ORIGINAL

Banc National d'Epreuve
Saint-Etienne

TEST REPORT N° 7-EN/17/BNE

on January 9th, 2017

DELIVERED TO:

INDUSTEEL FRANCE, site du Creusot

56 rue Clémenceau

71201 LE CREUSOT Cedex FRANCE

PURPOSE: Validation of the protection level of five armor plates targets against the ammunition of the Standard AEP 55 vol.1, Edition C, Ver. 1, KE threat, level 2, according to the customer's specification dated on August 26th, 2016.

TESTED SAMPLE(S): MARS 600

TESTING DATE: August 30th, 2016

Publication: INDUSTEEL FRANCE – 2 copies

This test report certifies only to characteristics of the sample subjected to the tests and does not prejudge characteristics of similar products. It does not thus constitute a certification of product in the sense of the article L115-27 of the code of the consumption and the law of June 3rd, 1994.

In order to notify the conformity or non-conformity to the requirements, the uncertainty of the test results has not been explicitly taken into account.

The present report contains 11 page(s).

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TESTED SAMPLE(S)

Five samples are supplied by the customer.

Samples numbers: 64542 R2, R3, R6, R7 and 737641
Size: 300x300 mm and 500x500mm for n° 737641
Grade: MARS 600
Nominal thickness: 8.50mm
Real thickness: 8.50mm
Casts: F9730 and F7825 for n° 737641
Hardness: /

TESTING CONDITIONS

Shooting range temperature: 21.6 to 22.3°C
Shooting range humidity: 60 to 64% RH

Samples are conditioned at -40°C for 24 hours minimum.

Used equipment

Climatic enclosure: CONGELATEUR COTTIER
Target frame: BLINDAGE ETBS
Velocity measurement: Radar DOPPLER 10GHz
Carriages: PROTOTYPA STZA 14A n°55

Test barrels caliber:
7.62x39 n° 4192 and 4278, 650mm length, right hand twist 240mm, 4 grooves (both)

Ammunition caliber:
7.62x39 API BZ batch n° 50-N-711, weighing 7.67g produced by KLIMOVSK Arsenal, Russia

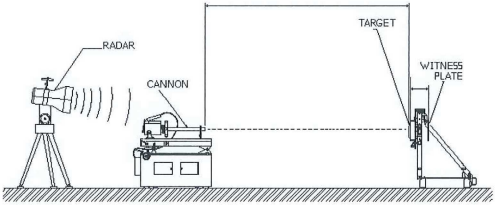
Implementation

According to the Standard AEP-55 Volume 1, Edition C, Version 1 (dated April 2014) for the threat; see following test set-up and customer's specification dated on August 26th, 2016.

The panels are tested at an angle of 0° NATO.

A nominal 0.5mm thick 2024 T3 Aluminum alloy sheet was placed at a standoff distance of 150mm behind and parallel to the rear surface of the target. The distance from the muzzle to the target is indicated in the result sheets.

ORIGINAL



TESTING RESULTS

See the enclosed results sheets n° 11589, 11593 and 11608.
See pictures.

CONCLUSION

The armor panels supplied by INDUSTEEL CREUSOT FRANCE have been submitted to the ballistic testing.

Samples withstood 44 impacts of the ammunition level 2 (7.62x39 API BZ) of the Standard AEP-55, Volume 1, Edition C, Version 1, at -40°C (no complete penetration).

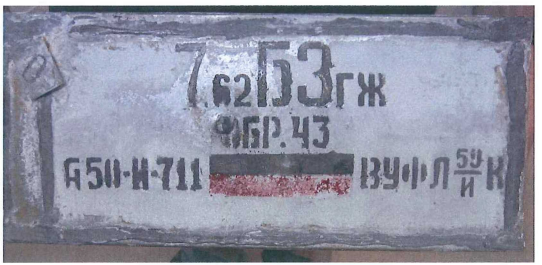
One sample withstood 10 impacts of edge effect testing at -40°C (no complete penetration); maximum 23mm from the edge.

