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European Railway Agency
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Däniken, 15.10.2018 RHM

Comment on the Draft for the new SRT TSI – fire safety requirements for cables

Dear Sirs,

We have seen the drafted modification of the SRT TSI requirement for cables in railway tunnels. As we have extensive experience of cable production and installation in the most recent big railway tunnel projects (Gotthard, Ceneri, Lötschberg, ...), we want to share our view of this issue and ask you to take this into account in your future decisions about SRT TSI.

The present fire class requirement is $B2_{ca}$-s1a,a1. The draft takes out all quantitative classification requirements, leaving a very broad choice of requirements from very good to quite low. This opens interpretation space and we see the danger that in future much lower fire performance cables could be installed in railway tunnels. Even the reaction to fire class D_{ca}-s2,d2,a2 could be allowed in future, which means that the fire requirements would clearly be much lower than in the SRT TSI 2008.

The fire safety properties of class D_{ca}-s2,d2,a2 are quite low, as can be seen in Annexe A. Its burning behaviour "fire performance approximately like wood" with "continuous flame spread" (see B.3.3 of EN13501-6), i.e. the absence of any requirement on fire spread and the very high allowed heat release values are in our judgement not at all adapted for fire safety in tunnels.

The cable quantity installed in railway tunnels is rather high, especially in modern railway tunnels like Gotthard, Ceneri and Lötschberg, as can be seen in Annexe B. Therefore, the present question is an important safety issue.

The fire safety requirements in Switzerland have always been high for open cable installation in railway tunnels. Before SRT TSI 2013, the Switzerland requirement included EN 60332-3-24 for fire spread, EN 61034-1/2, for smoke and EN 60754-1 and -2 or EN 50267-2-1 and -2-2 for low

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toxicity (absence of halogens). With SRT TSI 2013, the $B2_{ca}$-s1a,a1 was added (see AB-EBV), formulating the past requirements in the new CPR-frame.

We fear that the presently drafted modification of the SRT TSI could provoke a cost driven fire safety downwards “optimization”. The presently high fire safety requirement would be significantly reduced. The result would be lower fire safety than required in SRT TSI 2008.

Therefore, we would suggest, that you carefully reconsider this question. It is certainly useful to have a real impression of the very different fire safety behaviour of the classes $B2_{ca}$-s1a,a1 versus D_{ca}-s2,d2,a2. If your experts want to witness these fire tests in our fire laboratory here in Switzerland, you are welcome.

Yours faithfully

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Annexe A:

D_{ca} reaction to fire class – what does this mean ?

The limiting values for reaction to fire class D_{ca} are:

- No requirement in flame spread. This means that once the fire started, it does not stop till the entire cable quantity is possibly consumed. As an example, see fig. 1 and fig. 2 below.
- Max. HRR 400 kW. This is a huge fire. Please see in fig. 1 a fire representing approx. 200 kW. The max allowed HRR can be double !
- Max. THR 70 MJ. The max. total heat released by a D_{ca}-cable of 70 MJ represents the energy of more than 2 litres of petrol.
- With a FIGRA of max 1300 W/s, the fire can develop very quickly. This is specially the risk for small cables. Imagine: after 10s, the fire can have the heat release of 13kW (a good chimney fire). After 60s it can have 78 kW and after 5 minutes it could reach the 400 kW-limit. For such a quick fire growth, the fire is easily out of control.

