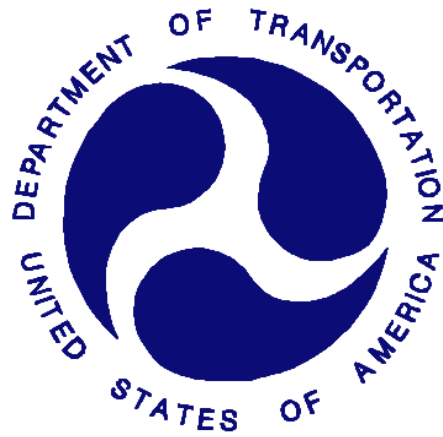


**Vehicle Research and Test Center
ECE R16 Dynamic Testing
ECE R16 Manikin**

**Prepared By:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319**



Summary Report

June - July 2020

**Prepared For
Vehicle Research and Test Center
P. O. Box 37
East Liberty, OH 43319**

SECTION 1
PURPOSE AND SUMMARY FOR R16 MANIKIN

The purpose of the testing is: (1) To understand the correlation between static requirements in U.S. regulation and dynamic requirements in European regulation (ECE R16 test), (2) Collect injury metrics for ECE R16 manikin, Hybrid III 50th and THOR 50th ATDs, including chest and pelvis excursion

SUMMARY

A R16 Manikin (serial number 3176UTAC) was secured in the left rear occupant position (position 4 or P4) or in the right rear occupant position (position 6 or P6). The R16 Manikin was instrumented with two (2) string pots. During this test series the dummy was restrained with a 2019 Lexus ES (US or EU), 2018 Subaru Impreza (WGN) (US or EU) or 2019 Chevrolet Suburban (US or EU) 3-point seatbelt.

Section 2 contains the left rear occupant position side views of the dummy. Section 3 contains the right rear occupant position side views of the dummy. Section 4 contains the dummy certification information.

SECTION 2
LEFT REAR OCCUPANT POSITION TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position # 4
ATD Type/Serial No.	R16 Manikin/3176UTAC
Belt Types	2019 Lexus ES
Regulation	US, EU
Positions	Left Hand (LH) Rear

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N1 Front	mm	1803.66	-2.50	-398.37
N3 Left Oblique	mm	1296.07	-1568.55	-437.53
N5 Left Side	mm	100.22	-1554.91	-367.46

DUMMY POSITIONING

BELT: 2019 Lexus ES – US – LH
NHTSA Vehicle Database Number: v11246

TRC Test Number: S200608-1

VRTC Test Number: ECER16_1



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-39.83	-4.55	-858.20
Bridge of Nose	mm	67.08	-9.01	-781.86
Right Head CG	mm	-19.41	74.11	-745.72
Left Head CG	mm	-20.62	-83.50	-743.23
Left Shoulder	mm	-26.70	-229.69	-494.20
Right Shoulder	mm	-27.75	233.95	-498.61
Right H-Point	mm	86.22	173.53	-111.68
Left H-Point	mm	79.51	-152.21	-112.39
Left Knee	mm	556.40	-114.30	-179.40
Right Knee	mm	559.25	119.45	-180.07
Right Ankle	mm	915.92	58.17	133.24
Left Ankle	mm	917.30	-60.86	137.18
Top of Shoulder Belt	mm	120.52	-0.43	-510.97
Bottom of Shoulder Belt	mm	166.93	0.57	-433.23
Top of Lap Belt	mm	140.91	0.23	-211.07
Bottom of Lap Belt	mm	164.76	-0.06	-169.99
Belt spool out	mm	-109.90	-208.81	-653.39
Shoulder belt spool out	mm	62.76	-90.36	-584.95
4 inch shoulder Belt	mm	182.26	59.26	-389.93
Shoulder Belt Center	mm	148.26	2.41	-468.60
Lap Belt Center	mm	152.63	0.00	-189.26
4 inch Lap Belt	mm	150.37	-102.42	-186.12

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

Dummy Top String Pot	mm	9.12	-209.17	-530.01
Dummy Bottom String Pot	mm	17.45	-166.42	-126.31
Retractor Bolt 1	mm	-721.42	-181.71	-657.50
Retractor Bolt 2	mm	-486.84	-166.74	-618.90
Outboard Anchor Bolt	mm	-3.81	130.93	-11.60
Inboard Anchor Bolt	mm	20.65	-191.57	-33.71
Guide Loop Bolt 1	mm	-260.75	-215.78	-691.82
Guide Loop Bolt 2	mm	-250.96	-247.38	-692.50