The director
P.RENAUDOT

BANC D'EPREUVE DE ST-ETIENNE

Pictures

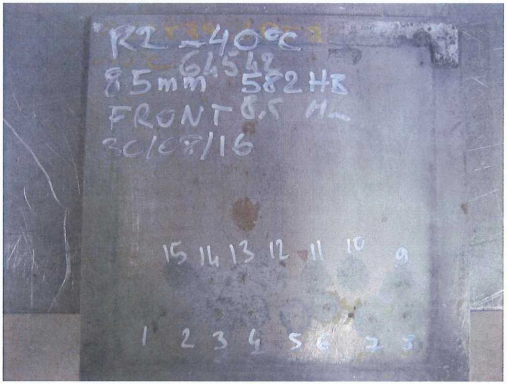
Ammunition

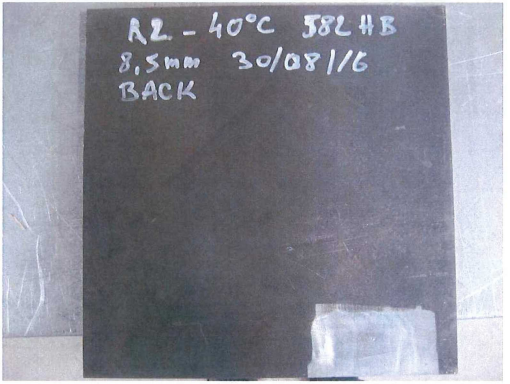


Ammunition package used for testing

Ammunition headstamp

Results sheet n° 11589, samples n° 64542 R2 and R3 (front and back faces)





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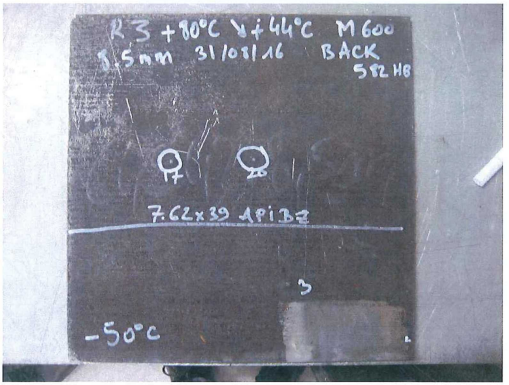
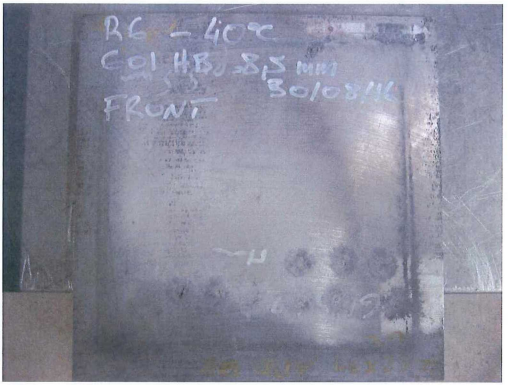
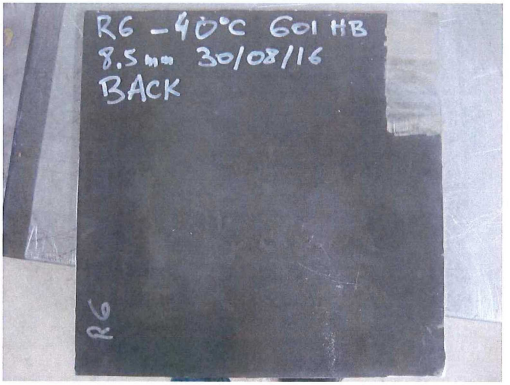
582HB
31/08/16
FRONT
7.62x39 APIBZ
30/08
Gold
-50°C


R3 +80°C ↘+44°C M600
8.5mm 31/08/16 BACK
582 HB
7.62x39 APIBZ
-50°C

Results sheet n° 11593, samples n° 64542 R6 and R7 (front and back faces)





