



PROFICIENCY TESTING 2008

UN-approved packaging in 2008

Inter-laboratory comparisons



Executive summary

- Large variations in results from different laboratories have been observed.
- Reason for variations are complex and not easy to detect.
- Variations in the Chemical compatibility: Variations in the processes of deterioration on polyethylene cause variations in following tests.
- Drop tests: Variations in drop orientations might cause large variations in results. Harmonization of drop orientations should be considered. Further analysis is required to understand the reasons for the variations.
- Leak test: Variations were observed in closing torque for plastic canister. Improvement in method description in the proficiency test scheme will be considered.
- Pressure test: Large variations are observed. Variation in temperature might be one reason. Another reason might be variations in the equipment used to do the test.
- Stacking test: Also here large variations are seen. Variations are also seen in the way laboratories calculate the stacking weight for the test.

Conclusion:

- The test scheme show that large variations occur in testing of packaging to obtain UN – approval.
- Reason for variations are complex and not easy to detect.
- To improve the harmonisation of methods and results further standardisation of test methods should be considered.
- Improvement in the Proficiency testing scheme and reference packaging used will be done prior to next inter-laboratory comparison.



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Organisational information

This first International Inter-laboratory comparison of methods used for UN approved dangerous goods packaging was organised by:

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NORWAY

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Objectives and Principles

- The proficiency test is a tool to determine the influence of parameters which may vary between individual laboratories, it does not represent a substitute for the calibration procedure, and the use of calibrated equipment is taken for granted.
- Proficiency testing is a tool for assuring the quality of test and calibration results. According to ISO 17025 proficiency testing (inter-laboratory comparisons) is a recommended way to secure quality of results. Proficiency testing will facilitate international harmonization and thus acceptance of test data from accredited laboratories. Especially for the equal interpretation of international regulations like ADR/RID and UN regulations, proficiency testing is seen as an efficient tool for third parties and supervisory bodies. It will give valuable information about lab performance and the bias of laboratory results.
- The participation in the proficiency test scheme is open for all testing laboratories with a specific experience in chosen methods; the extent of the method selection is free.
- The proficiency test is run and evaluated according to the ISO-Guide 43-1.
- The identity of the participants is handled confidentially and the anonymity of the results is safeguarded by the allocation of the LabCodeNumbers to the participants.
- This first International Proficiency testing scheme is run without acceptance criteria. The aim at this stage is to collect data from the participating laboratories and share information of the achieved test results. The main purpose is to identify inter-laboratory differences. We encourage the participants to evaluate their results and compare them with the other participants, and make the necessary evaluation of improvement areas.



Foreword

- Test methods to be used for the proficiency testing: ISO 16101 and UN model regulation chapter 6.1
- Nordisk Emballasje Testing AS (NET) is accredited according to ISO17025. SWEDAC in Sweden is our accreditation body. NET will distribute a copy of this report to our accreditation body. We will at the same time encourage all participants to do the same. We encourage also all participants to distribute this report and other relevant information in connection with this proficiency testing scheme to the national authorities.
- Packaging with the following UN-codes to be tested: 3H1 (plastic), 1A2/1A2 (steel) and 4G (fibreboard)
- NET has developed the scheme used in this inter-laboratory comparison. This is the first international proficiency scheme developed for testing of dangerous goods packaging in order to obtain UN approval.
- NET aim to make this into a biannual event. The experience obtained through this work will be used to develop the proficiency testing scheme into a more reliable testing scheme for verification of test data from accredited laboratories with the aim to facilitate international harmonization of test results.



Facts

- 14 participant registered, 13 countries
- Four different packaging types: 3H1, 1A2, 1A2, 4G



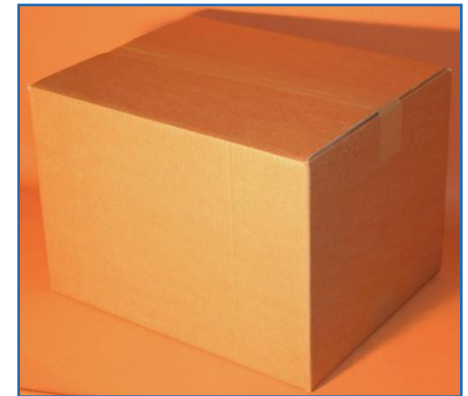
1A2 (liq.)



1A2 (sol.)



3H1 "Euro" and "S2"



4G



Participants

COMPANY	FIRST NAME	FAMILY NAME	E-MAIL
BVT Bureau de Verifications Techniques	E	Fragu	efragu@bvt.eu
Impact Laboratories Ltd	Gregg	Falconer	gregg.falconer@impact-labs.com
OFI	Helmut	Baumann	helmut.baumann@ofi.at
ITENE	Amparo	Martinez Giner	amginer@itene.com
SABS Commercial-Paper&Packaging	Corna	Schoonbee	schooncc@sabs.co.za
SP Sveriges Tekniska Forskningsinstitut	Lars	Andersson	lars.andersson@sp.se
BAM	Thomas	Goedecke	thomas.goedecke@bam.de
Ten-E	Larry	Anderson	larry.anderson@ten-e.com
PIRA	James	Raw	james.raw@pira-international.com
CIMTO	Magdalena	Bambouskova	bambouskova@cimto.cz
Centro Nacional de Embalagem	Margarida	Alves	margaridaalves.cne@isq.pt
BVI/ TNO	Maxence Alexander	Wittebolle de Vendt	m.wittebolle@ibebvi.be alexander.devendt@quality.tno.nl
LNE	Philippe	Thibaudeau	philippe.thibaudeau@lne.fr
NET	Tom	Haugan	tom.haugan@net17025.com



Information about reference material

- Reference material supplied for test purpose is ordinary production samples delivered from reputable UN packaging suppliers.
- 10 l. Plastic packaging 3H1 was produced by Promens AS Kongsvinger: "Euro" and "S2"
- 20 l . Steel drum 1A2 (liq.) was produced by Hannells Industrier AB.
- 20 l . Steel drum 1A2 (sol.) was produced by Hannells Industrier AB.
- 40 l. Fibreboard box was produced by Stora Enso AB



Test protocol and information to participants



Round Robin
UN-test 2008

- The test protocol has been send to participants, but is also distributed together with this report

**E-mail send to all participants 29.05.2008:
Proficiency testing -2008
Inter-laboratory comparisons**

Some answers to relevant questions that have been asked so far.

1. Gross mass 30 kg for fibreboard box 4G is also meant to be used for the drop test, not only for stacking.
2. Gross mass 35 kg for steel packaging 1A2 is also meant to be used for the drop test, not only for stacking.
3. The note in Leakproofness test page 4 in the protocol should be: "Start with a low torque, increase until the sample does not leak during the test."
4. According to the product for testing of solids, every single lab should "replace" the solid specified in Test medium as they usually do. This will give information on how it is solved and how that influence on the result.
5. The increment in height of drop for staircase method should be 0.2 m.
Finally, the data base is promised finished by Thinkpage on the 15th of June.

**E-mail send to all participants 04.06.2008:
Proficiency testing -2008
Inter-laboratory comparisons**

We have to decrease the closure torque for "Euro" can from 10 to 6 Nm.
The closure torque for "S2" is still 10 Nm.

Sorry for the problems this may have caused you.



Test protocol and information to participants

E-mail send to all participants 16.06.2008:

Proficiency testing -2008 Inter-laboratory comparisons

Within 24 hours from now your contact person will all get an e-mail from Thinkpage.

In this e-mail you will find what you need for registration of results according to RR-08.

You will get an username and a password for safe login. The results, will first after every one of you have put your data into the data base, be accessible for NET for further preparation into the final report issued in November.

The two writing errors:

-first on page 6 in your protocol: the heading: is "Steel Packaging, 1A1" should be

"Steel Packaging, 1A2"

-second; on page 7 in your protocol: the table under leakproofness test, first column, third row. The result should not be in "Nm" but as "yes" or "no" as explained.

E-mail send to all participants 18.10.2008:

Dear participants in RR-2008,

several participants have not reported their results. We have therefor extended the time limit for reporting the results to 31.10.2008.

A new mail with username and password have been send to you. Please log in on the enclosed web-site to report your results:

<http://www.net17025.com/testing2008/index.php>

If you for some reason have not been able to do the tests or for some other reason cannot give results, please notify us by e-mail.



Test protocol and information to participants

E-mail send to all participants 12.11.2008:

Dear participants in RR-2008,

There are still a few missing results.
The deadline is now set for November 21. This is the final reminder

A mail with username and password have been send to you. Please log in on the enclosed web-site to report your results:

<http://www.net17025.com/testing2008/index.php>

If you for some reason have not been able to do the tests or for some other reason cannot give results, please notify us by e-mail.

E-mail send to all participants 18.12.2008:

Dear Participants in RR-2008,

The reporting of results is closed and data processing has started.

Due to some late reported results and extensions of timeframe, the final report will be delayed.

We are now going into a season were we take some time to relax, celebrate and spend some time with our friends and family, so will also we in NET.

The final report will be distributed in the first half of January 2009.



