

## Grouting Instruction VL4-A FIRST GROUT FAN

|                |                         |
|----------------|-------------------------|
| Tunnel         | VL4-A (W=9,55-H=7,60)   |
| Instruction N° | General Instruction 572 |

|                                |         |
|--------------------------------|---------|
| Chainage                       | 1+851,8 |
| Total Inflow face (L/s)        |         |
| Total Inflow Probe holes (L/s) | 4,0     |
| Water pressure measured (Bar)  | 16      |

Mark additional holes with x and number

Erase holes not to be used

**1-DRILL PROBEHOLES:**

DRILL PROBEHOLES IN POSITIONS OF GROUTING CURTAIN FOLLOWING THE GUIDELINES OF GENERAL SI N°572. GROUT ALL PROBEHOLES AS STANDARD GROUTING.

**2- DRILL HOLES UNTIL COMPLETE THE CURTAIN (15 HOLES) AND THEN GROUT:**

DRILL THE HOLES AND INSTALL THE PACKERS. DRILL TO FULL LENGTH (IF  $Q_w < 10$  L/s), OTHERWISE DRILL TO END OF RESPECTIVE ROD. MEASURE WATER INFLOW AND PRESSURE IN EVERY DRILLED HOLE

**3- GROUT ALL HOLES AS INDICATED BELOW AND IN "NOTES".**

|                                 |   |
|---------------------------------|---|
| Design Mix (Type A,B,C, D or E) | A |
|---------------------------------|---|

|     |  |
|-----|--|
| WCR | 0.45 if water inflow > 2.5 L/s<br>0.65 if water inflow < 2.5 L/s |
|-----|--|

**Closure criteria**

|                     |      |
|---------------------|------|
| Pmax                | 25*  |
| Vmax (l/m borehole) | 85   |
| GIN                 | 1000 |

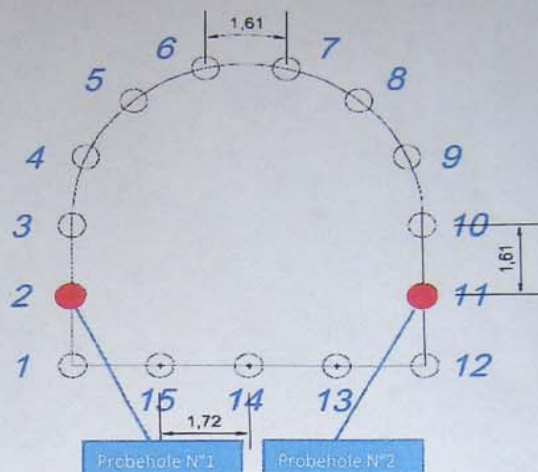
\*IF GROUNDWATER PRESSURE IS HIGHER THAN 10 BAR THEN APPLY GROUT PRESSURE OF 2,5 TIMES GROUNDWATER PRESSURE

|                   |                        |
|-------------------|------------------------|
| Instructed by:    | Ernesto Henriquez Jara |
| Instruction date: | 05/08/2016             |

HOLES 1-15

|                                  |         |
|----------------------------------|---------|
| N° of Grout holes                | 15      |
| Grout holes length (m)           | 27      |
| Grout hole angle ref Tunnel axis | 10°-15° |

Position of Grout holes 1st grout round:

**NOTES:**

- 1- The maximum increase of grouting pressure shall be not more than 2,5 Bar per minute.
- 2- Use pump rate of 10 L/min for hole filling (=4 l grout per meter). Increase pump rate afterwards (to 25 L/min).
- 3- The volume closure criteria of 1000 Liters of grout shall apply if not significant pressure increase is observed (i.e. >3Bar).
- 4- Use anti wash-out additive (Sikament 100SC or equivalent).
- 5- After grouting of all holes redrilling can be conducted.

STRABAG

Subjected to comment

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Signature

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