

Technical Report No.: 51002 – 15 – TAC
ECE Regulation No.: 58.02
Manufacturer: Takler srl
Type: ALUMINIUM BUMPER *270X116X2400

**TECHNICAL REPORT
No. 51002 – 15 – TAC**

Calculation test according to the ECE Regulation No. 58.02, Annex 5

Uniform provisions concerning the approval of rear underrun protective device

ECE No. 58.02 – date of entry into force: 11 July 2008

including all amendments up to and including:

ECE No. 58.02, Supplement 3 – date of entry into force: 15 July 2013

Objectives: Document for issue of approval certificate

I. Technical data

- 0.1. Make (trade name of manufacturer): Takler
- 0.2. Type: ALUMINIUM BUMPER *270X116X2400
- 0.3. Means of identification of type: N/A
- 0.5. Name and address of manufacturer: Takler srl
via Machiavelli
77 – 70022 Altamura (BA)
Italy
- 0.8. Address of assembly plant: Takler srl
via Appia antica, km 13,100
70022 Altamura (BA)
Italy
- 0.9. Location of the approval mark: Self adhesive label bonded on rear side
of RUPD bumper

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II. Test report

1. Test conditions

- 1.1. Category and maximum permissible mass of the vehicle: N2, N3, O3, O4
 up to and over 20 000 kg

- 1.1.1 Product under test: The rear underrun protection device is welded to the vehicle frame. RUP is approving as a component and vehicle frame can be various.

The RUP has three main parts. First part is aluminium bumper that is connected to vehicle with two steal consoles (Fig. 1). Bumper is connected to consoles with special bolts (Fig. 2). Rear underrun protection device type:

The material properties can be seems at Tab. 1.

TK7820 var. A - consoles pitch 860 mm (TEST 1)

TK7820 var. B - consoles pitch 1360 mm (TEST 2)

Thickness of consoles is 8mm in partly close modification Fig. 3

Maximum width of the vehicle rear axle: 2400 mm

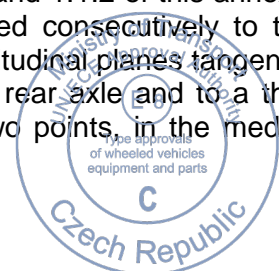
Distance between chassis side-members at mounting points of the device: 860-1360 mm

Maximum allowable longitudinal distance between the rear of the RUPD and the rear extremity of the vehicle: 320 mm

- 1.2. Test procedures used: The non-linear calculation using FEM of rear underrun protection device HS under load mode defined by ECE Regulation No. 58.02, Annex 5, item 3

A horizontal force of 100 kN shall be applied consecutively to two points situated symmetrically about the centre line of the device or of the vehicle whichever is applicable at a minimum distance apart of 700 mm and a maximum of 1000 mm. The exact location of the points of application shall be specified by the manufacturer.

In the cases defined in paragraphs 1.1.1 and 1.1.2 of this annex a horizontal force of 50 kN shall be applied consecutively to two points located 300 ± 25 mm from the longitudinal planes tangential to the outer edges of the wheels on the rear axle and to a third point located on the line joining these two points, in the median vertical plane of the vehicle.



Simulation settings:

TEST 1 – consoles pitch 860 mm Fig. 4, loading sequence Tab. 2

TEST 2 – consoles pitch 1360 mm Fig. 5, loading sequence Tab. 3

Boundary conditions:

Movements and rotations are fixed at the end of the consoles (welding).

Manufacturers' documents:

Drawing:

24730.tif – bumper drawing

Profile_2_Tolerance.JPG – definition of manufacture tolerances

3D CAD data

staffa_sald_dx_2.igs – right console

staffa_sald_sx_2.igs – left console

Profilo_Takler_2.stp – bumper

Others:

Checklist_70-221-EEC_V02_rev1.pdf

1.3. Measuring and test equipment:

Preprocessing: ANSA 15.2.2.