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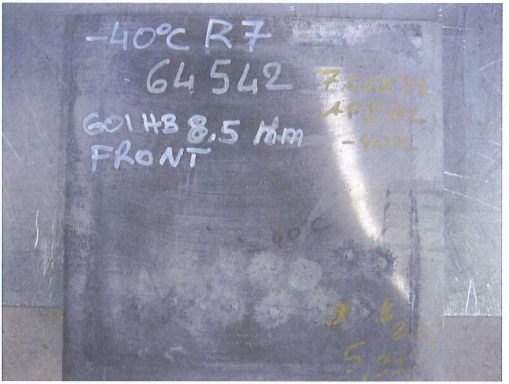

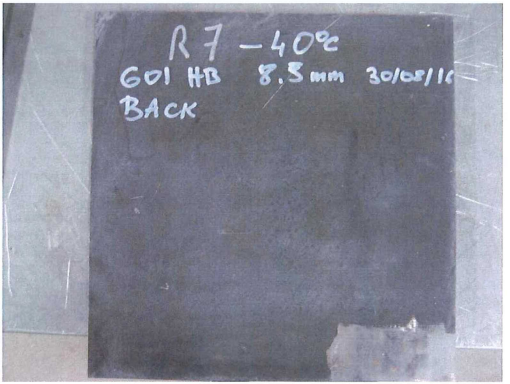

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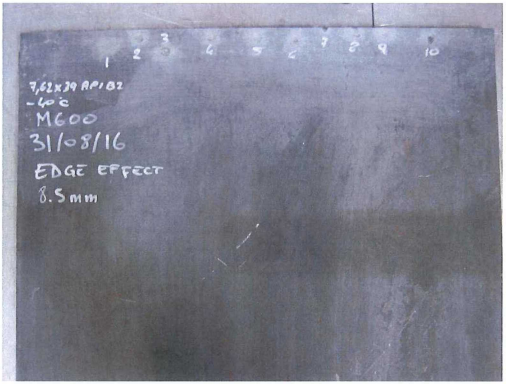
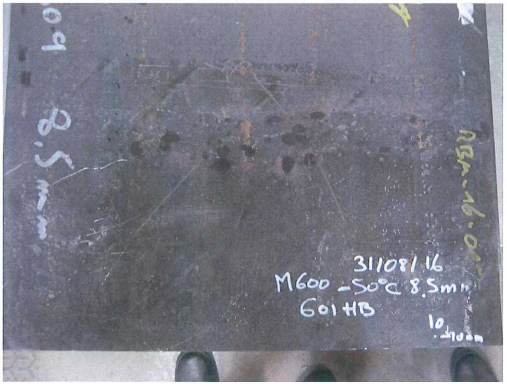
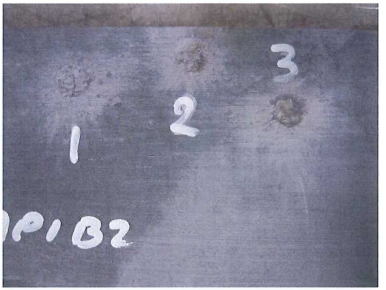
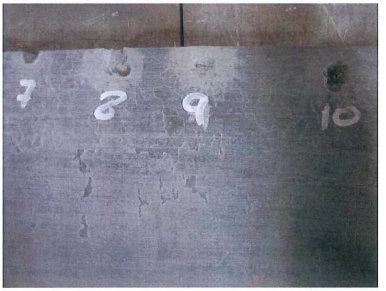
Results sheet n° 11608, sample n° 737641 (front and back faces)