DUMMY INJURY

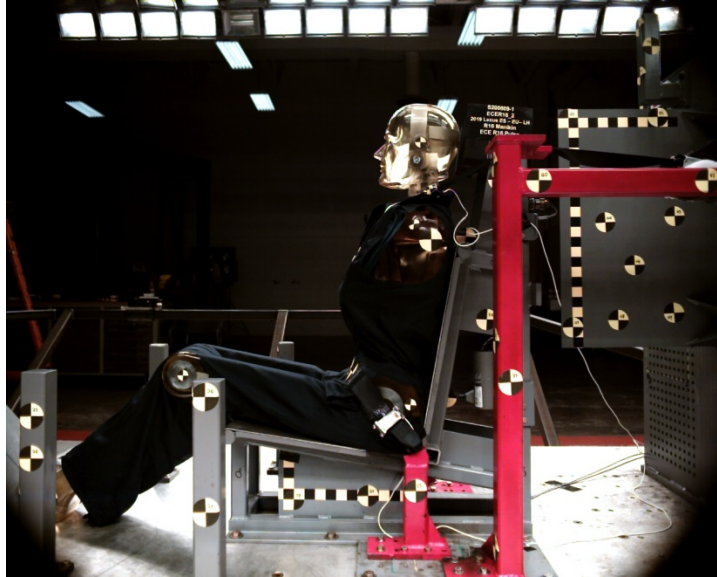
Torso String Pot (mm)	282
Pelvis String Pot (mm)	97

DUMMY POSITIONING

BELT: 2019 Lexus ES – EU – LH
NHTSA Vehicle Database Number: v11247

TRC Test Number: S200609-1

VRTC Test Number: ECER16_2



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-39.36	-4.90	-857.89
Bridge of Nose	mm	69.16	-7.25	-786.36
Right Head CG	mm	-18.23	72.48	-747.24
Left Head CG	mm	-14.69	-83.48	-744.11
Left Shoulder	mm	-24.73	-230.37	-493.49
Right Shoulder	mm	-25.65	232.92	-498.72
Right H-Point	mm	85.88	175.04	-111.86
Left H-Point	mm	78.96	-150.75	-111.08
Left Knee	mm	555.73	-114.63	-180.88
Right Knee	mm	558.39	119.03	-182.95
Right Ankle	mm	914.21	55.86	135.49
Left Ankle	mm	915.31	-62.93	137.64
Top of Shoulder Belt	mm	113.34	0.28	-511.59
Bottom of Shoulder Belt	mm	159.07	-0.47	-440.77
Top of Lap Belt	mm	141.78	0.00	-212.25
Bottom of Lap Belt	mm	156.35	0.52	-176.87
Belt spool out	mm	-29.90	-165.10	-609.46
Shoulder belt spool out	mm	55.74	-88.69	-587.20
4 inch shoulder Belt	mm	176.15	53.61	-392.43
Shoulder Belt Center	mm	141.91	-0.48	-474.99
Lap Belt Center	mm	154.30	0.96	-192.75
4 inch Lap Belt	mm	148.76	-102.24	-188.87

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

String Pot Top	mm	-134.26	-4.12	-521.65
String Pot Bottom	mm	-85.41	-0.25	-114.12
Dummy Top String Pot	mm	11.41	-210.17	-528.62
Dummy Bottom String Pot	mm	16.67	-164.67	-123.58
Retractor Bolt 1	mm	-721.81	-180.79	-657.45
Retractor Bolt 2	mm	-486.19	-166.80	-618.80
Outboard Anchor Bolt	mm	-3.65	127.04	-11.98
Inboard Anchor Bolt	mm	20.09	-190.12	-31.61
Guide Loop Bolt 1	mm	-260.89	-215.96	-691.69
Guide Loop Bolt 2	mm	-251.01	-247.38	-692.22

DUMMY INJURY

Torso String Pot (mm)	310
Pelvis String Pot (mm)	99

SECTION 3
RIGHT REAR OCCUPANT POSITION TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position # 6
ATD Type/Serial No.	R16 Manikin/3176UTAC
Belt Types	2018 Subaru Impreza (WGN), 2019 Chevrolet Suburban
Regulation	US, EU
Positions	Right Hand (RH) Rear