Calculation: PamCrash 2014.01

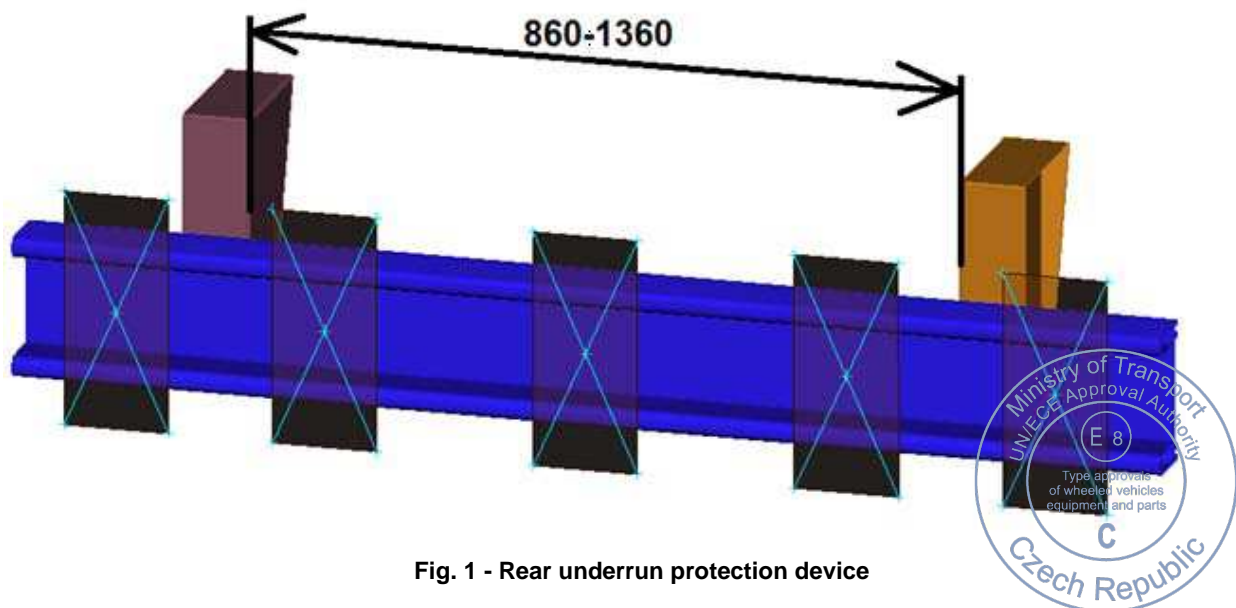


Fig. 1 - Rear underrun protection device



Fig. 2 – Bolt between bumper and console

Tab. 1 Material properties

Material	E-modulus [GPa]	Yield strength [MPa]	Ultimate strength [MPa]	Ductility [%]	Parts
AW6060-T5	70	191	215	10	Bumper
S235JR	210	235	360	26	Consoles
Class 8.8	210	640	800	---	Bolts

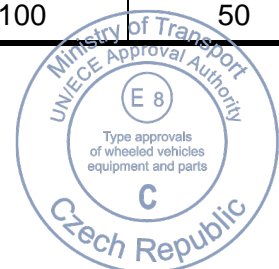
Material properties are defined by manufacturer and validated by TÜV SÜD Czech internal database.

Tab. 2 Loading sequence TEST 1 (P2 distance – 700mm)

Points	P1 left	P2 left	P3	P2 right	P1 right
Test sequence	Step_1	Step_3	Step_5	Step_2	Step_4
Loading [kN]	50	100	50	100	50

Tab. 3 Loading sequence TEST 2 (P2 distance 1000mm)

Points	P1 left	P2 left	P3	P2 right	P1 right
Test sequence	Step_3	Step_1	Step_5	Step_2	Step_4
Loading [kN]	50	100	50	100	50



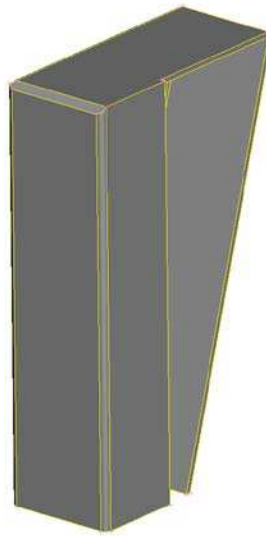


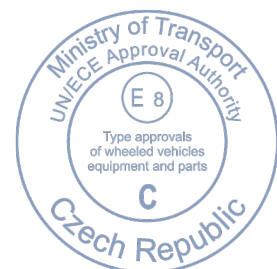
Fig. 3 – Console

2. Test results The rear underrun protection device was loaded in accordance with Regulation 58.02. The loading sequence is in Tab. 2, Tab. 3. Overall maximal displacement (worst case) from both tests is in the Tab. 4.

Tab. 4 – Worst case displacements (pitches of consoles are 1400 and 700 mm)

Pitch of consoles [mm]	860	1360
Loading point	under P1 left	under P2 right
Displacement under loading [mm]	49,3	78,8
Residual displacement [mm]	30,6	69,1

3. Specimen submitted to test on: February 2015
4. Date of test: February 2015



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Czech

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III. Manufacturer's information folder

No. R58-AB-00

11 pages total of 2 March 2015

IV. Attachments

Figures

page 7 to 11

Measuring and test equipment and test site meet the requirements of the applicable legislation.
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V. Final assessment

The described rear underrun protection devices TK7810, TK7820
comply

with the requirements of ECE Regulation No. 58.02, item 16.3

for issue of approval certificate

on condition that the following mounting requirements are accomplished :

Horizontal distance between the rear part of the RUP device and the rear extremity of the vehicle mustn't exceed 320mm.

This technical report consists of pages No. 1 to 11 incl. 5 pages of attachments.