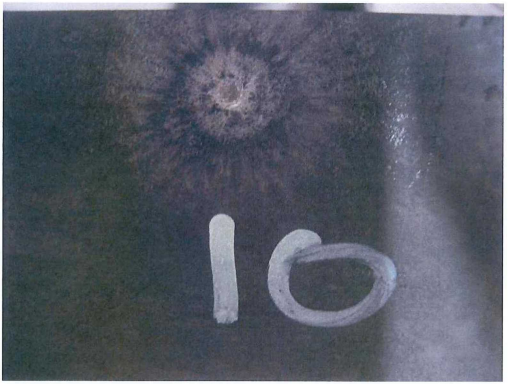


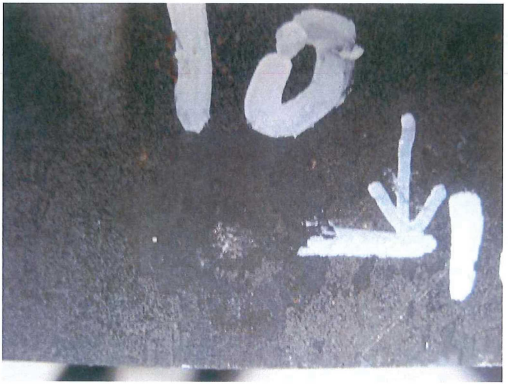
Strike face (impacts n° 1 to 10 details)





Impact n° 10 (impact details front and back faces)





BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS

Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison

Impact resistance testing

Result sheet N° : 11589

Sample N° : 64542 (R2/R3)

BNE Ref. : RBM-16-2054/2055

Customer : INDUSTEEL CREUSOT

Date : 30/08/2016

Size : 300 X 300 mm

Real thickness : 8,50 mm

Composition : Steel MARS 600 ; n° de coulée: F9730

Scales : OHAUS PA413 (R2)
Climatic enclosure : CONGELATEUR COTTIER
Target frame : BLINDAGE ETBS
Recorder : M-THR-24
Additional information about metrology : M-RAP-02, M-RAY-01, M-TEL-03, M-MEX-15, M-RUB-25
Velocity measurement : RADAR DOPPLER 10GHz
Carriage : PROTOTYPA STZA 14A N° 55

Calibre :	7,62 X 39
Distance :	15,00 m
Barrel :	4192

Shooting range N° : 1

Shooting range temperature : 21,6 °C

Sample temperature : -40,0 °C

Shooting range humidity : 64 %

Cyril PIETROY
Technicien Laboratoire

Series	Shot	Calibre	Projectile type	Batch	Incidence	V15 (m/s)	Protection	Remarks
1	1	7,62 X 39	API BZ	50-N-711	0°	697,6	YES	Target R2 (-42.5°C)
1	2	7,62 X 39	API BZ	50-N-711	0°	705,1	YES	Distance shot: 30mm
1	3	7,62 X 39	API BZ	50-N-711	0°	698,1	YES	Distance shot: 25mm
1	4	7,62 X 39	API BZ	50-N-711	0°	702,8	YES	Distance shot: 25mm
1	5	7,62 X 39	API BZ	50-N-711	0°	702,6	YES	Distance shot: 33mm
1	6	7,62 X 39	API BZ	50-N-711	0°	698,6	YES	(-32.6°C) Distance shot: 25mm
1	7	7,62 X 39	API BZ	50-N-711	0°	702,6	YES	(-49.6°C) Distance shot: 35mm
1	8	7,62 X 39	API BZ	50-N-711	0°	697,4	YES	Distance shot: 28mm
1	9	7,62 X 39	API BZ	50-N-711	0°	697,1	YES	Distance shot: 24mm
1	10	7,62 X 39	API BZ	50-N-711	0°	699,2	YES	Distance shot: 31mm
1	11	7,62 X 39	API BZ	50-N-711	0°	696,3	YES	Distance shot: 30mm
1	12	7,62 X 39	API BZ	50-N-711	0°	697,5	YES	Distance shot: 30mm
1	13	7,62 X 39	API BZ	50-N-711	0°	696,8	YES	Distance shot: 22mm
1	14	7,62 X 39	API BZ	50-N-711	0°	701,3	YES	Distance shot: 25mm
1	15	7,62 X 39	API BZ	50-N-711	0°	690,6	YES	(-33.1°C) Distance shot: 25mm
2	1	7,62 X 39	API BZ	50-N-711	0°	705,1	YES	Target R3 (-43.1°C)
2	2	7,62 X 39	API BZ	50-N-711	0°	701,8	YES	Distance shot: 28mm
2	3	7,62 X 39	API BZ	50-N-711	0°	700,8	YES	Distance shot: 26mm
2	4	7,62 X 39	API BZ	50-N-711	0°	697,9	YES	Distance shot: 27mm
2	5	7,62 X 39	API BZ	50-N-711	0°	699,4	YES	Distance shot: 33mm
2	6	7,62 X 39	API BZ	50-N-711	0°	699,7	YES	Distance shot: 19mm
2	7	7,62 X 39	API BZ	50-N-711	0°	695,9	YES	(-30.9°C) Distance shot: 24mm

