Some experiences in full scale fire test and training in San Pedro de Anes facilities

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Established in Spain, September 2005

Operating company of the “San Pedro de Anes” Experimental Centre

ACTIVITIES

- Full scale tunnel fire and ventilation tests
- Training of fire fighters and rescue brigades
- High temperature fan testing according to standard EN 12.101-3
Full scale tunnel fire test and training
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- 600 m long
- min. radius 400 m
- 4 emergency exits (every 150 m)
- 2 ventilation stations
Full scale tunnel fire test and training

ACTUAL TUNNEL LAYOUT
Full scale tunnel fire test and training

ACTUAL TUNNEL LAYOUT

- 2 x 355 KW (160 m3/s)
- 21 dampers 1x1.5 m
- 6 x 45 KW jet fans
- Protected Areas (100 m y 15 m)
Full scale tunnel fire test and training

VENTILATION SYSTEM

Semi-transversal

Longitudinal

Saccardo
Full scale tunnel fire test and training

VENTILATION SYSTEM - LONGITUDINAL

6 JET FANS (45KW each)
Full scale tunnel fire test and training

VENTILATION SYSTEM – AXIAL FAN

- North station: 2 x 355 KW (160 m3/s)
- Saccardo station: 2 x 355 KW (120 m3/s)
Full scale tunnel fire test and training

VENTILATION SYSTEM – AXIAL FAN
Full scale tunnel fire test and training

DATA ACQUISITION SYSTEM

- Distributed control (15 monit. & control Outstations)
- Multiple format inputs/outputs
- Fiber optics loop (100 MBS on TCP/IP)
- Uninterrupted Power Supply
- Redundant computer system
Full scale tunnel fire test and training

LOCATION OF CONTROL STATIONS
Full scale tunnel fire test and training

JET FANS MONITORING AND CONTROL
Full scale tunnel fire test and training

SACCARDO MONITORING AND CONTROL
Full scale tunnel fire test and training

ADDITIONAL TUNNEL EQUIPMENT

- Hydrants line at 9.5 bar (each 50 m)
- 3 water tanks (total capacity 570 m³)
- Water supply of 3000 l/min at 3.5 bar
- 50 m³ settling basin for tunnel spills
- 250 W luminaries (each 15 m)
Full scale tunnel fire test and training

FULL SCALE FIRE
## Full scale tunnel fire test and training

### TEST CAMPAIGNS

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Full scale tunnel fire test and training

SCHEDULE

- INSTRUMENTATION:
  - Gas analyzers
  - Thermocouples
  - Pitot tubes and Pressure transducers

- PRE TEST
  - Ventilation test
  - Water Test

- FIRE TEST

- FREE BURNING TEST

- DISASSEMBLE AND LEAVING
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FIRE TEST INSTRUMENTATION I
Full scale tunnel fire test and training
Full scale tunnel fire test and training

PRE TEST
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Full scale tunnel fire test and training

FREE BURNING TEST

Minuto 1.mp4
Segunda parte.mp4
Tercera parte.mp4
Spalling.mp4
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WATER MIST TEST (PALLETTS)
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WATER MIST TEST (DIESEL POOLS)
FIRE IN TUNNELS TRAINING COURSES

OBJETIVES

• Problem analysis.

• Addressing the intervention.

• Implementation.
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FIRE IN TUNNELS TRAINING COURSES

THEORY

- Fire evolution
- Active protection systems
- Special equipment
- Ventilation systems
- Case study
- Practical events
- Risks during intervention
- Operational procedures
- Staff control
- Management and control
- Legal framework
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FIRE IN TUNNELS TRAINING COURSES

PRACTICES

- Smoke evolution:
- Orientation and search:
- Penetration with long lays and tracking sectorization.
- Penetration with heavy-duty urban pump:
- Penetration through entrances:
- Simultaneous penetration:
- Multiple penetrations:
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FIRE GALLERY

- 150 m long
- Two different fire areas
- 8 different exits (same, upper and lower level)
- Fires up to 15 MW
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FIRE IN TUNNELS TRAINING COURSES
THANK YOU VERY MUCH FOR YOUR ATTENTION

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