Michal Kalinský

Test executive

Vít Bursík

Officially recognized expert

Prague, 16 March 2015



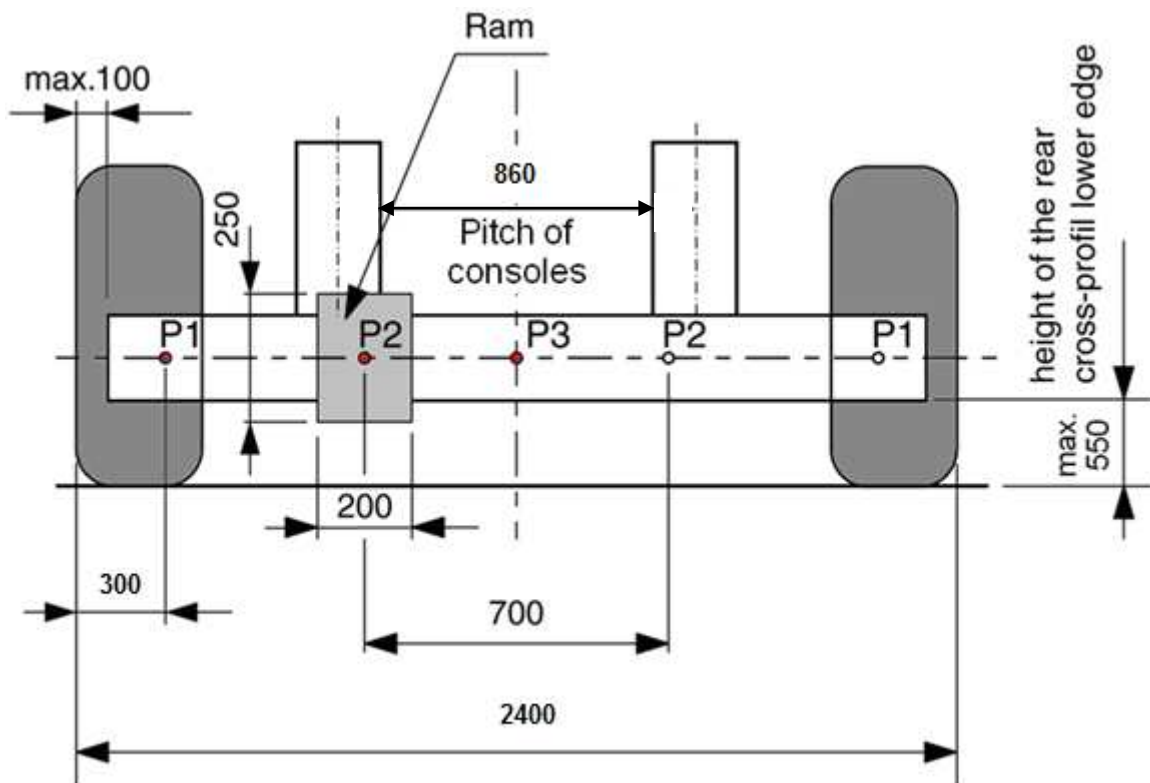


Fig. 4 - Loading points on the rear underrun protection device (pitch of consoles is 860 mm)

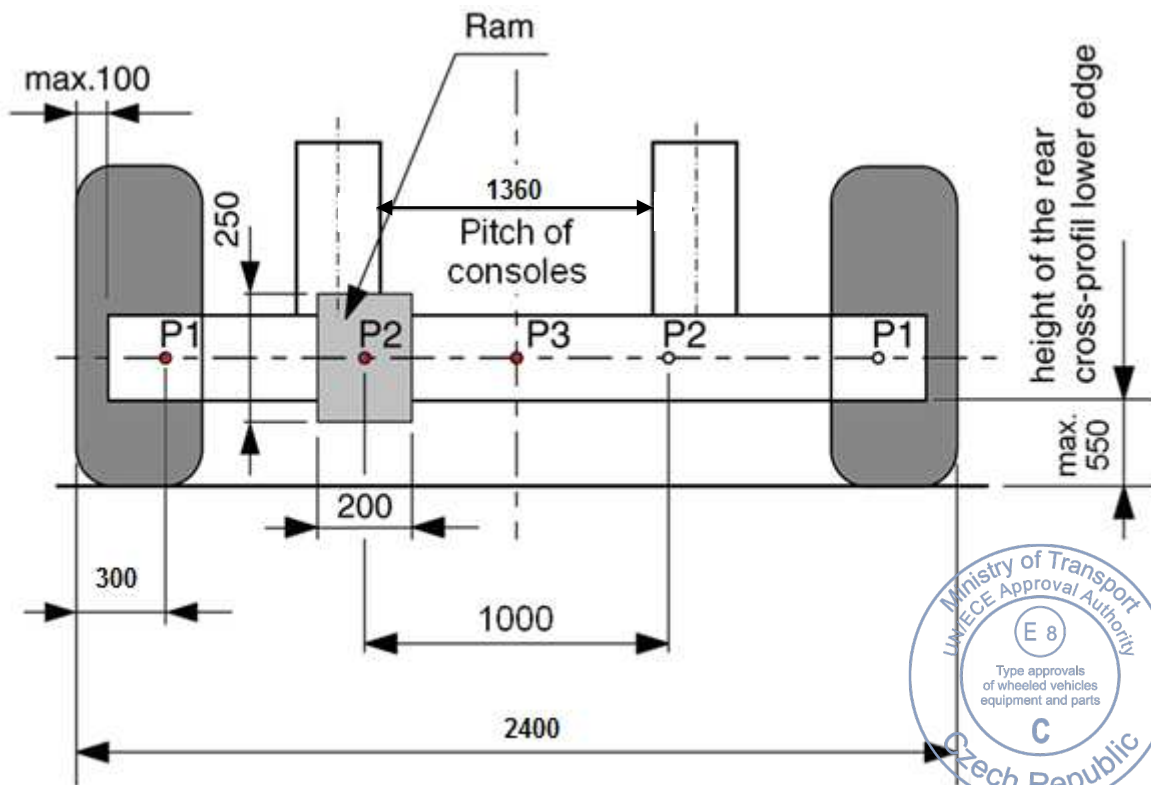


Fig. 5 - Loading points on the rear underrun protection device (pitch of consoles is 1360 mm) – TEST 2