"Cet essai a été réalisé dans un laboratoire dont le système de management de la qualité est certifié AFAQ ISO 9001"

Operator(s) : M. PIETROY / M. DOPPLER "This test was conducted in an AFAQ ISO 9001 certified laboratory"

BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison

Impact resistance testing

Result sheet N° :	11589	**Sample N° :**	64542 (R2/R3)
		BNE Ref. :	RBM-16-2054/2055
Customer :	INDUSTEEL CREUSOT	Date :	30/08/2016
Size :	300 X 300 mm		
		Real thickness :	8,50 mm

Composition : Steel MARS 600 ; n° de coulée: F9730

Attending person(s) :

Remarks :

Specifications :

Cyril PIETROY
Technicien Laboratoire

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BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison

Impact resistance testing

Result sheet N° : 11593 — **Sample N° :** 64542 (R6/R7)
BNE Ref. : RBM-16-2065/2064

Customer : INDUSTEEL CREUSOT — Date : 30/08/2016
Size : 300 X 300 mm
Real thickness : 8,50 mm

Composition : Steel MARS 600 ; n° de coulée: F9730

Scales : OHAUS PA413 (R2)
Climatic enclosure : CONGELATEUR COTTIER
Target frame : BLINDAGE ETBS
Recorder : M-THR-24
Additional information about metrology : M-RAP-02, M-RAY-01, M-TEL-03, M-MEX-15, M-RUB-25
Velocity measurement : RADAR DOPPLER 10GHz
Carriage : PROTOTYPA STZA 14A N° 55

Calibre :	7,62 X 39
Distance :	15,00 m
Barrel :	4192

Shooting range N° : 1
Shooting range temperature : 21,6 °C — Sample temperature : -40,0 °C
Shooting range humidity : 64 %

Cyril PIETROY
Technicien Laboratoire

Series	Shot	Calibre	Projectile type	Batch	Incidence	V15 (m/s)	Protection	Remarks
1	1	7,62 X 39	API BZ	50-N-711	0°	699,5	YES	Target R6 (37.8°C)
1	2	7,62 X 39	API BZ	50-N-711	0°	687,9	YES	Distance shot: 25mm
1	3	7,62 X 39	API BZ	50-N-711	0°	687,5	YES	(-30.3°C) Distance shot: 30mm
1	4	7,62 X 39	API BZ	50-N-711	0°	698,6	YES	(-44.7°C) Distance shot: 28mm
1	5	7,62 X 39	API BZ	50-N-711	0°	697,4	YES	Distance shot: 33mm
1	6	7,62 X 39	API BZ	50-N-711	0°	694,3	YES	Distance shot: 38mm
1	7	7,62 X 39	API BZ	50-N-711	0°	698,4	YES	Distance shot: 45mm
1	8	7,62 X 39	API BZ	50-N-711	0°	693,8	YES	Distance shot: 32mm
1	9	7,62 X 39	API BZ	50-N-711	0°	697,9	YES	(-29.9°C) Distance shot: 30mm
1	10	7,62 X 39	API BZ	50-N-711	0°	707,6	YES	(-46.4°C) Distance shot: 32mm
2	1	7,62 X 39	API BZ	50-N-711	0°	684,7	YES	Target R7 (-43.7°C)
2	2	7,62 X 39	API BZ	50-N-711	0°	680,0	YES	Distance shot: 36mm
2	3	7,62 X 39	API BZ	50-N-711	0°	686,4	YES	Distance shot: 25mm
2	4	7,62 X 39	API BZ	50-N-711	0°	688,7	YES	(-31.7°C) Distance shot: 29mm
2	5	7,62 X 39	API BZ	50-N-711	0°	702,2	YES	(-47.0°C) Distance shot: 30mm
2	6	7,62 X 39	API BZ	50-N-711	0°	703,4	YES	Distance shot: 35mm
2	7	7,62 X 39	API BZ	50-N-711	0°	698,2	YES	Distance shot: 34mm
2	8	7,62 X 39	API BZ	50-N-711	0°	702,4	YES	Distance shot: 40mm
2	9	7,62 X 39	API BZ	50-N-711	0°	700,2	YES	(-30.8°C) Distance shot: 27mm
2	10	7,62 X 39	API BZ	50-N-711	0°	686,8	YES	(-45.3°C) Distance shot: 36mm
2	11	7,62 X 39	API BZ	50-N-711	0°	696,9	YES	Distance shot: 33mm
2	12	7,62 X 39	API BZ	50-N-711	0°	703,8	YES	(-38.6°C) Distance shot: 28mm

