

ISO 15830-4:2005-12 (E)

Road vehicles - Design and performance specifications for the WorldSID 50th percentile male side impact dummy - Part 4: User's manual

Contents		Page
Foreword		xi
Introduction		xii
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Requirements	2
4.1	Disassembly and assembly	2
4.2	Full arm changeover	2
Annex A (normative) Procedures for disassembling and assembling the WorldSID		3
A.1	Head	3
A.1.1	Parts list for head	3
A.1.2	Disassembling	5
A.1.3	Assembling	6
A.1.4	Instrumentation mounting	7
A.2	Neck	8
A.2.1	Parts lists for neck	8
A.2.2	Disassembling	10
A.2.3	Assembling	12
A.2.4	Instrumentation mounting	14
A.3	Thorax, abdomen and shoulder	14
A.3.1	Parts list	14
A.3.2	Disassembling	20
A.3.3	Assembling	27
A.3.4	Instrumentation mounting	32
A.4	Full arm	35
A.4.1	Parts list	35
A.4.2	Disassembling	42
A.4.3	Assembling the arm	44
A.4.4	Adjusting the arm	46
A.4.5	Changing full arm from left to right side impact	49
A.5	Half arm	50
A.5.1	Parts list for half arm	50
A.5.2	Disassembling	51
A.5.3	Assembling	51
A.6	Pelvis	52
A.6.1	Parts list for pelvis	52
A.6.2	Disassembling	57
A.6.3	Assembling the pelvis	66
A.6.4	Instrumentation mounting	67
A.7	Full leg assembly	67
A.7.1	Parts list	67
A.7.2	Disassembling	74
A.7.3	Assembling the leg	76
A.7.4	Adjusting the leg	80

A.8	Suit assembly	82
A.8.1	Parts list for suit	82
A.8.2	Disassembly	82
A.8.3	Assembly	82
Annex B (informative) Overview of an example permissible internal data acquisition system		83
B.1	General	83
B.2	System components	83
B.2.1	G5 module	84
B.2.2	G5 docking station	84
B.2.3	G5-DB	84
B.2.4	Docking station to G5-DB cable	84
B.2.5	In-dummy battery and cable	86
B.2.6	G5-DB to battery and temperature sensor cable	86
B.2.7	G5-DB to dummy exit cable	86
B.2.8	Dummy exit to TDAS status box cable	86
B.2.9	TDAS status box	86
B.2.10	DC/DC converter	87
B.2.11	AC/DC converter	87
B.2.12	TDAS power supply	87
B.2.13	TDAS software	87
B.2.14	Status box to PC cable	87
B.2.15	Notebook PC	87
B.3	Dummy exit to status box cable pinout	88
B.4	Sensor cable length	89
Annex C (normative) Fastener torque values		91
Annex D (informative) Fastener abbreviations and ISO references for user convenience		92
Annex E (informative) Recommended WorldSID general practices		93
E.1	Certification test intervals	93
E.2	Recommended inspection practices	93
E.3	WorldSID thorax half width	94
E.4	Avoiding possible connector damage	94
E.5	Temperature range	94
E.6	Dummy handling	94
E.6.1	General	94
E.6.2	Procedures for using the lifting bracket are as follows	95
E.7	Dummy storage	95
Annex F (informative) Recommended WorldSID seating procedure		96
F.1	Placement procedures for the driver seat position	96
F.1.1	General	96
F.1.2	Electronic spreadsheets	96
F.2	Placement procedures for the rear seat position	96
F.2.1	ATD preparation	96
F.2.2	Position the seat	96
F.2.3	Dummy placement	96
Annex G (informative) Suggested WorldSID wiring procedures		98
G.1	Head wiring	98
G.2	Neck	98
G.3	Shoulder rib and 1st thorax rib	99
G.4	2nd and 3rd Thorax ribs and abdomen ribs	100
G.5	Pelvis cable routing	100
G.6	Installation of sensor connectors to the thorax connector station	101
G.7	Instrumented arm cable routing	107