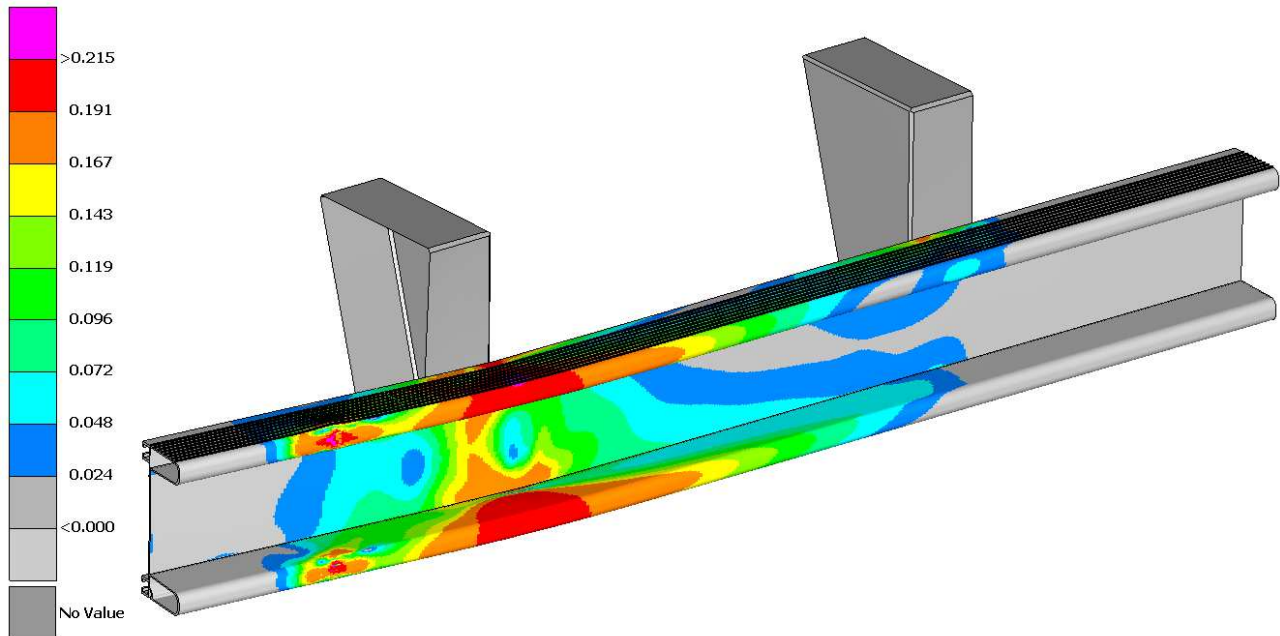


Fig. 6 - RUP device (860 mm) – TEST1, loading point P1 left (50 kN) – VM Stress (worst case) – Bumper