Results – Chemical compatibility ADR 6.1.5.2.6- 3H1

Lab_Code_Id	Starting time	First turn	Second turn	Ending time	Name of used Wetting Solution	Aqueous solution (%)	Number of days in storage
3PBeYk4h	01.08.2008	26.10.2008	26.10.2008	26.10.2008	5 % Eumulgin C4, Henkel	5	86
ct7XR4hH	02.09.2008	03.09.2008	22.09.2008	23.09.2008	Aqueous solution Extran	1	21
dcj5xpBP	10.10.2008	11.10.2008	27.10.2008	28.10.2008	Igepal/Water	1	18
eBZTwp9p	19.06.2008	20.06.2008	09.07.2008	10.07.2008	Caflon NP9	2	21
ezddb7yc	11.08.2008	12.08.2008	31.08.2008	01.09.2008	Lutensol FSA 10	5	21
hWAHQ55R	23.07.2008	23.07.2008	13.08.2008	14.08.2008	LANCIL herbal shampoo Ry11	5	22
jw1Fabtb	28.05.2008	29.05.2008	17.06.2008	18.06.2008	Teepol detergent	5	21
TZ5Pnnre	04.06.2008	05.06.2008	24.06.2008	25.06.2008	LAS	1	21
W9FvkvwW	22.08.2008	23.08.2008	11.09.2008	12.09.2008	Alkyl Benzene sulfonate	1	21
wmET88u9	24.06.2008	25.06.2008	14.07.2008	15.07.2008	Lutensol	5	21
xdVtmmJ0	15.07.2008	16.07.2008	04.08.2008	05.08.2008	Aqueous solution of alkyl benzene sulphonate	1	21



Results – Chemical compatibility ADR 6.1.5.2.6 – 3H1



Comments

- 11 reported results
- Reported results show:
 - Variations in use of wetting agent
 - Variations in concentration of wetting agent in wetting solution
 - Three laboratories did not follow the time schedule for the processes of deterioration on polyethylene canister.

Due to variations in above factors in addition to the standard variables, a higher variation in tests performed on the plastics packaging must be expected.



Results – Drop test ADR 6.1.5.3 f_{50} – 3H1

Lab_Code_Id	Drop orientation	6.1.5.3 f_{50} (in meter)	6.1.5.3 ST.DEV.	Second drop orientation
3PBeYk4h	To closure	0,80	0,07	on bottom
ct7XR4hH	Diagonally on the closure	1,10	1,20	horizontal on the seam
dcj5xpBP	Diagnol on Closure	1,10	3,00 	flat on side (Opposite closure)
eBZTwp9p		1,12	0,80	belly with closure at 6 O'clock
ezddb7yc	Diagonally on the bottom	1,10	0,40	flat on the bottom
hWAHQ5R	Diagonally on the bottom	2,10	0,40	anywhere on the closure
jw1Fabtb	Diagonally onto the closure	1,25	0,10	flat on small side face (closure lowermost)
TZ5Pnnre	Bottom edge	1,77	0,29	flat on the short side closure facing down
W9FvkvwW	Diagonally on the closure	1,60	0,70	flat on the front side
wmET88u9	diagonally on the closure	1,30	0,20	diagonally on the bottom
xdVtmmJ0	Drop diagonally on the bottom chime	1,80	0,10	drop diagonally on the top (closure side)
Average		1,37		

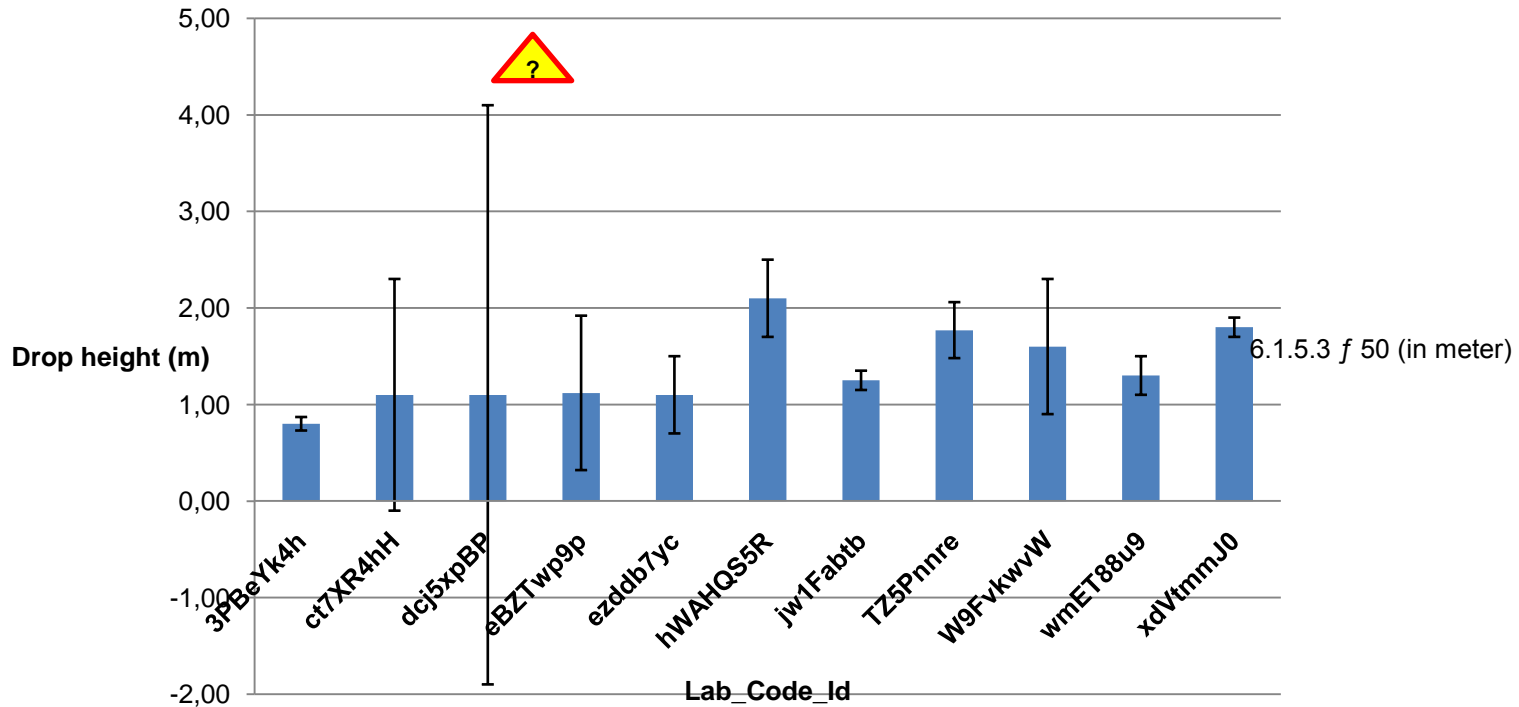


is used to indicate abnormal reported data



Results – Drop test ADR 6.1.5.3 f_{50} – 3H1

6.1.5.3 f_{50} (in meter)





Comments – Drop test ADR 6.1.5.3 f_{50} – 3H1

Comments:

- 11 reported results
- Reported f_{50} drop height: min.=0.8 m. , max.=2.1 m., Average=1.37 m.
- 6 laboratories dropped the canister on the closure
- 4 laboratories dropped the canister on the bottom
- 1 laboratory did not report drop orientation

Second drop orientation (weakest part not testes in the first drops) :

- Variations on drop orientations!





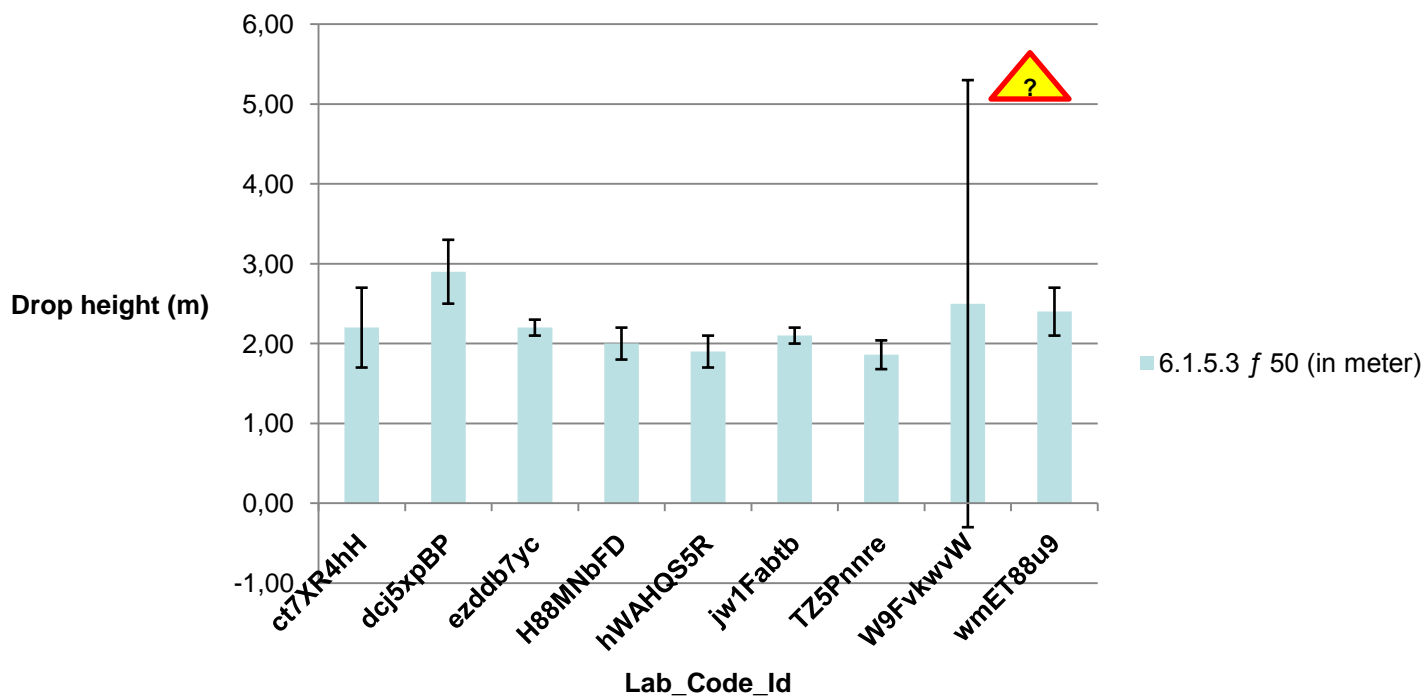
Results – Drop test ADR 6.1.5.3 f_{50} – 1A2 (liq)