CAMERA POSITIONING FARO MEASUREMENTS

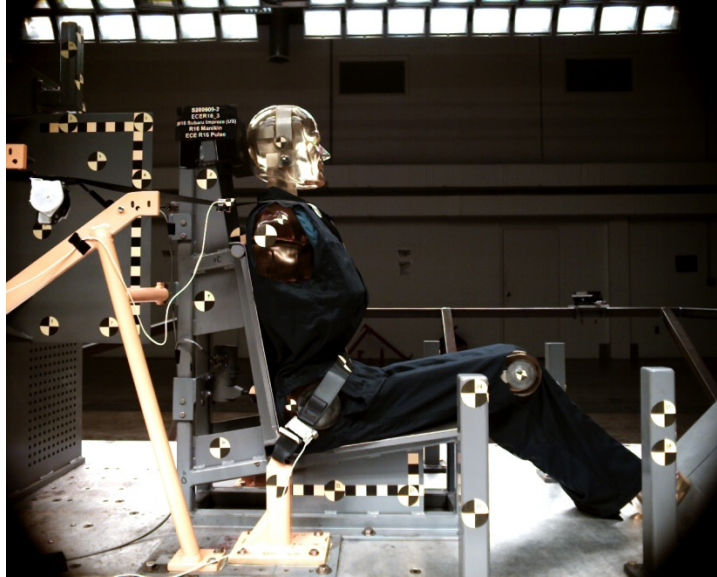
Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N1 Front	mm	1803.34	-2.66	-398.21
N3 Right Oblique	mm	1300.38	1578.38	-433.35
N5 Right Side	mm	215.79	1564.50	-360.62

DUMMY POSITIONING

BELT: 2018 Subaru Impreza (WGN) – US – RH
NHTSA Vehicle Database Number: v11248

TRC Test Number: S200609-2

VRTC Test Number: ECER16_3



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-39.76	-5.48	-859.98
Bridge of Nose	mm	69.25	-5.90	-785.42
Right Head CG	mm	-19.50	73.85	-747.42
Left Head CG	mm	-15.71	-83.68	-744.83
Left Shoulder	mm	-24.48	-231.24	-494.25
Right Shoulder	mm	-27.22	232.06	-499.08
Right H-Point	mm	85.55	172.05	-110.66
Left H-Point	mm	78.91	-153.62	-111.43
Left Knee	mm	556.63	-114.47	-178.23
Right Knee	mm	558.52	119.08	-178.62
Right Ankle	mm	917.85	56.72	133.68
Left Ankle	mm	918.18	-62.48	136.78
Top of Shoulder Belt	mm	118.75	0.14	-512.69
Bottom of Shoulder Belt	mm	157.03	0.75	-444.27
Top of Lap Belt	mm	133.55	0.28	-227.15
Bottom of Lap Belt	mm	152.79	0.39	-184.90
Belt spool out	mm	-108.91	212.26	-573.55
Shoulder belt spool out	mm	68.30	88.46	-576.05
4 inch shoulder Belt	mm	171.00	-61.31	-401.89
Shoulder Belt Center	mm	138.52	0.27	-479.15
Lap Belt Center	mm	147.08	1.67	-209.05
4 inch Lap Belt	mm	139.53	101.57	-201.89
String Pot Top	mm	-136.76	2.41	-521.75

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

String Pot Bottom	mm	-86.46	4.93	-114.26
Dummy Top String Pot	mm	8.50	216.80	-537.07
Dummy Bottom String Pot	mm	20.83	175.57	-117.61
Retractor Bolt 1	mm	-567.79	322.69	-643.87
Retractor Bolt 2	mm	-313.70	301.80	-545.26
Outboard Anchor Bolt	mm	-90.90	-176.11	-18.88
Inboard Anchor Bolt	mm	15.09	230.95	-15.08
Guide Loop Bolt 1	mm	-494.82	305.97	-615.05
Guide Loop Bolt 2	mm	-490.60	321.64	-615.34