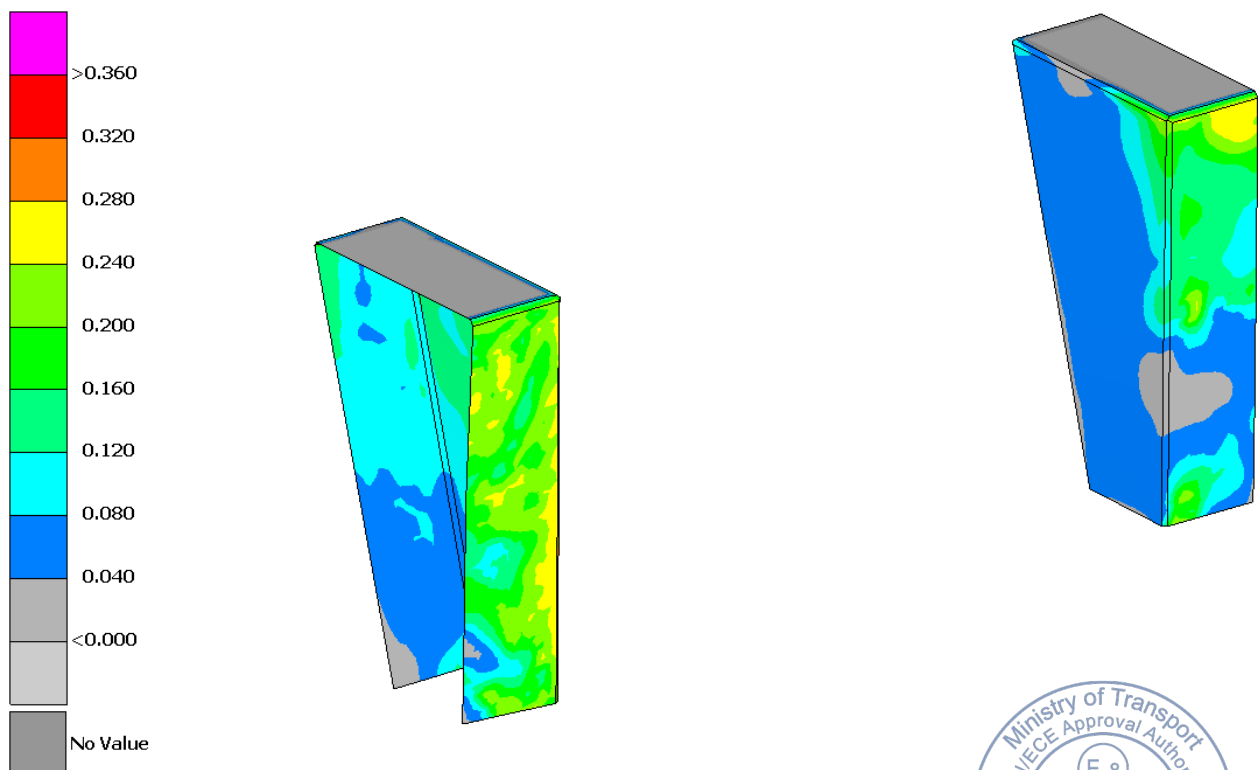
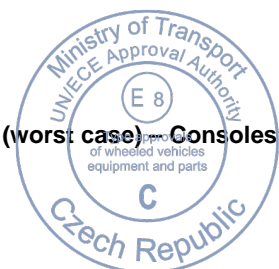


Fig. 7 – RUP device (860 mm) – TEST1, loading point P1 left (50 kN) – VM Stress (worst case) – Consoles



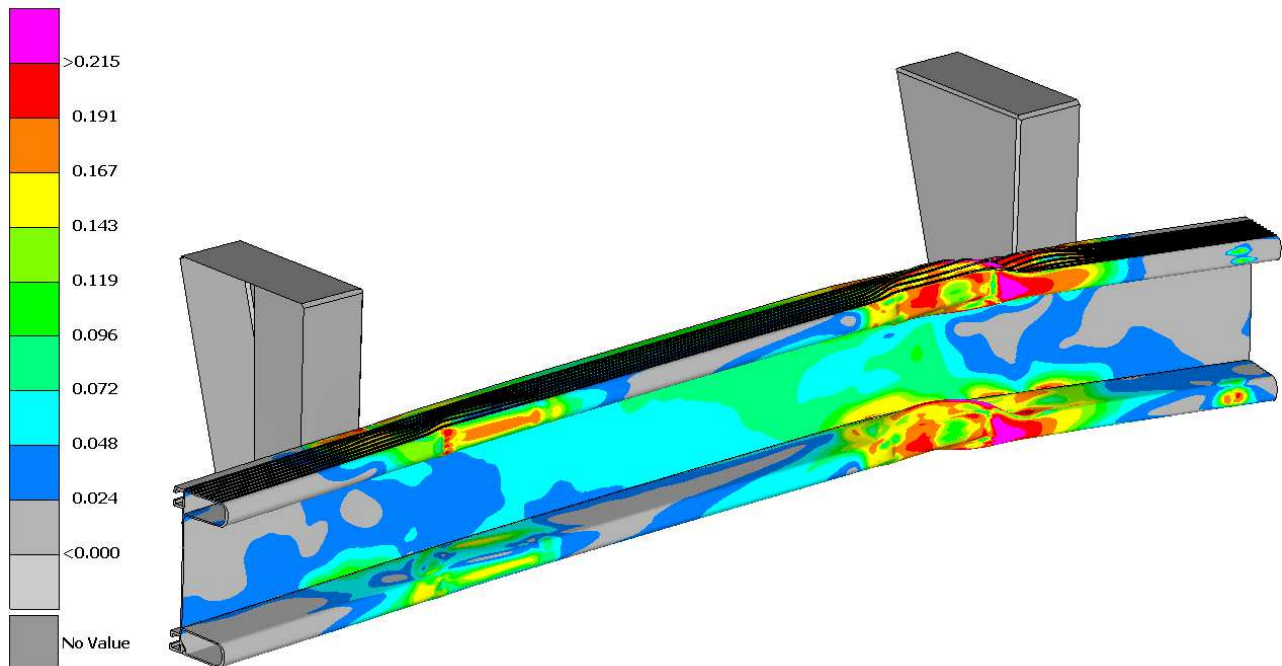


Fig. 8 - RUP device (1360 mm) – TEST2, loading point P2 right (100 kN) – VM Stress (worst case) – Bumper