Lab_Code_Id	Drop orientation	6.1.5.3 f_{50} (in meter)	6.1.5.3 ST.DEV.	Second drop orientation
ct7XR4hH	welded longitudinal seam of the drum body	2,20	0,50	diagonally on the closure
dcj5xpBP	the welded longitudinal Seam	2,90	0,40	Flat on Side
ezddb7yc	the welded longitudinal seam	2,20	0,10	diagonally on the lid
H88MNbFD	the welded longitudinal seam	2,00	0,20	the target diagonaly on the top chime
hWAHQ5R	welded longitudinal seam	1,90	0,20	diagonally on lid, closure and locking ring in impact point
jw1Fabtb	welded longitudinal seam	2,10	0,10	diagonally on top with closure in 3 o'clock position
TZ5Pnnre	welded longitudinal seam	1,86	0,18	diagonally on the closure
W9FvkwvW	diagonal bottom on weld	2,50	2,80	flat on handle
wmET88u9	diagonal bottom on closure	2,40	0,30	diagonally on the welded longitudinal seam
Average		2,23		



Results – Drop test ADR 6.1.5.3 f_{50} – 1A2 (liq)

6.1.5.3 f_{50} (in meter) - 1A2 (liq)





Comments – Drop test ADR 6.1.5.3 f_{50} – 1A2 (liq)

Comments:

- 9 reported results
- Reported f_{50} drop height: min.=1,86 m. , max.=2.9 m., Average=2,23 m.
- 7 laboratories dropped the steel drum on the welded longitudinal seam


Second drop orientation (weakest part not tested in the first drops) :

- 6 laboratories dropped the steel drum diagonally on the closure
- 2 laboratories dropped the steel drum flat on side
- 1 laboratory dropped the steel drum on the welded longitudinal seam (reporting error?)





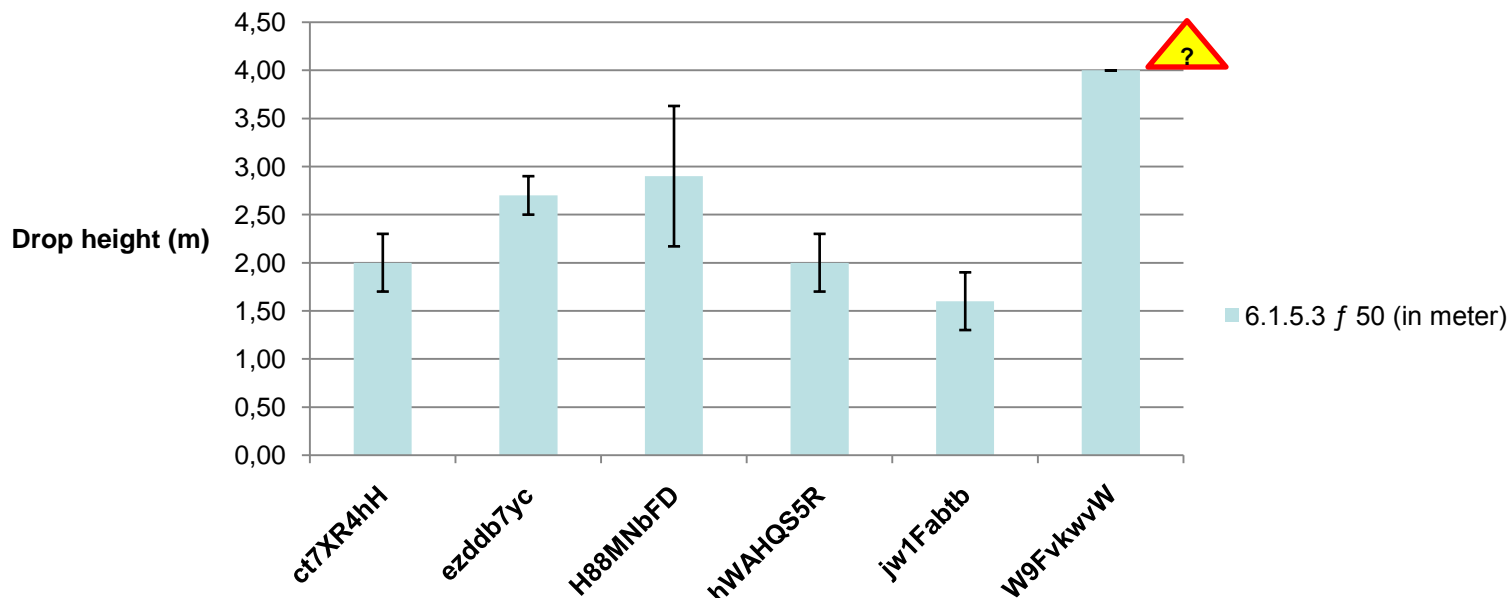
Results – Drop test ADR 6.1.5.3 f_{50} – 1A2 (sol.)

Lab_Code_Id.	Drop orientation	6.1.5.3 f_{50} (in meter)	6.1.5.3 ST.DEV.	Second drop orientation
ct7XR4hH	welded longitudinal seam of the drum body	2,00	0,30	diagonally on the closure
ezddb7yc	the welded longitudinal seam	2,70	0,20	Diagonally on the lid
H88MNbFD	the welded longitudinal seam	2,90	0,73	the target diagonaly on the top chime
hWAHQ55R	the welded longitudinal seam	2,00	0,30	diagonally on lid, closure and locking ring in impact point
jw1Fabtb	the welded longitudinal seam	1,60	0,30	Diagonally on top opposite first impact
W9FvkwvW	diagonal bottom seam (stop test maximum drop installation)	4 	0	FLAT ON HANDLE
Average		2,53		



Results – Drop test ADR 6.1.5.3 f_{50} – 1A2 (sol.)

6.1.5.3 f_{50} (in meter)





Comments – Drop test ADR 6.1.5.3 f_{50} – 1A2 (sol.)

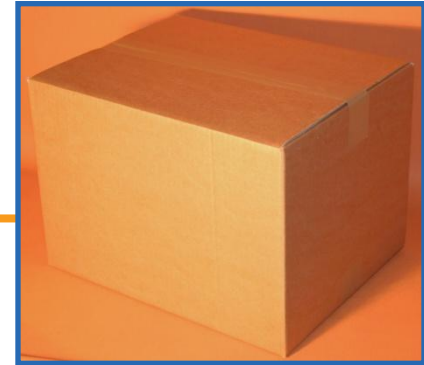
Comments:

- 6 reported results
- 1 laboratory lacked equipment to complete the test
- Reported f_{50} drop height: min.=1.6 m. , max.=2.9 m., Average=2.53 m.
- 5 laboratories dropped the steel drum on the welded longitudinal seam
- 1 laboratories dropped the steel drum diagonally on the bottom

Second drop orientation (weakest part not tested in the first drops) :

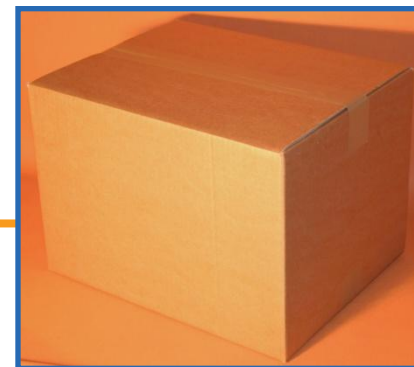
- 5 laboratories dropped the steel drum diagonally on the bottom
- 1 laboratory dropped the steel drum flat on side





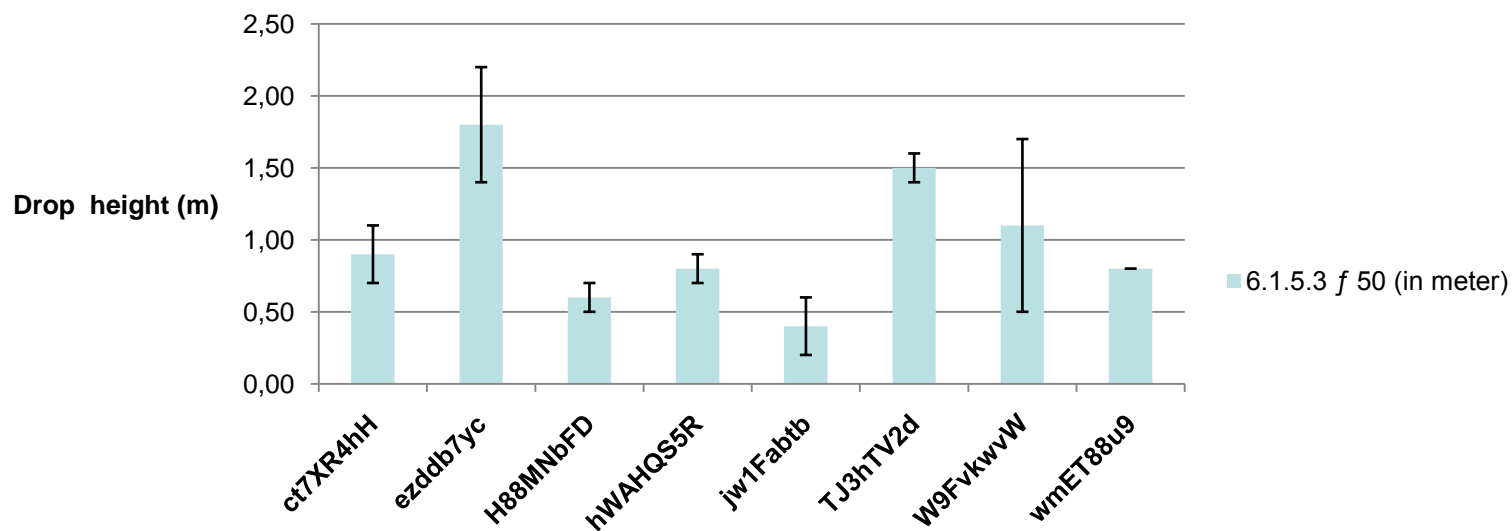
Results – Drop test ADR 6.1.5.3 f_{50} – 4G