Cet essai a été réalisé dans un laboratoire dont le système de management de la qualité est certifié AFAQ ISO 9001"
"This test was conducted in an AFAQ ISO 9001 certified laboratory"

Operator(s) : M. PIETROY / M. DOPPLER

BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison

Impact resistance testing

Result sheet N° : 11593 — **Sample N° :** 64542 (R6/R7)
BNE Ref. : RBM-16-2065/2064

Customer : INDUSTEEL CREUSOT — Date : 30/08/2016

Size : 300 X 300 mm — Real thickness : 8,50 mm

Composition : Steel MARS 600 ; n° de coulée: F9730

Attending person(s) :

Remarks :

Specifications :

Cyril PIETROY
Technicien Laboratoire

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BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison
Impact resistance testing

Result sheet N° : 11608 — **Sample N° :** 737641
BNE Ref. : RBM-16-21

Customer : INDUSTEEL CREUSOT — Date : 30/08/2016
Size : 500 X 500 mm
Real thickness : 8,50 mm
Composition : Steel MARS 600 ; n° de coulée: F7825

Scales : OHAUS PA413 (R2)
Climatic enclosure : CONGELATEUR COTTIER
Target frame : BLINDAGE ETBS
Recorder : M-THR-24
Additional information about metrology : M-RAP-02, M-RAY-01, M-TEL-03, M-MEX-15, M-RUB-25
Velocity measurement : RADAR DOPPLER 10GHz
Carriage : PROTOTYPA STZA 14A N° 55

Calibre :	7,62 X 39
Distance :	15,00 m
Barrel :	4278

Shooting range N° : 1
Shooting range temperature : 22,3 °C — Sample temperature : -40,0 °C
Shooting range humidity : 60 %

Series	Shot	Calibre	Projectile type	Batch	Incidence	V15 (m/s)	Protection	Remarks
1	1	7,62 X 39	API BZ	50-N-711	0°	732,3	YES	(-50°C) Distance from the edge: 15mm
1	2	7,62 X 39	API BZ	50-N-711	0°	725,6	YES	Distance from the edge: 7mm
1	3	7,62 X 39	API BZ	50-N-711	0°	727,9	YES	Distance from the edge: 23mm
1	4	7,62 X 39	API BZ	50-N-711	0°	726,1	YES	Distance from the edge: 8mm
1	5	7,62 X 39	API BZ	50-N-711	0°	725,3	YES	(-42.6°) Distance from the edge: 10mm
1	6	7,62 X 39	API BZ	50-N-711	0°	727,0	YES	Distance from the edge: 13mm
1	7	7,62 X 39	API BZ	50-N-711	0°	723,4	YES	Distance from the edge: 2mm
1	8	7,62 X 39	API BZ	50-N-711	0°	726,6	YES	Distance from the edge: 6mm
1	9	7,62 X 39	API BZ	50-N-711	0°	733,9	YES	Distance from the edge: 6mm
1	10	7,62 X 39	API BZ	50-N-711	0°	724,7	YES	(-31.5°C) Distance from the edge: 10mm

Operator(s) : M. PIETROY / M. DOPPLER
Attending person(s) :

Remarks :
Specifications :

Cyril PIETROY
Technicien Laboratoire

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