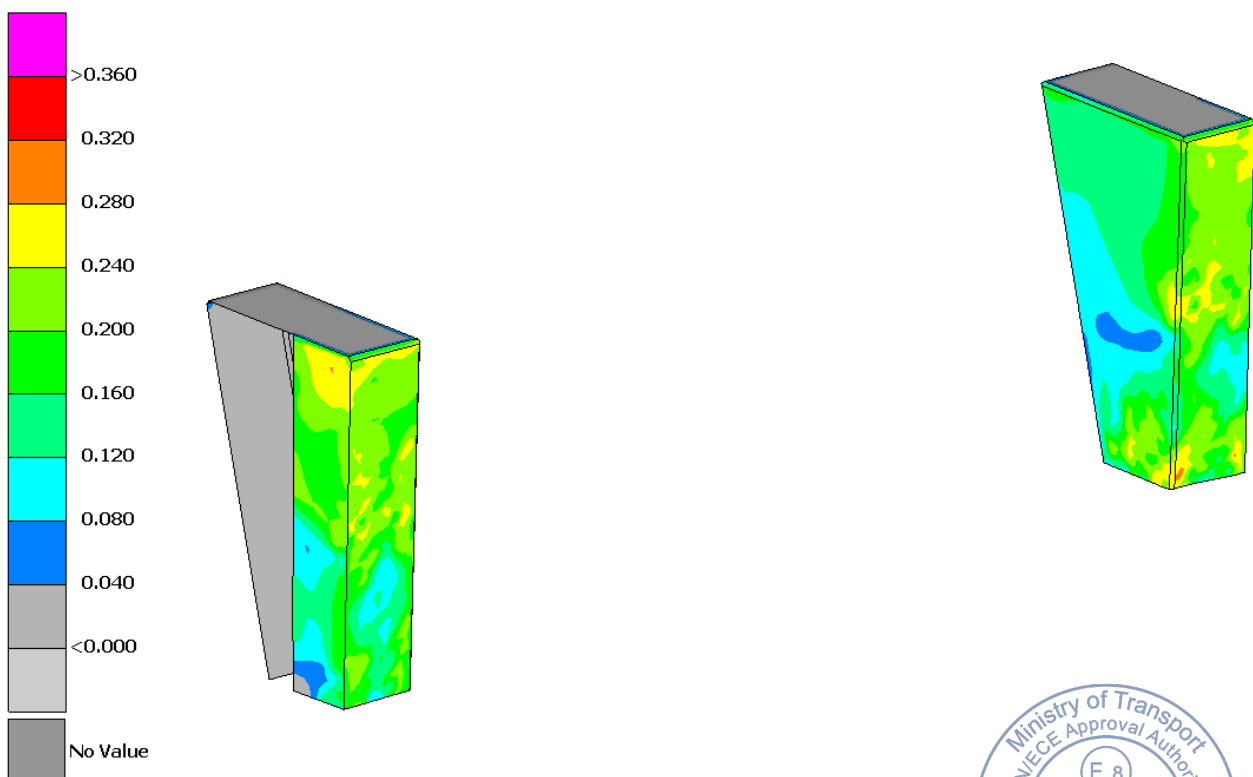


Fig. 9 – RUP device (1360 mm) – TEST2, loading point P2 right (100 kN) – VM Stress (worst case) – Consoles