Lab_Code_Id	Drop orientation	6.1.5.3 f_{50} (in meter)	6.1.5.3 ST.DEV.
ct7XR4hH	corner of the manufactured edge joint	0,90	0,20
ezddb7yc	on a corner	1,80	0,40
H88MNbFD	on the top corner	0,60	0,10
hWAHQ5R	on a corner	0,80	0,10
jw1Fabtb	diagonally on corner 3,4,6	0,40	0,20
TJ3hTV2d	on the corner	1,50	0,10
W9FvkvwW	top corner diagonally opposite to manufacturing joint	1,10	0,60
wmET88u9	on a corner (top)	0,8	0
Average		0,99	



Results – Drop test ADR 6.1.5.3 f_{50} – 4G

6.1.5.3 f_{50} (in meter)

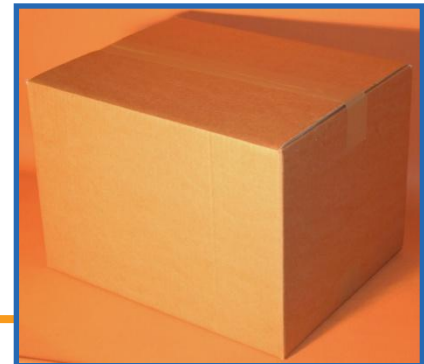




Comments – Drop test ADR 6.1.5.3 f_{50} – 4G

Comments:

- 8 reported results
- Reported f_{50} drop height: min.=0.4 m. , max.=1.8 m., Average=0.99 m.
- 8 laboratories dropped the fibreboard box on a corner





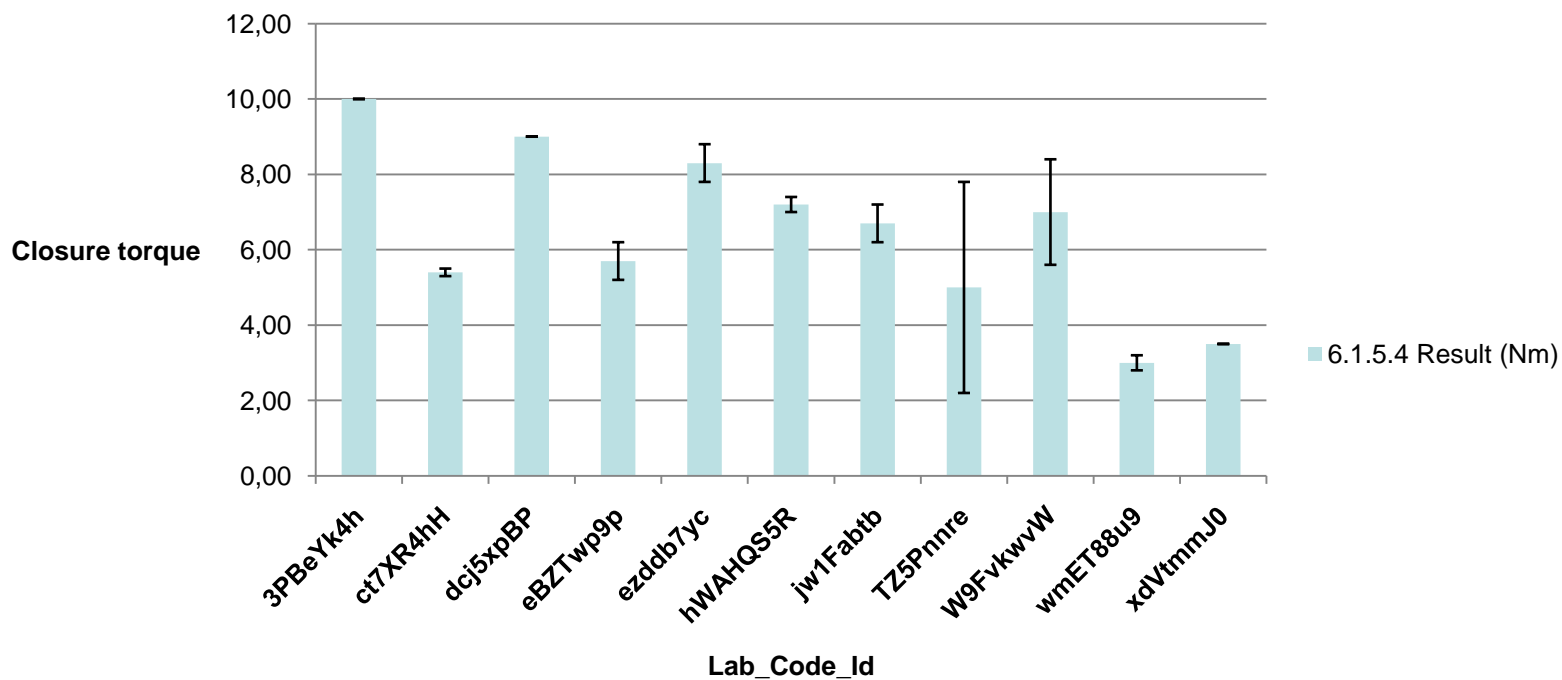
Results – Leak test ADR 6.1.5.4 – 3H1 closing torque

Lab_Code_Id	6.1.5.4 Sample 1	6.1.5.4 Sample 2	6.1.5.4 Sample 3	6.1.5.4 Result (Nm)	6.1.5.4 ST.DEV
3PBeYk4h	10,00	10,00	10,00	10,00	0,00
ct7XR4hH	5,40	5,30	5,60	5,40	0,10
dcj5xpBP	9,00	9,00	9,00	9,00	0,00
eBZTwp9p	5,00	6,00	6,00	5,70	0,50
ezddb7yc	8,00	9,00	8,00	8,30	0,50
hWAHQ5R	7,50	7,20	6,90	7,20	0,20
jw1Fabtb	7,00	7,00	6,00	6,70	0,50
TZ5Pnnre	3,00	9,00	3,00	5,00	2,80
W9FvkwvW	8,00	8,00	5,00	7,00	1,40
wmET88u9	3,00	2,80	3,30	3,00	0,20
xdVtmmJ0	3,50	3,50	3,50	3,50	0,00
Average				6,44	



Results – Leak test ADR 6.1.5.4 – 3H1 closing torque

6.1.5.4 Result (Nm)





Comments – Leak test ADR 6.1.5.4 – 3H1

Comments to finding the lowest closure torque for the sample to pass the test:

- 11 reported results
- Reported lowest closure torque: min.=3 Nm , max.=10 Nm, Average=6.44 Nm.





Results – Leak test ADR 6.1.5.4 – 1A2 (liq.)

Lab_Code_Id	6.1.5.4 Sample 1	6.1.5.4 Sample 2	6.1.5.4 Sample 3	6.1.5.4 Result
ct7XR4hH	1	1	1	1
dcj5xpBP	1	1	1	1
ezddb7yc	1	1	1	1
H88MNbFD	1	1	1	1
hWAHQ5R	1	1	1	1
jw1Fabtb	1	1	1	1
TZ5Pnnre	1	1	1	1
W9FvkwwW	1	1	1	1
wmET88u9	No result	No result	1	0

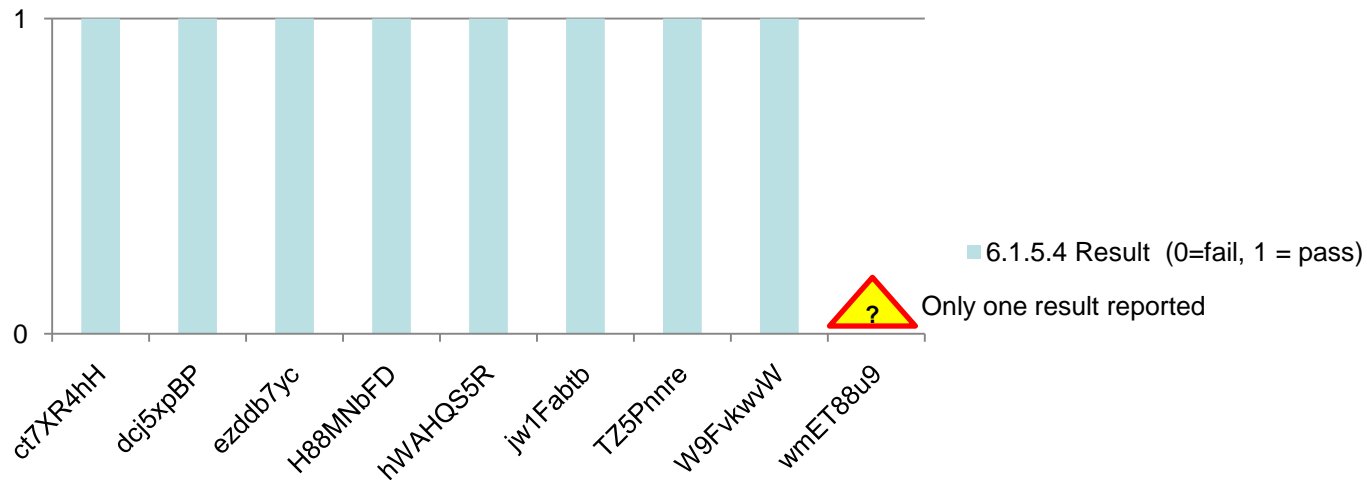
Comments:

9 laboratories (all participants) reported the steel drum to pass the leak test.
One laboratory did not complete the three leak tests.



Results – Leak test ADR 6.1.5.4 – 1A2 (liq.)

6.1.5.4 Leak test 1A1(liq.)



Comments:

9 laboratories (all participants) reported the steel drum to pass the leak test.
One laboratory did not complete the three leak tests.



