

## 2. DESIGN FIRES

This section presents information relating to design fires used in different countries and discusses data from full-scale fire tests. A risk-based approach to establishing design fire size is also discussed.

### 2.1. SUMMARY OF PRACTICES ADOPTED IN DIFFERENT COUNTRIES

The following table summarizes the typical design-fire assumptions used in different countries. More complete details are to be found in *appendix 1*.

TABLE 1. FIRE SIZES ADOPTED IN DIFFERENT COUNTRIES		
Country	Design Fires (MW)	Notes
Australia	50	With FFFS (deluge system), for ventilation only
Austria	30	High risk category: 50 MW
France	30 – 200	200 MW when transports of dangerous goods allowed but only applied for longitudinal ventilation
Germany	30 – 100	Depending on length and HGV in tunnel
Greece	100	Longitudinal ventilation
Italy	20 – 200	
Japan	30	
Netherlands	100-200	100 MW if tankers are not allowed, otherwise 200 MW for ventilation system
Norway	20 – 100	Depending on risk class, always longitudinal ventilation
Portugal	10-100	Based on traffic type
Russia	50-100	
Singapore	30-200	Depends on vehicle types allowed
Spain	≥30	
Sweden	100	Longitudinal ventilation
Switzerland	30	Smoke extraction equals 3,3-4 m/s times cross section
UK	30 – 100	
USA	30 – 300	300 MW if dangerous goods allowed

It is evident from *table 1* that:

- Several countries adopt a range of fire sizes depending on the type of vehicle admitted to the tunnel, recognizing the possibility of larger fires with HGV and dangerous goods;
- Countries that only utilize longitudinal ventilation allow for higher HRR design fires.

The use of higher heat release rates for longitudinally ventilated tunnels reflects that this mode of ventilation can generally be designed to deal with higher fire sizes at reasonable expense, while transverse ventilation would require very expensive increases in tunnel structure and equipment.