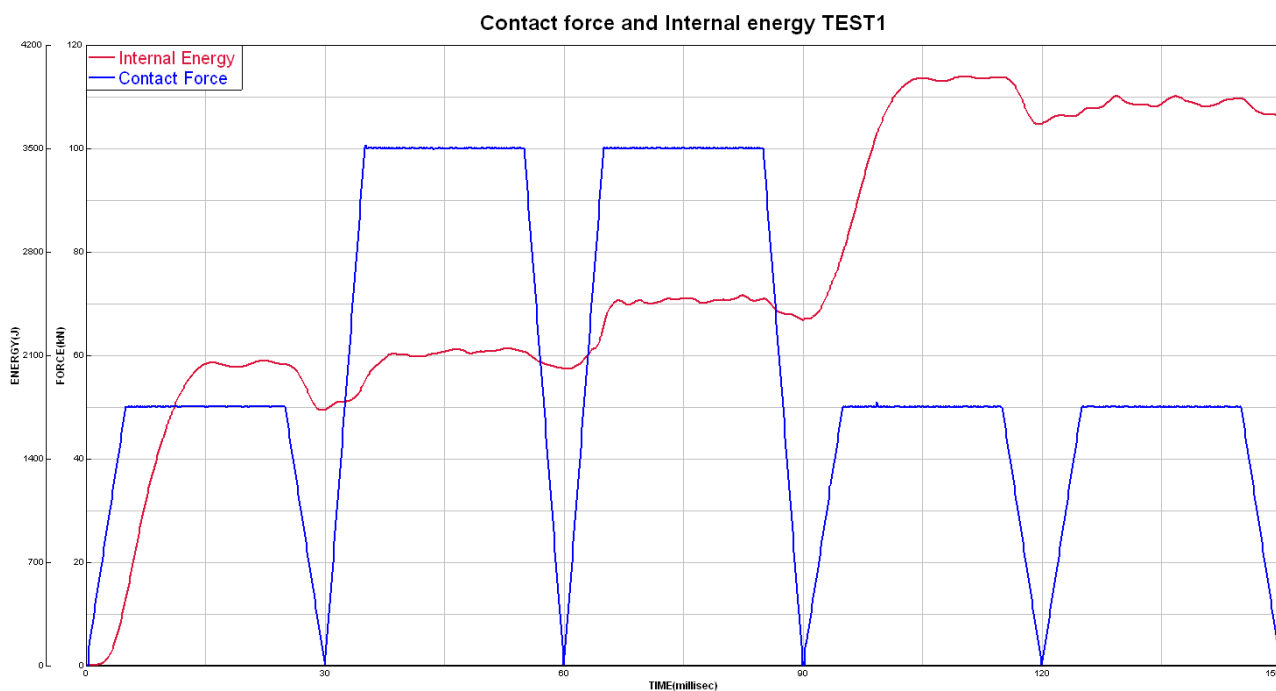


Fig. 10 - RUP device (860 mm) – TEST1, time history of the contact force and internal energy

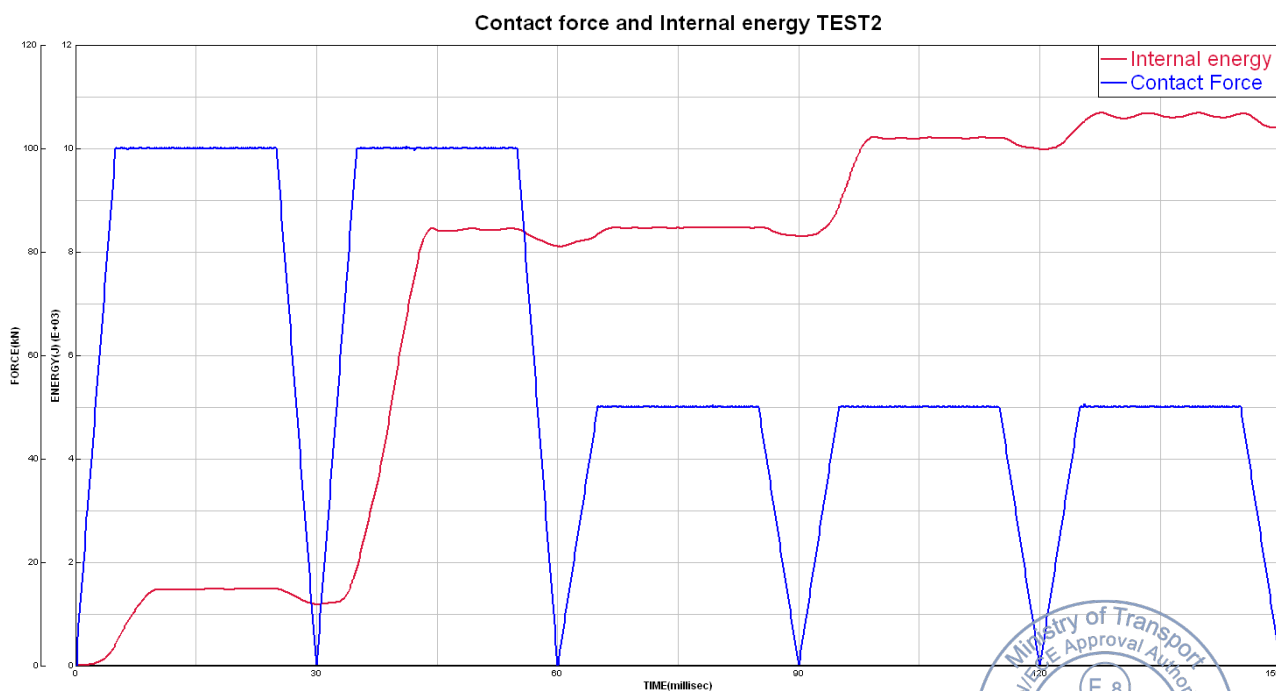
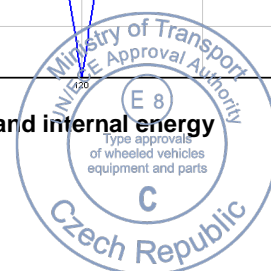


Fig. 11 - RUP device (1360 mm) – TEST2, time history of the contact force and internal energy