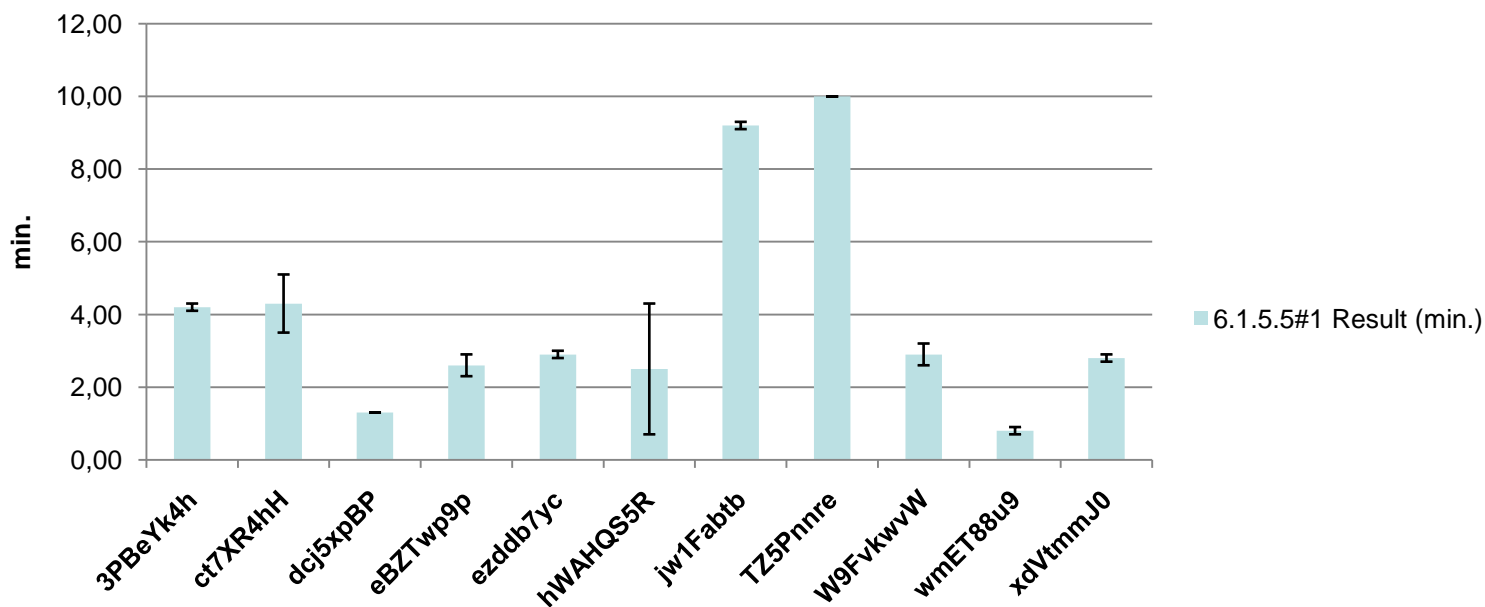
Results – Pressure test ADR 6.1.5.5 – 3H1 step 1 Time to reach 200 kPa

	Step 1				
Lab_Code_Id	6.1.5.5#1 Sample 1	6.1.5.5#1 Sample 2	6.1.5.5#1 Sample 3	6.1.5.5#1 Result (min.)	6.1.5.5#1 ST.DEV
3PBeYk4h	4,20	4,30	4,10	4,20	0,10
ct7XR4hH	4,50	5,20	3,30	4,30	0,80
dcj5xpBP	1,26	1,26	1,26	1,30	0,00
eBZTwp9p	2,50	3,00	2,33	2,60	0,30
ezddb7yc	2,80	3,00	2,80	2,90	0,10
hWAHQ5R	0,00	3,20	4,20	2,50	1,80
jw1Fabt	9,30	9,10	9,20	9,20	0,10
TZ5Pnnre	10,00	10,00	10,00	10,00	0,00
W9FvkwwW	3,10	2,50	3,00	2,90	0,30
wmET88u9	0,60	0,90	0,80	0,80	0,10
xdVtmmJ0	2,70	2,70	3,00	2,80	0,10
Average				3,95	



Results – Pressure test ADR 6.1.5.5 – 3H1 step 1 Time to reach 200 kPa

6.1.5.5#1 Result (min.)





Comments – Pressure test ADR 6.1.5.5 – 3H1 step 1 Time to reach 200 kPa

Comments:

- 11 reported results
- Reported time to reach 200 kPa: min.=1.3 min, max.=10 min, Average=3.95 min.





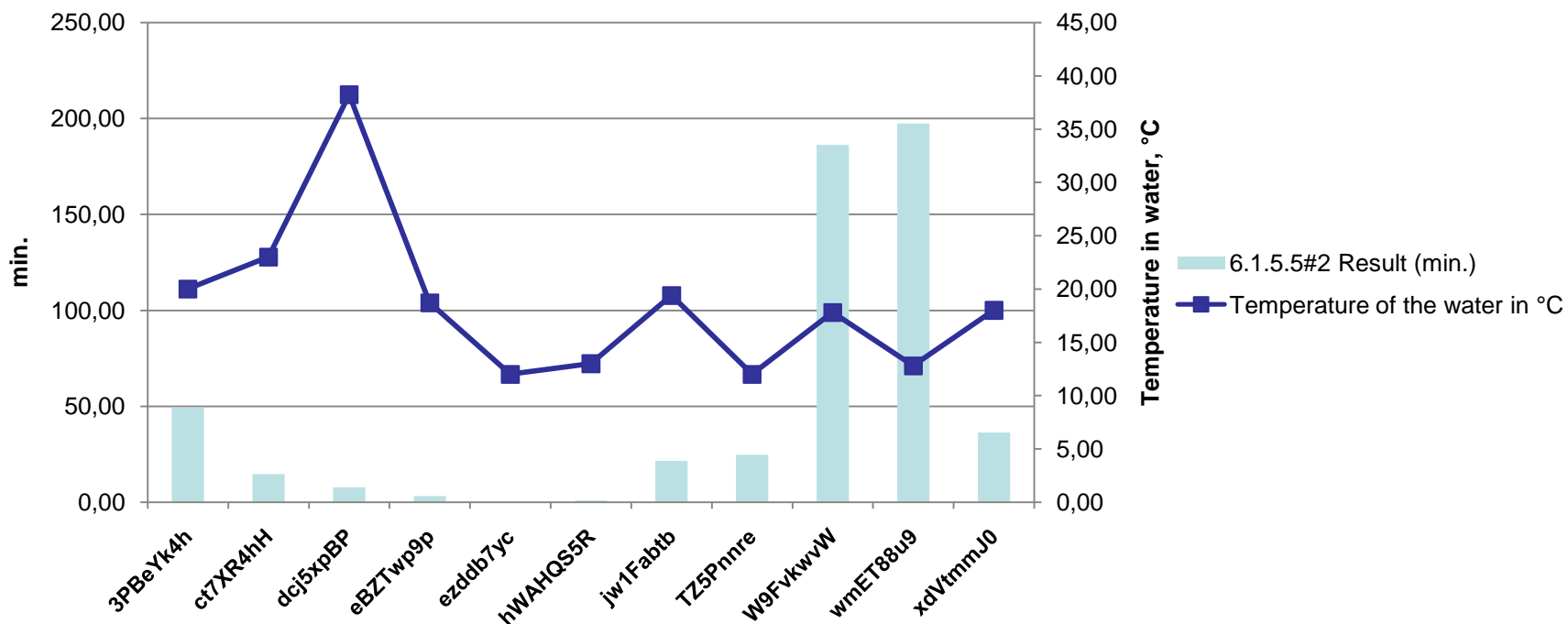
Results – Pressure test ADR 6.1.5.5 – 3H1 step 2 Time to leak

Lab_Code_Id	Step 2					Temperature of the water in °C
	6.1.5.5#2 Sample 1	6.1.5.5#2 Sample 2	6.1.5.5#2 Sample 3	6.1.5.5#2 Result (min.)	6.1.5.5#2 ST.DEV	
3PBeYk4h	51,00	70,00	27,00	49,30	17,60	20,00
ct7XR4hH	14,30	14,50	15,30	14,70	0,40	23,00
dcj5xpBP	5,50	16,38	1,45	7,80	6,30	38,22
eBZTwp9p	3,00	2,50	4,00	3,20	0,60	18,70
ezddb7yc	-0,10	-0,20	-0,10	-0,10	0,10	12,00
hWAHQ5R	0,00	2,10	1,10	0,90	0,90	13,00
jw1Fabtb	29,50	18,20	17,00	21,60	5,60	19,40
TZ5Pnnre	13,00	10,00	51,00	24,70	18,70	12,00
W9FvkvwW	137,20	202,30	219,50	186,30	35,40	17,80
wmET88u9	238,60	153,60	200,20	197,50	34,80	12,80
xdVtmmJ0	45,00	32,00	32,00	36,30	6,10	18,00
Average				49,29		



Results – Pressure test ADR 6.1.5.5 – 3H1 step 2 Time to leak

Time to leak, min





Comments – Pressure test ADR 6.1.5.5 – 3H1 step 2 Time to leak

Comments:

- 11 reported results
- Reported time to leak at 200 kPa: min.=0 min, max.=186.3 min, Average=32.5 min.
- 1 participant did not reach 200 kPa before leak
- Temperature in test water: min. = 12°C, max.= 38.22°C