G.7.1	General considerations	107
G.7.2	Lower arm cables	107
G.7.3	Upper arm cables	108
G.7.4	Elbow cables	108
G.7.5	Routing wires through flesh component	109
G.8	Instrumented leg cable routing	110
G.8.1	Lower leg cable routing	110
G.8.2	Knee cable routing	111
G.8.3	Femoral neck cable routing	112
G.9	Wiring with an external DAS	113
Annex H (informative) WorldSID temperature information		114
H.1	Temperature sensitivity of WorldSID	114
H.2	Monitoring of temperature variations of WorldSID	114
H.3	Effect of internal DAS on dummy temperature	115
H.4	Practical notes for full body testing related to temperature	115
Annex I (normative) Recommended WorldSID grounding scheme		116
I.1	Parts list	116
I.2	Grounding procedures	116
Figures Figure A.1 -- WorldSID head components		4
Figure A.2 -- Removal of moulded head		5
Figure A.3 -- Separating the head core from the neck		5
Figure A.4 -- Removing upper neck load cell from instrumented head core		6
Figure A.5 -- Wire routing for head instrumentation		7
Figure A.6 -- WorldSID head instrumentation		8
Figure A.7 -- WorldSID neck components		9
Figure A.8 -- Removing lower neck bracket		10
Figure A.9 -- Removing upper neck bracket		10
Figure A.10 -- Using clamp to remove neck interface plate		11
Figure A.11 -- Neck dampers are free to be removed when interface plates are removed		11
Figure A.12 -- Lateral positions for neck buffers		12
Figure A.13 -- Assembling of neck buffers		13
Figure A.14 -- Neck triaxial accelerometer installation		14
Figure A.15 -- Components of WorldSID thorax and abdomen		17
Figure A.16 -- Shoulder		18
Figure A.17 -- WorldSID spine box assembly		20
Figure A.18 -- Removing shoulder load cell assembly		21
Figure A.19 -- Detaching shoulder rib at front from sternum		22
Figure A.20 -- Detaching the rib from the spine box at the rear		22

Figure A.21 -- Battery assembly	24
Figure A.22 -- Internal spine box assembly	25
Figure A.23 -- Angular accelerometer assembling	26
Figure A.24 -- IR-TRACC ball joint assemblies are mounted to the struck-side plate of the spine box	27
Figure A.25 -- Shoulder rib is grey, the first thoracic rib is red, and the second and third thoracic ribs and abdominal ribs are white	28
Figure A.26 -- Components of thorax rib	29
Figure A.27 -- Wire routing for rib instrumentation	30
Figure A.28 -- Plugging rib instrumentation cables into the front of the G5 modules mounted in the spine box	30
Figure A.29 -- The rib and abdominal couplers are attached to the ribs after instrumentation is plugged in	31
Figure A.30 -- Installation of G5 modules	32
Figure A.31 -- WorldSID rib instrumentation	33
Figure A.32 -- G5 DAS module	34
Figure A.33 -- Interposer connector	34
Figure A.34 -- DAS connector	34
Figure A.35 -- Arrangement of DAS, interposer connector, and connector	35
Figure A.36 -- Full arm, exploded	37
Figure A.37 -- Shoulder-arm detail	38
Figure A.38 -- Upper arm, exploded	39
Figure A.39 -- Elbow section	40
Figure A.40 -- Lower arm, exploded	41
Figure A.41 -- Wrist	42
Figure A.42 -- 'Z' Pivot and upper arm tube	43
Figure A.43 -- Elbow potentiometer	45
Figure A.44 -- Elbow potentiometer wiring	45
Figure A.45 -- Arm joint rotation	46
Figure A.46 -- Arm joint tension points	47
Figure A.47 -- Elbow adjustment	48
Figure A.48 -- Elbow friction adjustment	49
Figure A.49 -- Change-over components	50

Figure A.50 -- Arm assembly	51
Figure A.51 -- WorldSID pelvis components	54
Figure A.52 -- Rear view of pelvis assembly	55
Figure A.53 -- Front view of pelvis assembly	55
Figure A.54 -- Close-up view of pubic assembly	56
Figure A.55 -- Close-up view of lumbar assembly	56
Figure A.56 -- Removing spine box from the pelvis	57
Figure A.57 -- Detaching the femur assemblies	58
Figure A.58 -- Pelvis flesh	59
Figure A.59 -- Removing sacroiliac backing plates to separate the pelvic bone-pubis assembly	59
Figure A.60 -- Separating moulded pelvis bone from pubis assembly	60
Figure A.61 -- Separating pubic buffers from pubic load cell structural replacement	60
Figure A.62 -- Detaching the lumbar spine	61
Figure A.63 -- Separating the upper lumbar clamping plate and lumbar mounting wedge from the lumbar spine	61
Figure A.64 -- Removing the lower lumbar mounting bracket weldment	62
Figure A.65 -- Removing the sacroiliac load cell interface	62
Figure A.66 -- Removing pelvis instrumentation cover plate	63
Figure A.67 -- Removing the pelvis instrumentation bracket	63
Figure A.68 -- Removing the DAS cover	64
Figure A.69 -- Removing the docking station	64
Figure A.70 -- Removing interposer mass replacement	65
Figure A.71 -- Separating the sacroiliac and lumbar spine load cell structural replacements	65
Figure A.72 -- Routing of wires for pelvis instrumentation	67
Figure A.73 -- Femoral neck	68
Figure A.74 -- Upper leg assembly	69
Figure A.75 -- Knee	70
Figure A.76 -- Lower leg tube assembly	71
Figure A.77 -- Foot and ankle	72
Figure A.78 -- Ankle assembly	73
Figure A.79 -- Ankle	75

