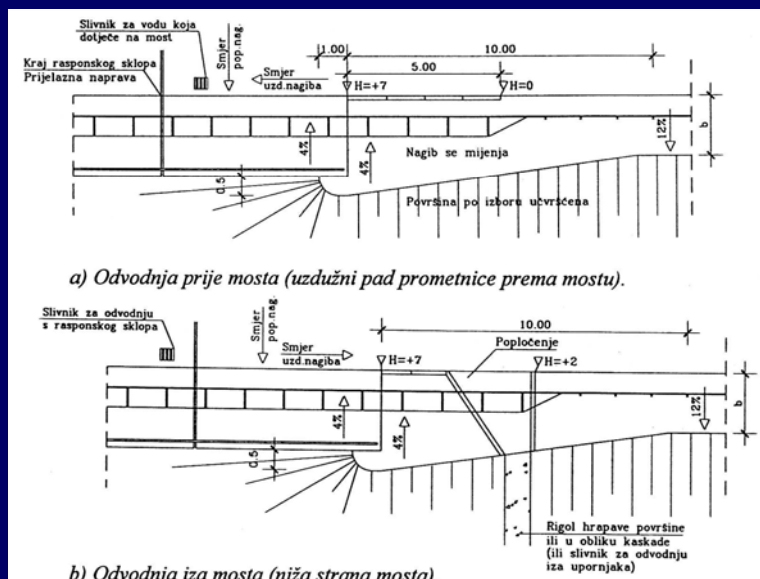
## Odvodnja vijadukta preko doline rijeke Mirne



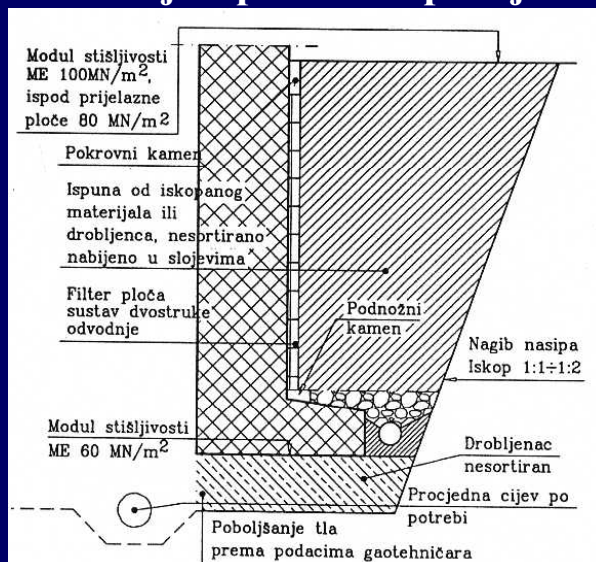
## Cijevi odvodnje većeg mosta pri upornjaku



## Odvodnja ispred i iza mosta

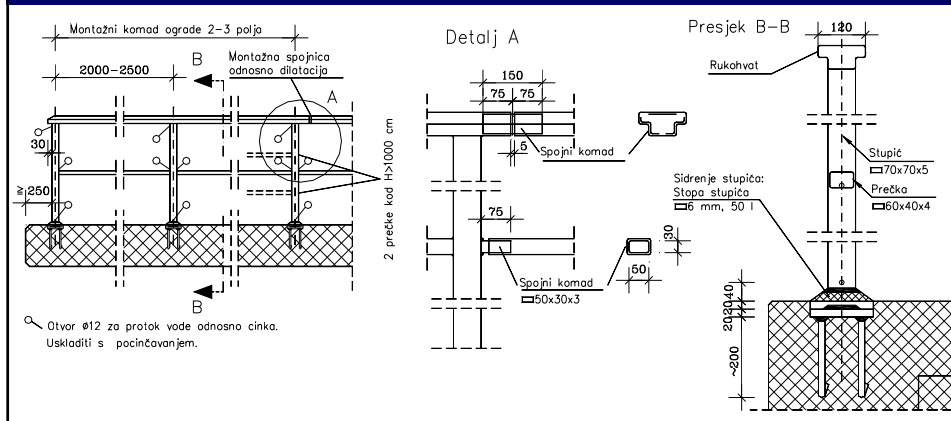


## Odvodnja ispune iza upornjaka





## Ograda s prečkama, za slab intenzitet pješačkog prometa



## Ograda s gustim stupićima, za intenzivan pješački promet