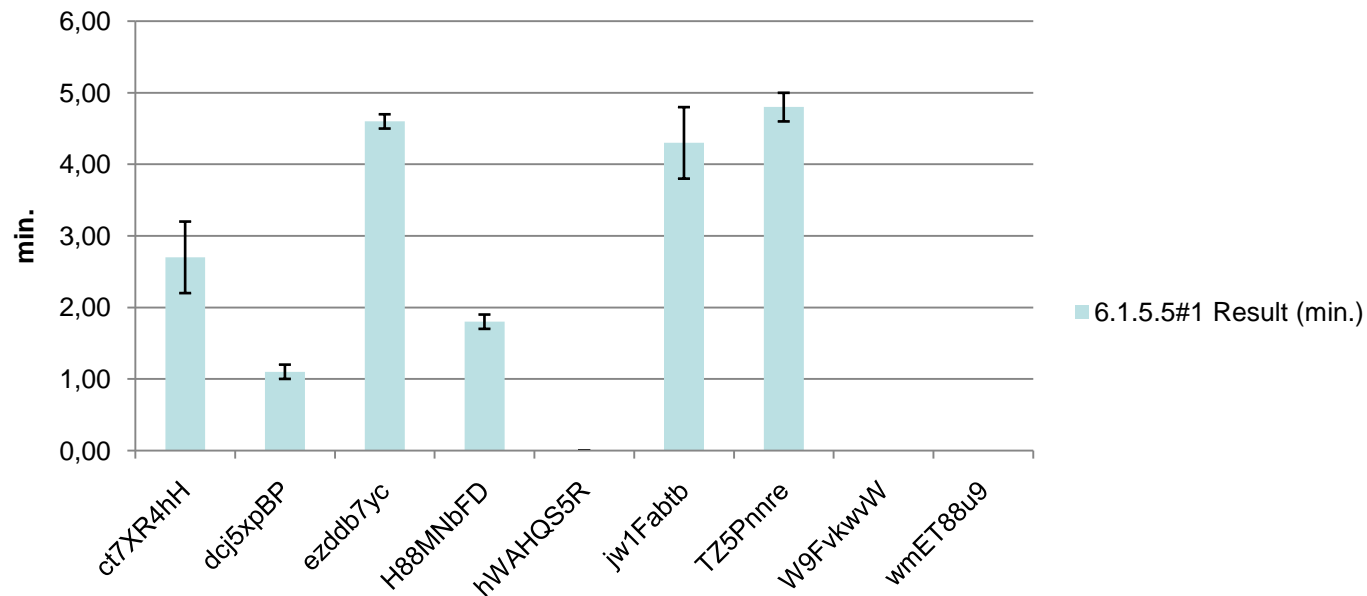
Results – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 1 Time to reach 200 kPA

Lab_Code_Id	Step 1				
	6.1.5.5#1 Sample 1	6.1.5.5#1 Sample 2	6.1.5.5#1 Sample 3	6.1.5.5#1 Result (min.)	6.1.5.5#1 ST.DEV
ct7XR4hH	3,00	2,00	3,00	2,70	0,50
dcj5xpBP	1,10	1,10	1,20	1,10	0,10
ezddb7yc	4,50	4,70	4,70	4,60	0,10
H88MNbFD	1,80	1,90	1,80	1,80	0,10
hWAHQ5R	-	-	-	-	-
jw1Fabtb	5,00	4,00	3,80	4,30	0,50
TZ5Pnnre	5,00	4,50	5,00	4,80	0,20
W9FvkwvW	-	-	-	-	-
wmET88u9	-	-	-	-	-
Average				2,76	



Results – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 1 Time to reach 200 kPa

6.1.5.5#1 Time to reach 200kPa, Result (min.)





Comments – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 1 Time to reach 200 kPa

Comments:

- 3 laboratories did not reach 200 kPa
- 6 reported time to reach 200 kPa: min.=0 min, max.=5 min, Average=2.5 min.





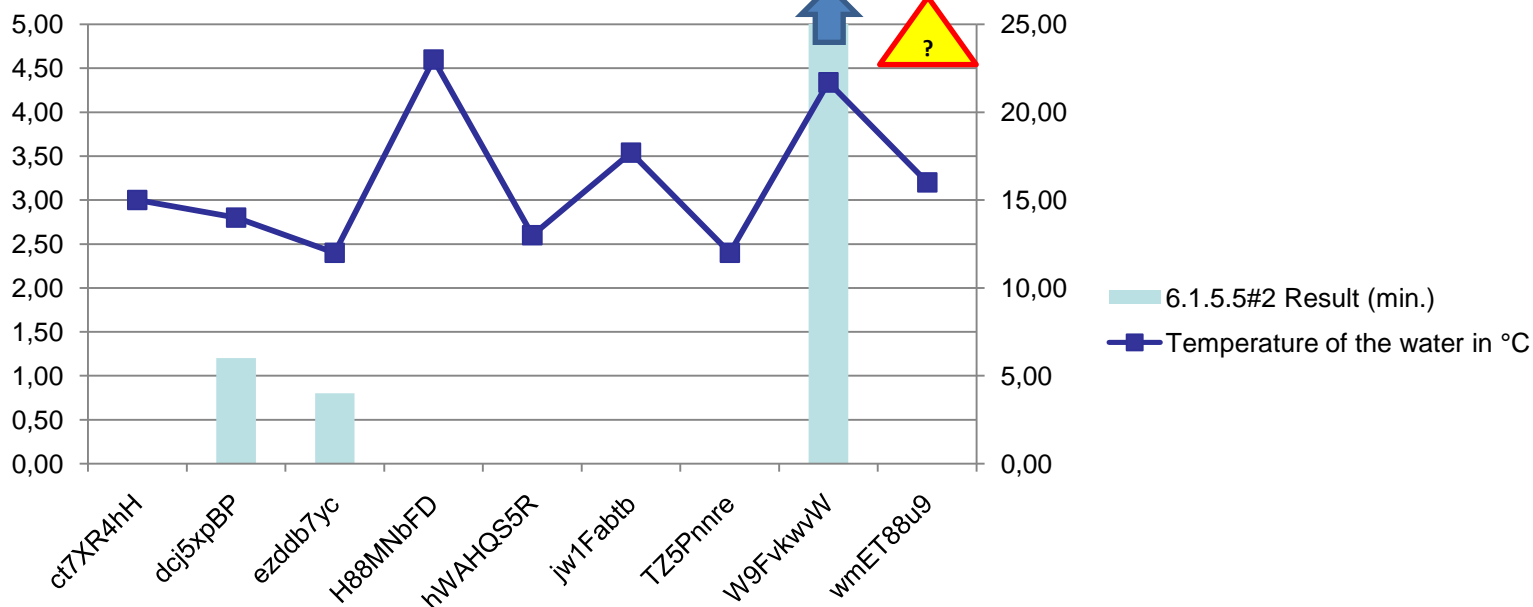
Results – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 2 Time to leak

Lab_Code_Id	Step 2					Temperature of the water in °C
	6.1.5.5#2 Sample 1	6.1.5.5#2 Sample 2	6.1.5.5#2 Sample 3	6.1.5.5#2 Result (min.)	6.1.5.5#2 ST.DEV	
ct7XR4hH	0,00	0,00	0,00	0,00	0,00	15,00
dcj5xpBP	1,10	1,10	1,30	1,20	0,10	14,00
ezddb7yc	0,80	0,40	1,30	0,80	0,40	12,00
H88MNbFD	0,00	0,10	0,00	0,00	0,10	23,00
hWAHQ5R	0,00	0,00	0,00	0,00	0,00	13,00
jw1Fabtb	0,00	0,00	0,00	0,00	0,00	17,70
TZ5Pnnre	0,00	0,00	0,00			12,00
W9FvkvwW	93 ?	95 ?	98 ?	95,3	2,10	21,70
wmET88u9	-0,1	-0,1	-0,1	-0,1	0,00	16,00
Average						



Results – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 2 Time to leak

6.1.5.5#2 Time to leak at 200 kPa, Result (min.)





Comments – Pressure test ADR 6.1.5.5 – 1A2(liq.) step 2 Time to leak

Comments:

- 2 laboratories reported time at 200 kPa
- 7 participants did not reach 200 kPa before leak

- Temperature in test water: min. = 12°C, max.= 21.7°C





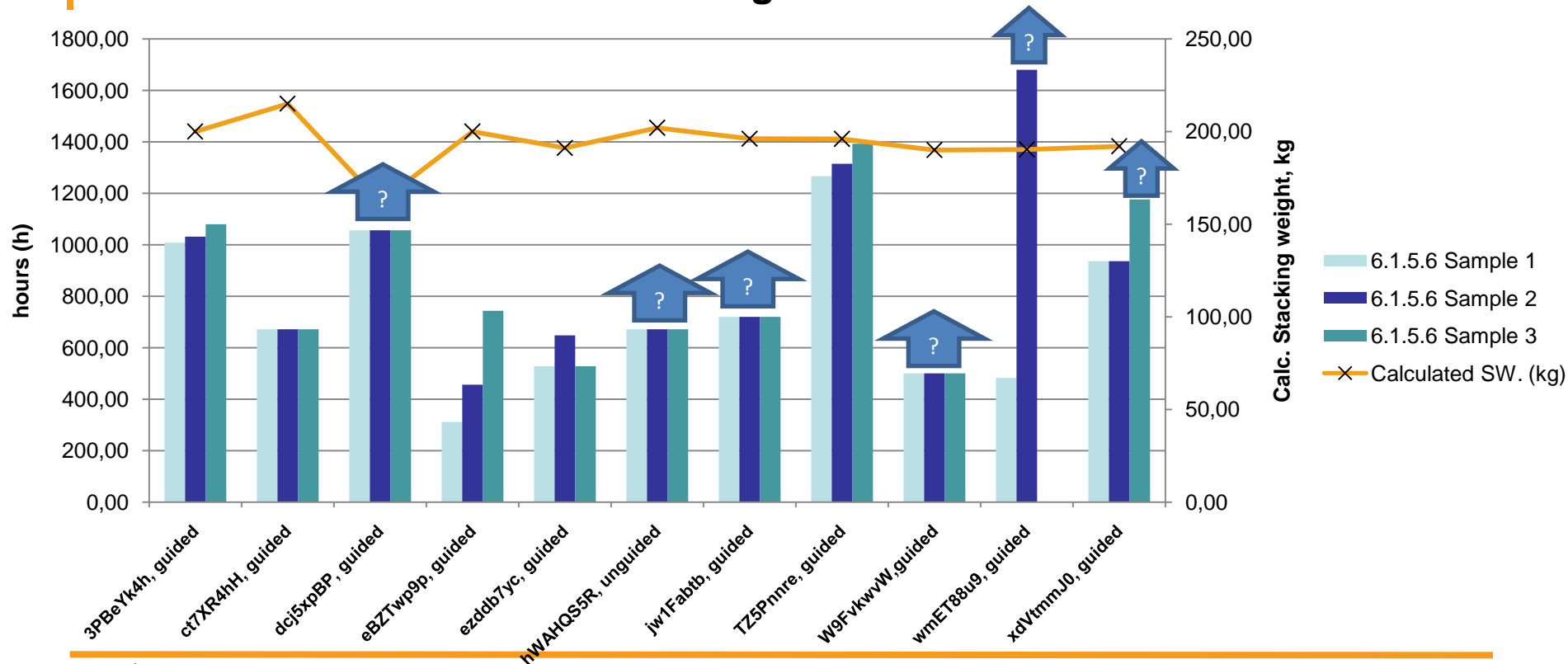
Results – Stacking test ADR 6.1.5.6- 3H1