Figure A.80 -- Knee assembling	76
Figure A.81 -- Knee potentiometer wiring	77
Figure A.82 -- Knee potentiometer installation	77
Figure A.83 -- Torquing the knee contact load cell	78
Figure A.84 -- Ankle potentiometer wiring	79
Figure A.85 -- 'X' and 'Y' version assembling	79
Figure A.86 -- Ankle assembly potentiometers	80
Figure A.87 -- Knee assembly	81
Figure A.88 -- Leg joint adjustments	81
Figure A.89 -- Ankle adjustment	82
Figure B.1 -- WorldSID G5 DAS system diagram	85
Figure B.2 -- Dummy exit to TDAS status box cable 2B 14-pin lemo connector wiring side view sockets	88
Figure B.3 -- Dummy exit to TDAS status box cable 2B 19-pin lemo connector, wiring side view, pins	89
Figure E.1 -- Lifting bracket assembly	95
Figure G.1 -- Cable routing for the head	98
Figure G.2 -- WorldSID neck cable routing	99
Figure G.3 -- IR-TRACC and linear accelerometer routing for shoulder and 1st thorax ribs	99
Figure G.4 -- Cable routing for IR-TRACC and linear triax accelerometers of the 2nd, 3rd thorax ribs and abdomen ribs	100
Figure G.5 -- Pelvis cable routing	101
Figure G.6 -- Installations of sensor connectors to the thorax connector station	101
Figure G.7 -- Cable routing for the thorax connector station	103
Figure G.8 -- Thorax cable routing	104
Figure G.9 -- Shoulder area final cable routing	104
Figure G.10 -- Pelvis cable and dummy exit cable routing	105
Figure G.11 -- Thorax cable routing	105
Figure G.12 -- DAS exit cable and tilt sensor cables	106
Figure G.13 -- Shoulder load cell cable routing	106
Figure G.14 -- WorldSID final dummy wiring	107
Figure G.15 -- Lower arm cables	108
Figure G.16 -- Upper arm cables	108

Figure G.17 -- Cables in the elbow region	109
Figure G.18 -- Lower arm flesh	109
Figure G.19 -- Upper arm flesh	110
Figure G.20 -- Lower arm suit	110
Figure G.21 -- Lower leg cables	111
Figure G.22 -- Knee area cable routing	111
Figure G.23 -- Knee area cable routing	112
Figure G.24 -- Knee area cable routing and flesh	112
Figure G.25 -- Femoral neck cable routing	113
Figure H.1 -- Location of temperature sensors used for internal temperature survey	114
Figure I.1 -- Cable attachment to the upper neck load cell	116
Figure I.2 -- Spine box cable routing	117
Figure I.3 -- Spine box cable attachment	117
Figure I.4 -- Spine box cable attachment	118
Figure I.5 -- Lumbar cable attachment	118
Figure I.6 -- Pelvic load cell cable attachment	119
Figure I.7 -- Knee cable attachment	119
Figure I.8 -- Cable attachment	120
Figure I.9 -- Tibia cable attachment	120
Tables Table A.1 -- Parts list for WorldSID head	3
Table A.2 -- Parts list for WorldSID neck	8
Table A.3 -- Parts list for the WorldSID thorax, abdomen and shoulder	15
Table A.4 -- Parts list for shoulder assembly	18
Table A.5 -- Parts list for WorldSID spine box	19
Table A.6 -- Parts list for full arm	36
Table A.7 -- Parts list for shoulder-arm	37
Table A.8 -- Parts for upper arm	38
Table A.9 -- Parts list for elbow	39
Table A.10 -- Parts for lower arm	40
Table A.11 -- Parts list for wrist	41
Table A.12 -- Parts list for WorldSID	50

Table A.13 -- Parts list for WorldSID pelvis	52
Table A.14 -- Parts list for femoral neck (W50-51034)	68
Table A.15 -- Parts for upper leg	68
Table A.16 -- Parts list for knee	69
Table A.17 -- Parts list for lower leg tube	70
Table A.18 -- Parts list for ankle-foot	71
Table A.19 -- Parts list for ankle	72
Table B.1 -- WorldSID G5 DAS parts list	83
Table B.2 -- Dummy exit to status box cable pinout	88
Table B.3 -- Example instrumentation cable lengths	89
Table C.1 -- Screw torques	91
Table D.1 -- Summary of fasteners abbreviations, descriptions and ISO references	92
Table E.1 -- Parts list for lifting bracket assembly	94
Table H.1 -- Effect of internal and external DAS on WorldSID internal air temperature	115
Table I.1 -- List of ground cables	116