	JERNBANEVERKET

TECHNICAL SPECIFICATION

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1 PURPOSE

This specification sets out objective requirements to enable suppliers to deliver expansion deveices that meet the expectations of the Norwegian National Rail Administration (Jernbaneverket, JBV).

2 SCOPE

This specification applies to delivery of expansion devices with movable stock rails on the JBV network with the following expansion capacity, basic rail profiles and bearer types .

2.1 Expansion capacity.

Designation	Expansion capacity [mm]	Max. displacement [mm]	Basic rail profile	Bearer type
GL-60-200B	200	± 100	60E1	Concrete bearers
GL-60-600B	600	± 300		
GL-60-1200B	1200	± 600		
GL-60-1600B	1800	± 900		
GL-54-200B	200	± 100	54E3	
GL-54-600B	600	± 300		
GL-60-200B	200	± 100		
GL-60-200T	200	± 100		Wooden bearers

3 DESIGN

The expansion devices shall be produced and delivered in accordance with EN 13232-8:2007+A1 with the following design inputs according to the standard.

3.1 Axle load and speed

The expansion devices with basic rail profile 60E1 shall be designed to accommodate the following combinations of axle loads and speed:

- Axleload = 17 tonnes at speed = 300 km/h
- Axleload = 18 tonnes at speed = 250 km/h
- Axleload = 20 tonnes at speed = 200 km/h
- Axleload = 25 tonnes at speed = 70 km/h

The expansion devices with basic rail profile 54E3 shall be designed to accommodate the following combinations of axle loads and speed:

- Axleload = 20.5 tonnes at speed = 160 km/h
- Axleload = 22,5 tonnes at speed = 90 km/h

3.2 Nominal track gauge

The expansion devices shall be designed to a nominal track gauge of 1435 mm

3.3 Direction of traffic

The expansion devices shall be designed for bidirectional traffic.

3.4 Track geometry

The expansion devices shall be designed to accommodate a minimum horizontal curve radius of 250 meter.

3.5 Expansion device type

The expansion devices shall be designed with movable stock rails.

3.6 Basic rail section and grade

The expansion devices shall be designed with basic rail section 60E1 or 54E3 according to EN 13674-1. The rail grade shall be R350HT according to EN 13674-1.

3.7 Rail inclination

The expansion devices shall be designed with rail inclination 1:20

3.8 Fastening system

The expansion devices shall be designed with Pandrol Fastclip fastening system, except for parts of the switch area where special fastenings are necessary.

3.9 Nominal support spacing

The expansion devices shall be designed with a nominal support spacing of 600 mm c-c.

4 MANUFACTURE

Prior to machining, the supplier must ensure that rails and switch blades comply with the maximum permissible variations in straightness and curvature specified in EN 13674-1 and EN 13674-2

4.1 Cutting

All rails and switch blades must be cut using chip-cutting tools. The edges of the cut surfaces must be bevelled at an angle of 45°.

4.2 Bending

A hydraulic press must be used if bending of components is necessary. To minimise detrimental stresses in the steel, reshaping must be performed slowly and steadily.

Pressing blocks must follow the entire rail/blade profile and must be designed so that they do not leave localised indentations in the rail.

Any necessary holes must be drilled only after bending has been completed.

4.2.1 Cold bending

Bending of up to 5° must be performed at normal temperature, provided the temperature of the material is at least +15 °C.

4.2.2 Hot bending

Bending exceeding 5° must be performed at a temperature between +640 and +680 °C. The rail must be heated from both sides so that the material reaches approximately the same temperature over its entire profile. The area heated should be 15–20 cm long. The time taken to heat the material from +20 to +600 °C must not be less than 30 minutes.

The temperature must be continuously monitored using temperature-sensitive chalk or a temperature meter.

To allow the material to cool slowly, the buckling point must be wrapped in thermally insulating sheets. The time taken to cool from +600 to +20 °C must not be less than 7 hours.

The pressing blocks must match the rail profile and must be wide enough not to leave an indentation in the rail.