Lab_Code_Id	6.1.5.6 Sample 1	6.1.5.6 Sample 2	6.1.5.6 Sample 3	6.1.5.6 Result (hours)	6.1.5.6 ST.DEV	Calculated SW. (kg)	Guided	Unguided	Average Temp. (°C)
3PBeYk4h	1008,00	1032,00	1080,00	1040,00	29,90	200,00	Yes	No	40,00
ct7XR4hH	672,00	672,00	672,00	672,00	0,00	215,00	Yes	No	40,00
dcj5xpBP	-1056,00	-1056,00	-1056,00	-1056,00	0,00	161,90	Yes	No	40,00
eBZTwp9p	312,00	456,00	744,00	504,00	179,60	200,00	Yes	No	41,20
ezddb7yc	528,00	648,00	528,00	568,00	56,60	191,10	Yes	No	42,00
hWAHQ5R	-672,00	-672,00	-672,00	-672,00	0,00	202,00	No	Yes	40,00
iw1Fabtb	-720,00	-720,00	-720,00	-720,00	0,00	196,10	Yes	No	40,50
TZ5Pnnre	1267,00	1315,00	1393,00	1325,00	51,90	196,00	Yes	No	40,00
W9FvkwvW	-500,00	-500,00	-500,00	-500,00	0,00	190,00	Yes	No	40,30
wmET88u9	483,00	-1680,00	0,00	-399,00	927,00	190,30	Yes	No	40,00
xdVtmmJ0	936,00	936,00	-1176,00	232,00	995,60	192,00	Yes	No	40,00



Results – Stacking test ADR 6.1.5.6- 3H1

Stacking hours 3H1



= the stacking test was stopped before the packaging started to leak



Comments – Stacking test ADR 6.1.5.6- 3H1

Comments stacking test results:

- 10 reported results
- 5 participants did not reach leak of packaging in stacking test.
- For the 5 participants reaching leak of packaging the results were: min.= 232 h., max.= 1325 h.

Comments to calculated stacking weight test results:

- The results of the calculated stacking weight is: min.= 161.9 kg., max.= 215 kg.

Comments to guided/unguided test reporting:

- 1 participant used unguided stacking

Comments to temperature test reporting:

- Temperature during stacking for the participants reporting results is for all bigger than or equal to 40 °C





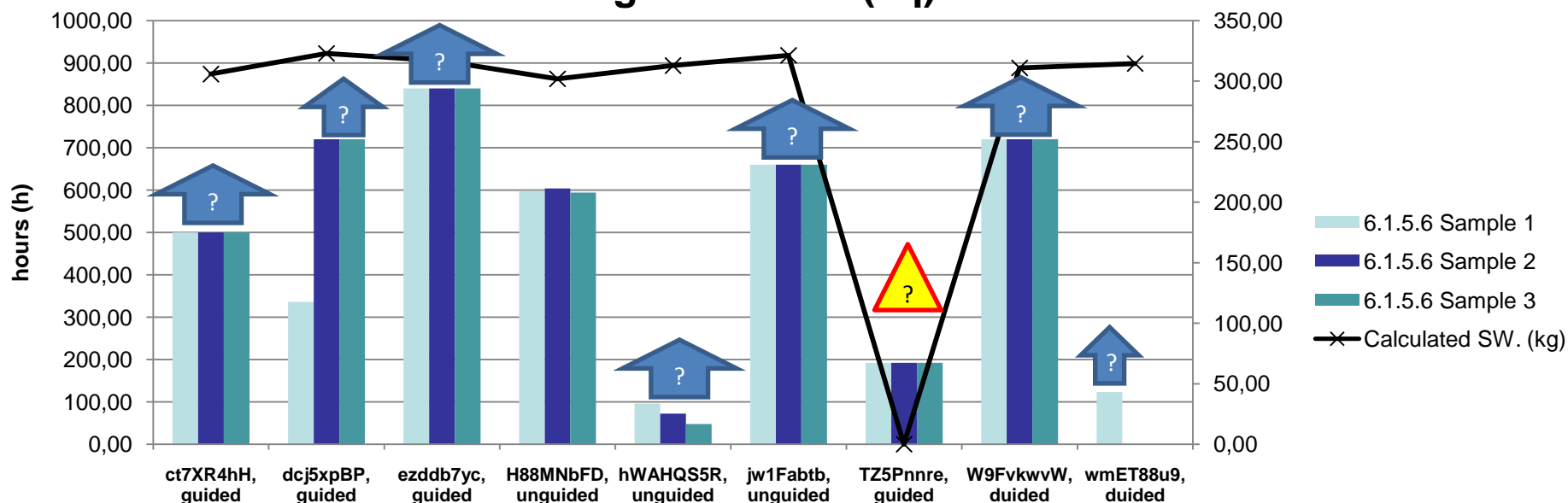
Results – Stacking test ADR 6.1.5.6- 1A2(liq.)

Lab_Code_I d	6.1.5.6 Sample 1	6.1.5.6 Sample 2	6.1.5.6 Sample 3	6.1.5.6 Result (hours)	6.1.5.6 ST.DEV	Calculated SW. (kg)	Guided	Unguided	Average Temp. (°C)
ct7XR4hH	-500,00	-500,00	-500,00	-500,00	0,00	306,00	Yes	No	22,00
dcj5xpBP	336,00	-720,00	-720,00	-368,00	497,80	323,00	Yes	No	23,00
ezddb7yc	-840,00	-840,00	-840,00	-840,00	0,00	317,00	Yes	No	23,00
H88MNbFD	598,00	604,00	594,00	598,70	4,10	302,00	No	Yes	22,00
hWAHQ5R	-96,00	-72,00	-48,00	-72,00	19,60	313,00	No	Yes	20,00
jw1Fabtb	-660,00	-660,00	-660,00	-660,00	0,00	321,40	No	Yes	23,00
TZ5Pnnre	192,00	192,00	192,00	192,00	0,00		Yes	No	20,00
W9FvkwwW	-720,00	-720,00	-720,00	-720,00	0,00	311,00	Yes	No	
wmET88u9	-123	-	-	-41	58	314,6	Yes	No	23,00



Results – Stacking test ADR 6.1.5.6- 1A2(liq.)

Stacking hours 1A2 (liq)



= the stacking test was stopped before the packaging started to leak



Comments – Stacking test ADR 6.1.5.6- 1A2(liq.)

Comments stacking test results:

- 7 reported results
- 5 participants did not reach leak of packaging in stacking test.

Comments to calculated stacking weight test results:

- 6 reported results
- The results of the calculated stacking weight is: min.= 302 kg., max.= 323 kg.

Comments to guided/unguided test reporting:

- 3 participants used unguided stacking
- 4 participants used guided stacking

Comments to temperature test reporting:

- Temperature during stacking for the participants reporting results is for all bigger than or equal to 20 °C





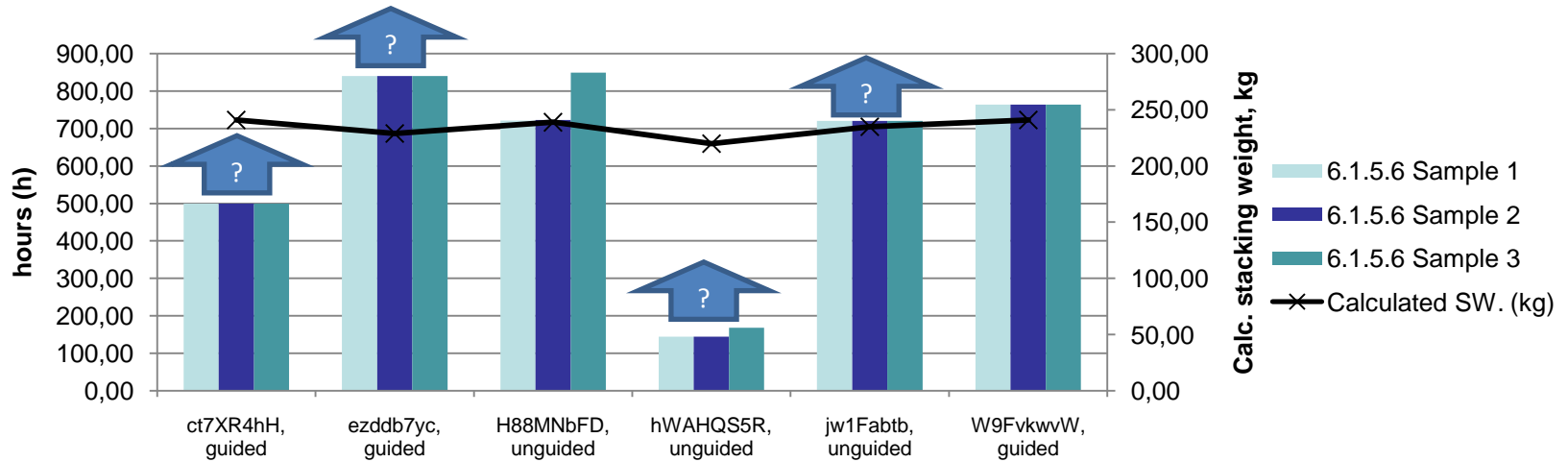
Results – Stacking test ADR 6.1.5.6- 1A2(sol.)

