

Information for the National Institute of Standards and Technology – Manufacturing Extension Partnership (NIST-MEP) scouting

Car body shells for High Speed Trains with operational speed up to 220 mph

1.1 Car Body Shell

The car body shells will be used in the Siemens Velaro high-speed trainsets with distributed power. The operational top speed of the Velaro trains is up to 220mph.

The car body shells of the Velaro are 2,900mm to 3,300mm wide and 25,000 mm to 29,000 mm long. They are designed as an integrated lightweight aluminum structure of the car bodies. It is largely constructed of large aluminum extruded profiles. To provide the maximum protection against corrosion, only extrusions made of silicon alloyed aluminum are used. In Figure -1 an example of the cross-section of the profiles in the car bodies are shown.

The rear area of the front-end head structure consists of a welded-in load-bearing aluminum framework and a fabricated steel structure that is bolted on in the front area. The visible exterior construction utilizes sandwich FRP.

The chemical composition of the semi-finished aluminum parts and their alloys used in the car body is defined in DIN EN 573-3. The strength requirements are specified in DIN EN 755-2 for extruded profiles (e.g., ENAW 6005A T6, ENAW 6106 T6) and in DIN EN 485-2 for sheet metal (e.g., ENAW 5083 H111, ENAW 5083 H 321).

All welding will meet the requirements for welded connections, per EN 15085, weld performance class CPC2, certification level CL1.

Welding procedures are Friction Stir Welding (FSW) and MIG Welding

Needed production tools are Milling machines (up to 29,000mm) / automated FSW- / MIG Welding for welding seams up to 29,000mm, robot based, Tooling for production of underframe, sidewalls, roof, front-end and the whole car shell.

The car body shell provides suitable interfaces for the integration of the equipment, e.g., C-rails, rivet nuts and welded or riveted supports.

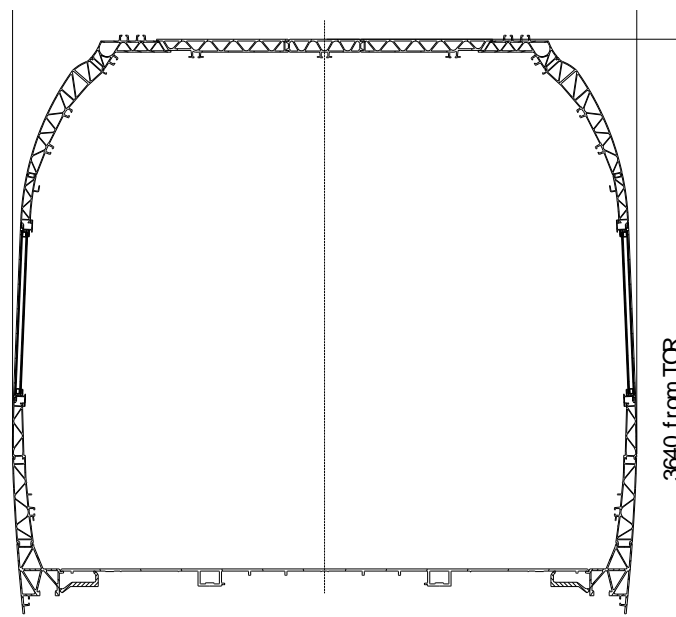


Figure -1: Example of the car body cross section of a Velaro High Speed Train

1.2 Scope and delivery dates

The scope include 56 car body shells. The car body shells need to be painted and ready for assembly.

The delivery dates, ex-works, are as follows:

1st car body shell: July 3, 2025

56th car body shell: January 11, 2027