DUMMY INJURY

Torso String Pot (mm)	210
Pelvis String Pot (mm)	216

DUMMY POSITIONING

BELT: 2018 Subaru Impreza (WGN) – EU – RH
NHTSA Vehicle Database Number: v11249

TRC Test Number: S200610-1

VRTC Test Number: ECER16_4



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-40.75	-4.65	-857.89
Bridge of Nose	mm	66.88	-5.71	-784.60
Right Head CG	mm	-20.13	72.63	-745.64
Left Head CG	mm	-17.63	-85.07	-744.38
Left Shoulder	mm	-23.04	-233.31	-494.36
Right Shoulder	mm	-29.79	229.88	-496.41
Right H-Point	mm	84.09	169.93	-110.38
Left H-Point	mm	79.54	-155.82	-111.90
Left Knee	mm	556.99	-115.65	-176.21
Right Knee	mm	558.86	118.05	-177.42
Right Ankle	mm	918.22	60.48	133.68
Left Ankle	mm	919.62	-58.89	137.79
Top of Shoulder Belt	mm	122.04	-0.35	-509.84
Bottom of Shoulder Belt	mm	157.99	0.61	-439.23
Top of Lap Belt	mm	129.74	-0.51	-223.82
Bottom of Lap Belt	mm	156.26	-0.48	-184.44
Belt spool out	mm	-109.89	208.74	-576.22
Shoulder belt spool out	mm	60.80	84.10	-573.51
4 inch shoulder Belt	mm	170.03	-59.47	-398.61
Shoulder Belt Center	mm	138.81	0.12	-475.30
Lap Belt Center	mm	143.69	0.99	-204.41
4 inch Lap Belt	mm	134.19	103.33	-199.68
String Pot Top	mm	-142.02	-0.06	-517.96

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

String Pot Bottom	mm	-86.66	4.18	-114.40
Dummy Top String Pot	mm	5.72	214.22	-535.78
Dummy Bottom String Pot	mm	20.25	173.36	-116.68
Retractor Bolt 1	mm	-568.09	322.15	-644.71
Retractor Bolt 2	mm	-314.43	301.61	-545.78
Outboard Anchor Bolt	mm	-91.47	-176.18	-19.09
Inboard Anchor Bolt	mm	16.07	229.92	-14.58
Guide Loop Bolt 1	mm	-509.09	309.96	-614.51
Guide Loop Bolt 2	mm	-504.80	325.32	-614.63

DUMMY INJURY

Torso String Pot (mm)	224
Pelvis String Pot (mm)	114

DUMMY POSITIONING

BELT: 2019 Chevrolet Suburban – US – RH
NHTSA Vehicle Database Number: v11250

TRC Test Number: S200610-2

VRTC Test Number: ECER16_5



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-38.96	-4.71	-858.21
Bridge of Nose	mm	69.95	-6.41	-785.25
Right Head CG	mm	-16.01	74.63	-746.33
Left Head CG	mm	-14.96	-83.77	-744.68
Left Shoulder	mm	-23.38	-230.85	-493.95
Right Shoulder	mm	-26.54	232.13	-497.87
Right H-Point	mm	84.55	172.57	-110.00
Left H-Point	mm	79.60	-153.19	-111.91
Left Knee	mm	556.13	-113.86	-181.11
Right Knee	mm	558.01	119.79	-181.66
Right Ankle	mm	914.36	57.97	134.70
Left Ankle	mm	915.61	-61.68	136.38
Top of Shoulder Belt	mm	122.07	0.07	-511.30
Bottom of Shoulder Belt	mm	157.45	0.47	-435.46
Top of Lap Belt	mm	140.68	1.28	-205.98
Bottom of Lap Belt	mm	165.10	0.55	-160.09
Belt spool out	mm	-101.29	214.34	-681.94
Shoulder belt spool out	mm	71.46	78.42	-570.97
4 inch shoulder Belt	mm	173.00	-55.00	-397.68
Shoulder Belt Center	mm	137.88	1.41	-475.47
Lap Belt Center	mm	155.91	0.67	-184.99
4 inch Lap Belt	mm	153.22	102.17	-184.04
String Pot Top	mm	-139.26	1.40	-520.07

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

String Pot Bottom	mm	-85.87	0.67	-111.21
Dummy Top String Pot	mm	9.04	216.75	-536.39
Dummy Bottom String Pot	mm	20.29	175.89	-115.68
Retractor Bolt 1	mm	-410.41	387.56	-238.53
D-ring	mm	-244.10	250.97	-788.65
Outboard Anchor Bolt	mm	-32.90	-204.81	11.86
Inboard Anchor Bolt	mm	-182.74	290.76	100.89