Lab_Code_Id.	6.1.5.6 Sample 1	6.1.5.6 Sample 2	6.1.5.6 Sample 3	6.1.5.6 Result (hours)	6.1.5.6 ST.DEV	Calculated SW. (kg)	Guided	Unguided	Average Temp. (°C)
ct7XR4hH	-500,00	-500,00	-500,00	-500,00	0,00	241,00	Yes	No	22,00
ezddb7yc	-840,00	-840,00	-840,00	-840,00	0,00	229,00	Yes	No	23,00
H88MNbFD	721,00	723,00	849,00	764,30	59,90	239,00	No	Yes	22,00
hWAHQ5R	-144,00	-144,00	-168,00	-152,00	11,30	220,00	No	Yes	20,00
jw1Fabtb	-720,00	-720,00	-720,00	168,00	0,00	235,00	No	Yes	23,00
W9FvkvwW	764	764	764	764	0	241	Yes	No	21



Results – Stacking test ADR 6.1.5.6- 1A2(sol.)

Stacking hours 1A2 (sol.)



= the stacking test was stopped before the packaging started to leak



Comments – Stacking test ADR 6.1.5.6- 1A2(sol.)

Comments stacking test results:

- 6 reported results
- 3 participants did not reach leak of packaging in stacking test.
- For the 3 participants reaching leak of packaging the results were: min.= 168 h., max.= 764.3 h.

Comments to calculated stacking weight test results:

- 6 reported results
- The results of the calculated stacking weight is: min.= 302 kg., max.= 323 kg.

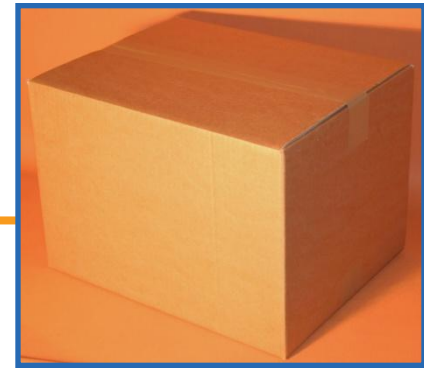
Comments to guided/unguided test reporting:

- 3 participants used unguided stacking
- 3 participants used guided stacking

Comments to temperature test reporting:

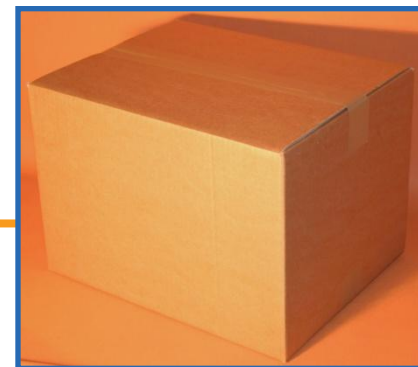
- Temperature during stacking for the participants reporting results is for all bigger than or equal to 20 °C





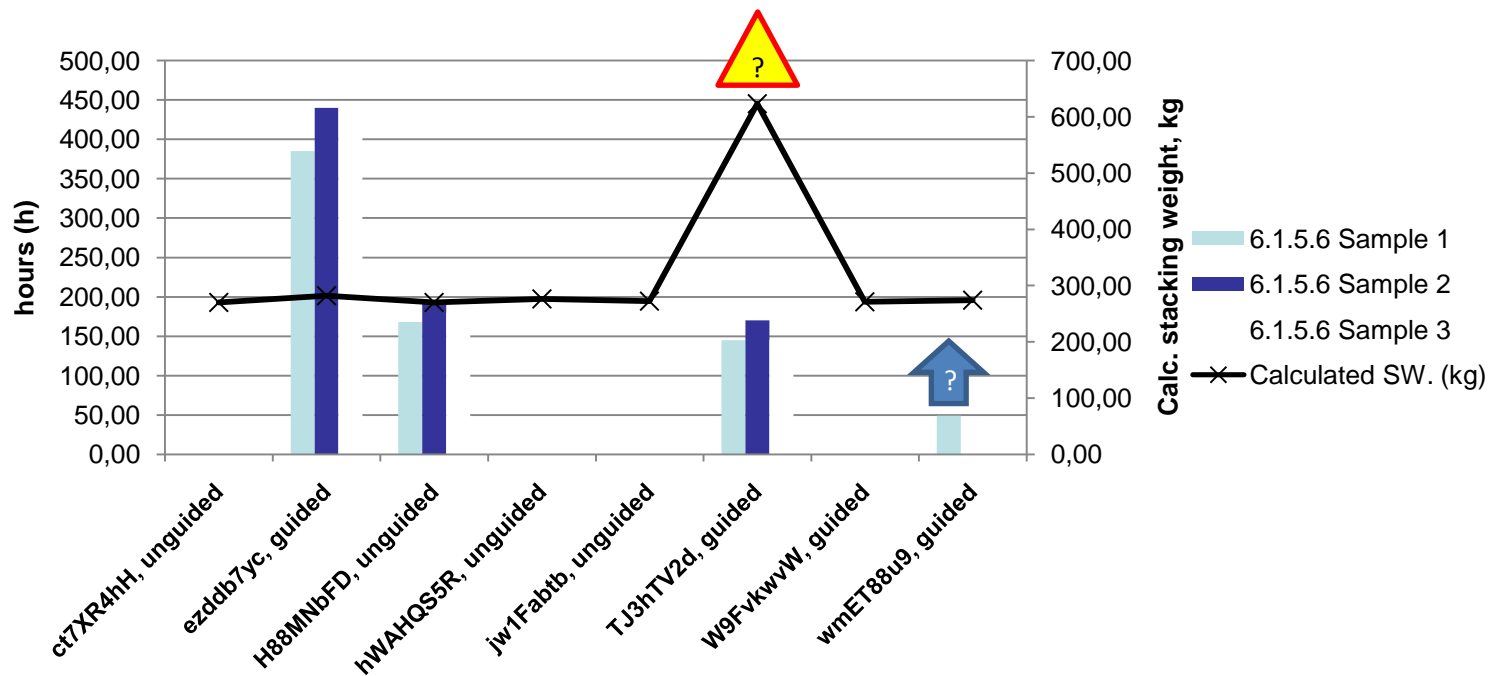
Results – Stacking test ADR 6.1.5.6- 4G

Lab_Code_I d	6.1.5.6 Sample 1	6.1.5.6 Sample 2	6.1.5.6 Sample 3	6.1.5.6 Result (hours)	6.1.5.6 S T.DEV	Calculated SW. (kg)	Guided	Unguided	Average Temp. (°C)
ct7XR4hH	0,01	0,00	0,00	0,00	0,00	270,00	No	Yes	23
ezddb7yc	385,00	440,00	440,00	421,70	25,90	282,00	Yes	No	23
H88MNbFD	168,00	192,00	180,00	180,00	9,80	270,00	No	Yes	23
hWAHQ5R	-	-	-	0,00	0,00	276,00	No	Yes	22
jw1Fabtb	1,00	0,00	0,00	0,30	0,50	272,00	No	Yes	23
TJ3hTV2d	145,00	170,00	145,00	153,30	11,80	623,30	? Yes	No	23
W9FvkvwW	0,00	0,00	0,00	0,00	0,00	271	Yes	no	23
wmET88u9	-49,00	0,00	0,00	-16,30	23,10	274,10	Yes	no	23



Results – Stacking test ADR 6.1.5.6- 4G

Stacking hours, 4G



= the stacking test was stopped before the packaging started to leak



Results – Stacking test ADR 6.1.5.6- 4G

Comments stacking test results:

- 8 reported results
- 5 participants reported leak immediately after applying the stacking weight
- Time reaching leak of packaging the results were: min.= 0 h., max.= 421.7 h.

Comments to calculated stacking weight test results:

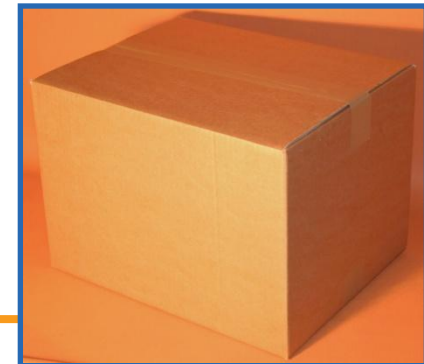
- 8 reported results
- The results of the calculated stacking weight is: min.= 270 kg., max.= 623.3 kg.

Comments to guided/unguided test reporting:

- 4 participants used unguided stacking
- 4 participants used guided stacking

Comments to temperature test reporting:

- Temperature during stacking for the participants reporting results is for all bigger than or equal to 22 °C





Summary

- Large variations in results from different laboratories have been observed.
- Reason for variations are complex and not easy to detect.
- Variations in the Chemical compatibility: Variations in the processes of deterioration on polyethylene cause variations in following tests.
- Drop tests: Variations in drop orientations might cause large variations in results. Harmonization of drop orientations should be considered. Further analysis is required to understand the reasons for the variations.
- Leak test: Variations were observed in closing torque for plastic canister. Improvement in method description in the proficiency test scheme will be considered.
- Pressure test: Large variations are observed. Variation in temperature might be one reason. Another reason might be variations in the equipment used to do the test.
- Stacking test: Also here large variations are seen. Variations are also seen in the way laboratories calculate the stacking weight for the test.



Conclusion

- The test scheme show that large variations occur in testing of packaging to obtain UN – approval.
- Reason for variations are complex and not easy to detect.
- To improve the harmonisation of methods and results further standardisation of test methods should considered.
- Improvement in the Proficiency testing scheme and reference packaging used will be done prior to next inter-laboratory comparison.