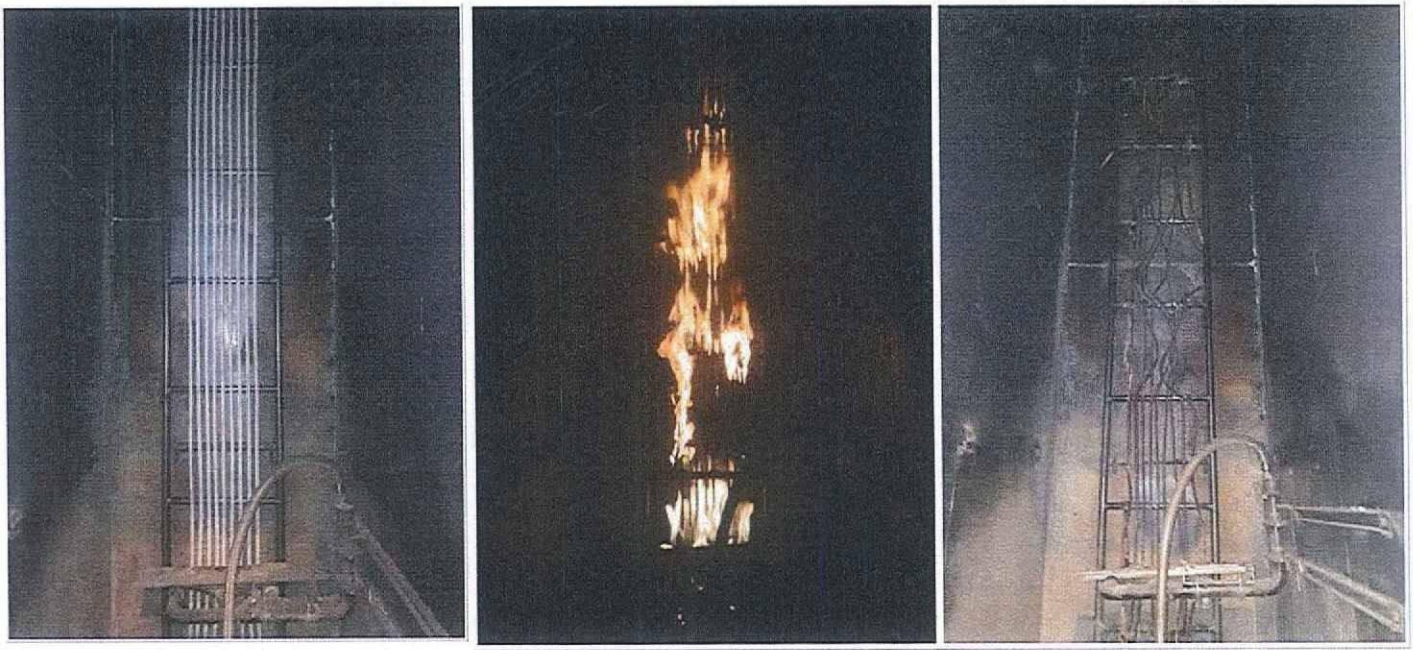

Fig. 1: Typical Class D_{ca}-s2,d2,a2 cable with low level fire performance before, during and after the EN50399-test. In this case, the whole cable burnt with peak HRR of 197.8kW, with THR of 63 MJ. The fire could still be twice as strong and the cable would still be D_{ca}!

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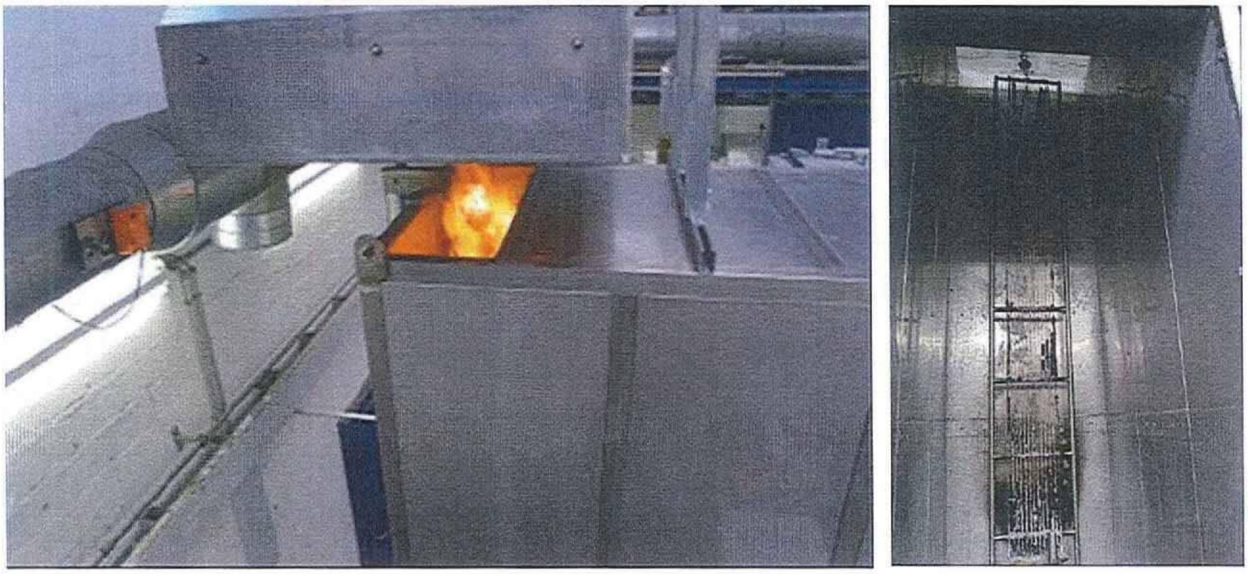

Fig. 2: Left: Flames coming out of the upper opening of the EN50399 cabin, as a D_{ca} cable burns entirely (right). Extensive heat develops around the cabin top, even with damage risk for the test equipment.

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Annexe B:

Cable quantity estimation in modern railway tunnels.

Fictive tunnel example, but based on project experience.
Tunnel length: 25 km, with two parallel tubes.

Installed cable quantity:

- Approx. 650 km medium voltage power cables
- Approx. 800 km low voltage power and signal cables
- FO cable quantity not counted
- Radiating cables (for radio signal transmission) not counted
- Additional smaller special cable quantities not counted

This means approx. 10km medium voltage cables and approx. 14km low voltage cables are installed per km of tunnel tube.

Estimated fire load:
For the entire tunnel: More than 20'000'000 MJ. This is the equivalent of approx. 500 to of fuel.
Per km of tunnel tube: more than 175'000 MJ/km. This is the equivalent of approx. 9 to of fuel/km. or 9 kg fuel/m.

Remark: This rough estimation has been done with best available knowledge. It aims to show the order of magnitude without precision. Fire protection of some of the considered cables can be done by non-combustible material around, which is not distinguished in this estimation. A more detailed analysis should also consider the FO cables, the radiating cables, and some smaller additional special cables not taken into account here. However, it clearly shows, that such big combustible material quantities in tunnels have to have very good fire protection properties, either by themselves of by external protection.

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