DUMMY INJURY

Torso String Pot (mm)	459
Pelvis String Pot (mm)	149

DUMMY POSITIONING

BELT: 2019 Chevrolet Suburban – EU – RH
NHTSA Vehicle Database Number: v11251

TRC Test Number: S200610-3

VRTC Test Number: ECER16_6



DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Top of Head	mm	-41.60	-4.47	-857.27
Bridge of Nose	mm	70.25	-7.12	-787.58
Right Head CG	mm	-15.38	74.34	-745.56
Left Head CG	mm	-15.16	-83.56	-743.80
Left Shoulder	mm	-23.04	-231.23	-494.29
Right Shoulder	mm	-24.86	231.93	-497.02
Right H-Point	mm	84.94	171.59	-109.77
Left H-Point	mm	79.61	-154.11	-111.45
Left Knee	mm	556.09	-116.10	-180.55
Right Knee	mm	558.50	117.63	-179.77
Right Ankle	mm	915.25	55.54	134.64
Left Ankle	mm	917.03	-63.33	138.37
Top of Shoulder Belt	mm	118.32	-0.27	-511.07
Bottom of Shoulder Belt	mm	161.24	0.15	-435.83
Top of Lap Belt	mm	142.88	-0.51	-206.69
Bottom of Lap Belt	mm	166.18	-0.16	-170.72
Belt spool out	mm	-101.60	215.11	-688.15
Shoulder belt spool out	mm	65.77	74.64	-572.05
4 inch shoulder Belt	mm	170.55	-52.73	-392.72
Shoulder Belt Center	mm	141.45	-0.66	-472.82
Lap Belt Center	mm	151.29	-0.79	-185.37
4 inch Lap Belt	mm	149.56	99.08	-186.16
String Pot Top	mm	-139.02	2.29	-521.14

DUMMY POSITIONING FARO MEASUREMENTS, CONTINUED

String Pot Bottom	mm	-86.95	4.83	-113.56
Dummy Top String Pot	mm	10.62	216.17	-535.95
Dummy Bottom String Pot	mm	20.37	174.84	-115.52
Retractor Bolt 1	mm	-409.84	386.15	-239.07
D-ring	mm	-243.42	251.66	-787.24
Outboard Anchor Bolt	mm	-32.89	-204.75	12.05
Inboard Anchor Bolt	mm	-184.04	291.19	102.63

DUMMY INJURY

Torso String Pot (mm)	247
Pelvis String Pot (mm)	153

SECTION 4

DUMMY CALIBRATION DATA

Date de création	28/11/2016	FOR-CPU-008 - 04
Date d'application	15/03/2018	Déclaration de Conformité 2.1 STANDARD

DECLARATION DE CONFORMITE 2.1 STANDARD STATEMENT OF CONFORMITY 2.1

ETABLI PAR L'INDUSTRIEL FOURNISSEUR CONFORMEMENT A LA NORME NF L00-015C
ESTABLISHED BY THE INDUSTRIAL SUPPLIER ACCORDING TO THE STANDARD NF L00-015C

RAISON SOCIALE FOURNISSEUR SUPPLIER	EXSTO Z.I 55 Avenue de la Déportation BP 280 26100 Romans sur Isère Tel : 04 75 72 72 72 Fax : 04 75 72 26 11 Mail : accueil@exsto.com		
N° de CERTIFICAT (N°d'AR) CERTIFICATE NUMBER (Acknowledge receipt Number)	177668	NOMBRE DE FEUILLE NUMBER OF SHEET	1

CLIENT CUSTOMER	BHAYANA BROTHERS LLC
N° DE COMMANDE CLIENT ORDER NUMBER OF CUSTOMER	63-2875
N° DU BORDEREAU DE LIVRAISON NUMBER OF DELIVERY NOTE	84421


DESIGNATION DE L'ARTICLE DESIGNATION	COMPLETE DUMMY
REFERENCE OU TYPE - CODE ARTICLE REFERENCE OR TYPE	3176UTAC
N° DE SERIE (OF) OU DE LOT SERIAL OR BATCH NUMBER	

QUANTITE LIVREE QUANTITY	1	MATIERE POLYURETHANE MATERIAL	E508
DURETE (si demandé) HARDNESS (if required)	58 Sha	POIDS (si demandé) WEIGHT (if required)	-

AUTRES INFORMATIONS OTHER INFORMATIONS

Nous déclarons que la fourniture citée est conforme aux exigences du contrat et que, après vérifications et essais, elle répond en tout point aux exigences spécifiées, aux normes et règlements applicables, saufs exceptions, réserves ou dérogations énumérées dans la présente déclaration de conformité.

