# BSPD - Estratto regolamento

## Definizioni

SDC - ShutDown Circuit

BSPD - Brake System Plausibility Device

LVMS - Low Voltage Master Switch

TSAC - Tractive System Accumulator Container

## Paragrafi

T1.3.1

Direct Connection – two devices or circuits are directly connected if the connection is not

routed through any common PCB and does not include any devices or functionality other

than overcurrent protection or connectors.

T11.6.1

A standalone non-programmable circuit, the BSPD, must open the SDC, see EV6.1 and

CV4.1, when hard braking occurs, whilst ≥5 kW power is delivered to the motors.

The SDC must remain open until power cycling the LVMS or the BSPD may reset itself if

the opening condition is no longer present for more than 10 s

T11.6.2

The action of opening the SDC must occur if the implausibility is persistent for more than

500 ms

T11.6.3

The BSPD must be directly supplied, see T1.3.1, from the LVMS, see T11.3.

T11.6.4

Standalone is defined as there is no additional functionality implemented on all required

PCBs. The interfaces must be reduced to the minimum necessary signals, i.e. power supply,

required sensors and the SDC. Supply and sensor signals must not be routed through any

other devices before entering the BSPD.

T11.6.5

To detect hard braking, a brake system pressure sensor must be used. The threshold must be

chosen such that there are no locked wheels and the brake pressure is ≤30 bar.

T11.6.6

[EV ONLY] To measure power delivery, a DC circuit current sensor only must be used. The

threshold must be chosen to an equivalent of ≤5 kW for maximum TS voltage.

T11.6.7

It must be possible to separately disconnect each sensor signal wire for technical inspection.

T11.6.8

All necessary signals are System Critical Signal (SCS), see T11.9.

T11.6.9

[EV ONLY] The BSPD including all required sensors must not be installed inside the TSAC

EV6.1.7

All circuits that are part of the SDC must be designed in a way, that in the de-energized/disconnected

state, they open the SDC.

EV6.1.9

Every system that is required to or can open the SDC must have its own, non-programmable,

power stage to achieve this. The respective power stages must be designed to be able to carry

the SDC current, e.g. AIR inrush currents, and such that a failure cannot result in electrical

power being fed back into the electrical SDC.

EV6.1.11

All signals influencing the SDC are SCSs, see T11.9.

T11.9.1

SCS are defined as all electrical signals which

• Influence actions on the SDC, see CV4.1 and EV6.1.

• Influence the wheel torque.

• [EV ONLY] Influence indicators according to EV5.8.9, EV4.10 or EV6.3.7.

T11.9.2

Any of the following SCS single failures must result in a safe state of all connected systems:

(a) Failures of signals transmitted by cable:

• Open circuit

• Short circuit to ground

(b) Failures of analog sensor signals transmitted by cable:

• Short circuit to supply voltage

(c) Failures of sensor signals used in programmable devices:

• Implausibility due to out of range signals, e.g. mechanically impossible angle of

an angle sensor.

(d) Failures of digitally transmitted signals by cable or wireless:

• Data corruption (e.g. checked by a checksum)

• Loss and delay of messages (e.g. checked by transmission time outs)

Signals might be a member of multiple signal classes, e.g. analog signals transmitted by

cable might be a member of T11.9.2.a, T11.9.2.b and T11.9.2.c.

IN4.1.3

The BSPD will be tested by sending an appropriate signal that represents the current, to

achieve ≤5 kW whilst pressing the brake pedal. This test must prove the functionality of the

complete BSPD except for any commercially available current sensors. Ends of a current

transducer’s auxiliary winding must be insulated.