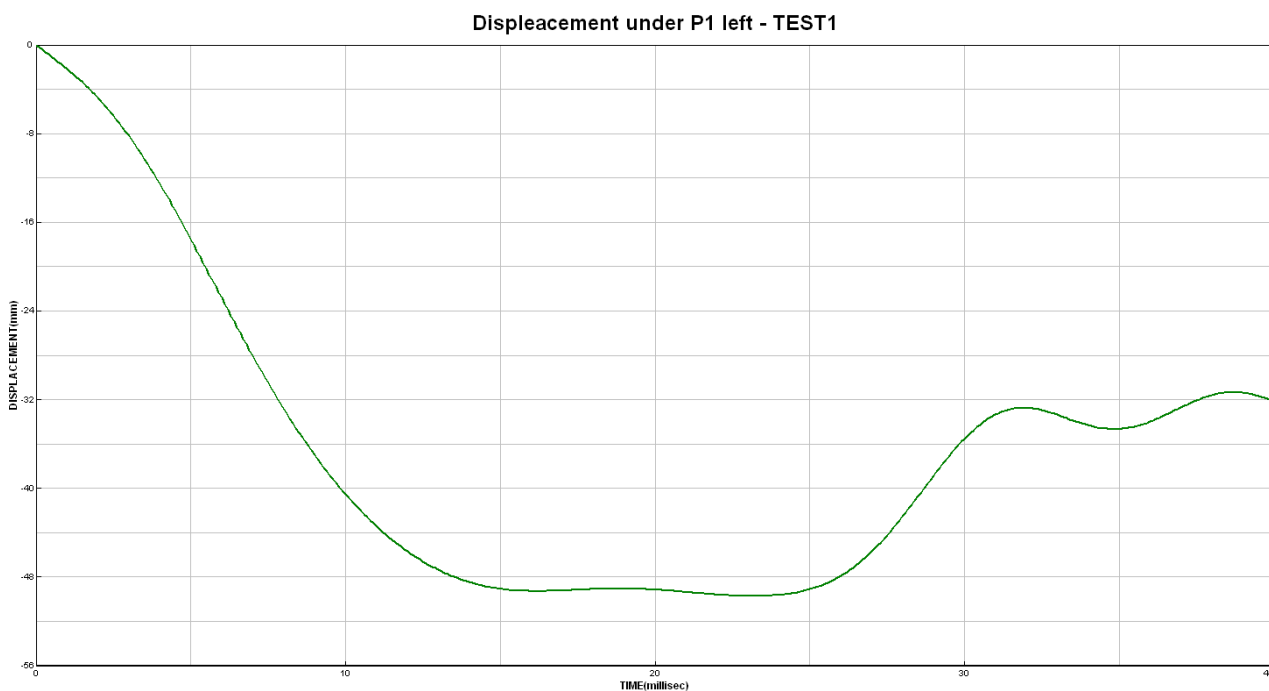


Fig. 12 - RUP device (860 mm) – TEST1, loading point P1 left (50 kN) – ram displacement

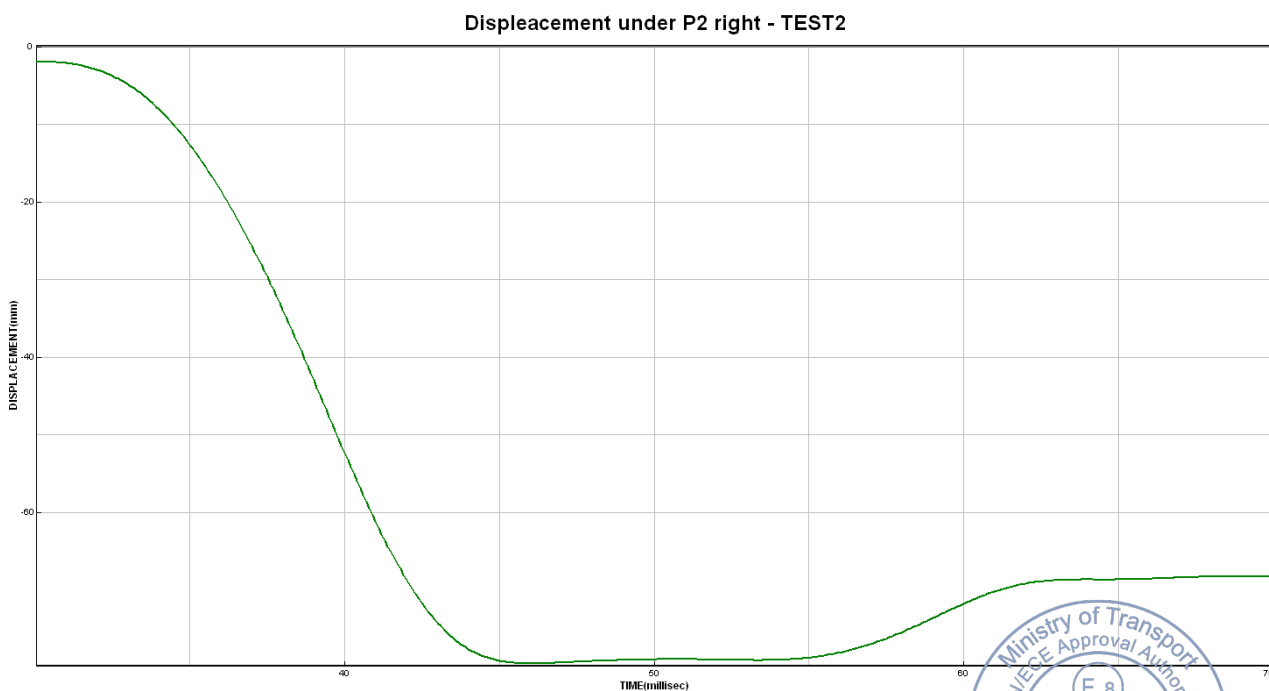


Fig. 13 - RUP device (1360 mm) – TEST2, loading point P2 right (100 kN) – ram displacement