We hereby declare, barring exceptions, reservations, or exemptions listed in this statement of conformity, that the listed supplies comply with the contract requirement and that after completion of testing and verification, they completely satisfy all specified requirements, and applicable standards and regulations.

EXSTO CONTRÔLE FOURNISSEUR SUPPLIER INSPECTION		EVENTUELLEMENT VISA DU SERVICE DE SURVEILLANCE IF REQUIRED VISA OF INSPECTION AUTHORITY	
NOM - NAME	MEKKAOUI Nori	NOM - NAME	
FONCTION - FUNCTION	Contrôleur qualité	FONCTION - FUNCTION	
DATE - DATE	03/02/2020	DATE - DATE	
SIGNATURE - VISA		SIGNATURE - VISA	



CONTROL REPORT

FOR ADULT MANNEQUIN Ref: MAN 16

N°	R16-TH-322	DATE	03/02/2020
CUSTOMER	BHAYANA BROTHERS LLC	CASE	63-2875
ACKNOWLEDGES RECEIPT	177668	DELIVERY ORDER	84421

PARTS of MANNEQUIN			Requested Specifications		Mesured Specifications		Monitoring	
N°	Reference	Designation	Weight Kg	Hardness Sh	Weight Kg	Hardness ShA	Identification	
			82,3 ± 1,5	58 ShA ± 3	81,13			
1	T 1	HEAD	3,7 ± 0,3	58 ShA ± 3	3,58	59	R16 - TE -	303
	T 2	NECK + SPINE + ATTACHMENTS	0,9 ± 0,1	58 ShA ± 3	0,80	59	R16 - V01 à V06 -	349
	TEC	TOTAL 1	4,6 ± 0,4		4,38			
2	TH 1	THORAX + ATTACHMENTS + NECK CHAIN	28,8 ± 1	58 ShA ± 3	28,20	60	R16 - TH -	322
	TH 2	VENTRAL WEIGHT LEFT	1 ± 0,03	58 ShA ± 3	0,98	59	R16 - LVG -	259
	TH 2	CENTRAL WEIGHT LEFT	1 ± 0,03	58 ShA ± 3	0,98	59	R16 - LCG -	250
	TH 2	BACK WEIGHT LEFT	1 ± 0,03	58 ShA ± 3	0,98	58	R16 - LDG -	259
	TH 2	VENTRAL WEIGHT RIGHT	1 ± 0,03	58 ShA ± 3	0,98	59	R16 - LVD -	248
	TH 2	CENTRAL WEIGHT RIGHT	1 ± 0,03	58 ShA ± 3	0,98	58	R16 - LCD -	255
	TH 2	BACK WEIGHT RIGHT	1 ± 0,03	58 ShA ± 3	0,98	58	R16 - LDD -	249
	THC	TOTAL 2	34,8 ± 1,3		34,08			
3	JC D	RIGHT LEG	12,1 ± 0,3	58 ShA ± 3	12,05	59	R16-CD-	336
	JC G	LEFT LEG	12,1 ± 0,3	58 ShA ± 3	12,06	59	R16-CG-	343
	JP	FOOT	8,2 ± 0,3	58 ShA ± 3	8,16	59	R16-P-	274
	JAC	TOTAL 3	32,4 ± 0,9		32,27			
4	AL 1	AXIS HIP	3,5 ± 0,1		3,50			
	AL 2	AXIS KNEE	1 ± 0,1		1,00			
	AL 3	HIP WEIGHT	6 ± 0,2		5,90			
	AL 4	FACEPLATES *						
	AL	TOTAL 4	10,5 ± 0,4		10,40			

*The faceplates are supplied in sets of 4

N° Balance	Serial Number	Date of last inspection	Validity date
N°10	O6F410907	13/01/2020	janv-21
N°34	05F682511	13/01/2020	janv-21
N°41	01F73608	13/01/2020	janv-21

COMPLIANT	NON CONFORMANCE	DATE	QUALITY MANAGER	VISA
X		03/02/2020	N.MEKKAOUI	