# ROLL-AWAY PROTECTION MODEL DOCUMENT

This document describes the terms used in the Roll-Away Protection model developed by SQS.

Variables related to Direction Controller:

- **forward:** Direction Controller position that allows train forward movement. *(Type : bool) (Possible values: true or false)*
- **backwards:** Direction Controller position that allows train reverse movement. *(Type : bool) (Possible values: true or false)*
- **neutral:** Direction Controller position where the RAP shall prevent forward and reverse movements of the train. *(Type : bool) (Possible values: true or false)*

Variables related to Train Speed:

- **VGreaterThanZero:** Train speed variable that indicates that train moves forward. *(Type : bool) (Possible values: true or false)*
- **VEqual2Zero:** Train speed variable that indicates that train is standstill. *(Type : bool) (Possible values: true or false)*
- **VLowerThanZero:** Train speed variable that indicates that train moves backwards. *(Type : bool) (Possible values: true or false)*

Variables related to Odometry:

- **TrainLocation:** Current train position. *(Type : float)*
- **TrainSpeed:** Current train speed. *(Type : float)*

Variables related to Roll Away Protection:

- **TrainLocationLastStandstill:** Train position when conditions to go inside roll away protection are met. *(Type : float)*

Variables related to DMI:

- **BrakingIndicator:** Indicator showing that the brake is pulled. *(Type : bool)(Possible values: true or false)*
- **RAPAckReq:** Acknowledgement request to the driver when brake command is triggered due to roll away protection. *(Type : String)(Possible values: Empty or equal to "Acknowledge Request")*
- **RAPAck:** Driver's acknowledgement to request of acknowledgement when brake command is triggered due to roll away protection. *(Type : String) )(Possible values: Empty or equal to "Acknowledged")*

Variables related to the braking of the train:

- **BrakeCommand:** Brake command sent via the TIU. *(Type : bool) )(Possible values: true or false)*

States involved in Roll Away Protection Model:

- **Standstill:** The state where the train is standing
- **CalculateRollAwayDistance:** The state where the roll away distance is calculated after happens one of the following events:
    - The direction controller's position is forward and train speed is equal to VLowerThanZero
    - The direction controller's position is backwards and train speed is equal to VGreaterThanZero
    - The direction controller's position is neutral and train speed is equal to VGreaterThanZero
    - The direction controller's position is neutral and train speed is equal to VLowerThanZero
- **Brake:** The state where the roll away protection is activated after D_NVROLL distance is reached. The train's brake will be activated, and an indication shall be given to the driver showing that the RAP is commanding the brakes. Acknowledge will also be asked to the driver. After happens the acknowledge of the driver and train speed is equal to zero, the model will go back to standstill state.
- **TrainMovement:** The state where the train moves correctly.