4.3 Drilling

- The distance between two holes, edge to edge, shall not be less than 2xdiameter of the minimal hole
- The distance between the edge of a hole and the edge of the switch blade/rail or a profile transition, shall not be less than the diameter of the hole
- Holes must be drilled with undamaged tools and coolant.
- All drilled holes must be bevelled at an angle of 45°. If the rail is to be bent, holes must always be drilled after bending.
- Plugging of holes with help of welding or other means is not permitted

4.4 Welding

Components must be electric arc welded only where indicated on the drawing. Electric arc welding must be carried out by welders certified in accordance with EN 287-1.

A welding procedure specification in accordance with EN 15607 must be prepared for every welded joint.

4.5 Machining

All machining must be performed in such a way that the specified tolerances and requirements for surface roughness are maintained. In the case of measurements for which no tolerances are defined, the provisions of ISO 2768-1 will generally apply. All burrs must be removed after machining.

4.6 Anticorrosive treatment

All surfaces that come into contact with one another must be thoroughly cleaned and coated with a layer of anticorrosive paint prior to bolting together. The coating must be completely dry before the components are assembled.

All welding seams must be coated with anticorrosive paint or oil.

All machined sliding surfaces on the blade bases, slide plates, lever mechanism etc. must be thoroughly cleaned prior to assembly and coated with anticorrosive lubricant.

All machined, exposed and isolated parts of a switch assembly – i.e. blades and stock railsmust be thoroughly cleaned and coated with a layer of anticorrosive paint after the switch has been assembled and inspected.

Unmachined surfaces (with mill scale) and the cut ends of the rails do not require painting.

5 TOLERANCES AND INSPECTION

Requirements for tolerances and inspection of the expansion devices are given in EN 13232-8.

5.1 Track gauge tolerance

Permissible variations from the nominal track gauge of 1435 mm is +3 / -1 mm .

6 IDENTIFICATION

The expansion devices shall be marked in accordance with EN 13232-8.

7 DOCUMENTATION

7.1 Drawings

The supplier must prepare geometry plan, assembly documents and detailed component plans according to EN 13232-8.

All drawings must be supplied in both of the following electronic formats:
- dwg (Autocad)
- pdf

The supplier has an obligation to supply files that are compatible with the version of Autocad currently used by JBV.

All drawings must be approved by JBV before production commences.

7.2 Parts lists

The supplier must prepare a comprehensive parts list for each switch type. Parts lists must be supplied in Open Document Format (ODF).

7.3 Materials certificates

The supplier must maintain comprehensive records of each order for switches. These records must include materials certificates for the following components:

- Switch blades/Stock rails
- Rails
- Base plates
- Slide plates
- Bolts/Nuts
- Blade bearers

The records are to be retained by the supplier, but must be available for inspection by JBV at any time. On request, the supplier must submit materials certificates to JBV.

7.4 Documentation of final inspection

Documents showing that a final inspection has been carried out in accordance with EN 13232-8 and that the outcome has been approved, must be retained by the supplier for each individual switch. These documents must be available for inspection by JBV at any time. On request, the supplier must submit any documents relating to the final inspection to JBV.

8 REFERENCE DOCUMENTS

EN 13232-8	Railway applications - Track - Switches and crossings - Part 8: Expansion devices
EN 13674-1	Railway applications - Track - Rail - Part 1: Vignole railway rails 46 kg/m and above
EN 13674-2	Railway applications - Track - Rail - Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above

9 CHECKLIST

Description of requirement	**Compliant** (Yes/No)	**Supplier's references**	**Supplier's comments**
2.1 Expansion capacity. **3.1 Axle load and speed** **3.2 Nominal track gauge** **3.3 Direction of traffic** **3.4 Track geometry** **3.5 Expansion device type** **3.6 Basic rail section and grade** **3.7 Rail inclination** **3.8 Fastening system** **3.9 Nominal support spacing** **4.1 Cutting** **4.2 Bending** **4.3 Drilling** **4.4 Welding** **4.5 Machining** **4.6 Anticorrosive treatment** **5 TOLERANCES AND INSPECTION** **5.1 Track gauge tolerance** **6 IDENTIFICATION** **7.1 Drawings** **7.2 Parts lists** **7.3 Materials certificates** **7.4 Documentation of final inspection**			