6ROYD\ )RUPHUO\ $GYDQFHG &R
070 &) 5: . 3: $6)DEUL
FXUH F\FOH FRPSDUHG WR 0+
(TXLYDOHQF\ 6WDWLVWLFDO $

)$$ 6SHFLDO 3URMHFW 1XPEHU 63 :, 4

1&$03 'RFXPHQW 1&3 53 5HY 1 &

5HSRUW 'DWH 0DUFK

(OL]DEHWK &ODUNVRQ 3K '
1DWLRQDO &HQWHU IRU $GYDQFLQJ 3UREDELOLVWLF 5HDVRQLQJ 1&$03
1DWLRQDO ,QVWLWXWH IRU $YLDWLRQ 5HVHDUFK
:LFKLWD 6WDWH 8QLYHUVLW\
:LFKLWD .6

7HVWLQJ)DFLOLW\
6ROYD\ )RUPHUO\ $GYDQFHG &RPSRVLWHV *URXS
6RXWK WK (DVW $YHQXH
7XOVD 2.

7HVW 3DQHO)DEULFDWLRQ)DFLOLW\
6ROYD\ )RUPHUO\ $GYDQFHG &RPSRVLWHV *URXS
6RXWK WK (DVW $YHQXH
7XOVD 2.

3UHSDUHG E\

(OL]DEHWK &ODUNVRQ

5HYLHZHG E\

-RQDWKDQ 7LVDFN .DWKHUL

$SSURYHG E\

5R\DO /RYLQJIRVV

7$%/(2) &217(176

/LVW RI 7DEOHV

/LVW RI)LJXUHV

,QWURGXFWLRQ

7KLV UHSRUW FRQWDLQHG QHZ \ WKHVH WRSLFV DXOWLRU FRUO \ $GYDQFHG &RPSRVLWHV *URXS 070 5: &). 3: $6)DEULFXUHG ´FFHOH FRPSDUHG WR DOWHUQDWLQJ SDQHO VKDSH PDWHULDO 7KHQ DVVHVVPHQW RI SHUIRUPDQFH XQGHU VWDWLF DQG G\QDPLF ORDGLQJ ZLWK)$$ RYHUVLJKWV WHFKQRORJLHV DQG 3RWHQWLDO 1X4PEHUG 6O3OR:,PHHW WKH UHTXLUHPHQWV 3RWWDQGHG GLQS1&UDW3QJ 3UHFHGXUHV SDQHOV WHVW VSHFLPHQV DQG WHVWLQJ KDWV EHHG E\ZLWK)$$

7KH PDWHULDO ZDV*SURFXUHGOWSHU&LILF DWERQL$&RQ , 5 GDWHG -DQXU\ HQW1&STX3LPDWHULRQ 1OSHFLILFKDW EHHQ FUHDWHG 106 SHFLFRQDWLRQV OLHUULWHGWKURWP DWKH TXDOLILFDWLRQ JDXLGHOLQHV LQ VHFWLRQ &207+)$$ 9ROXPH 5HY * VHFWLRQ

7KH PHFKDQLFDO WHVWVWGQE\ZD&* SWUWRKHLRP DXODVFLO2W0 7KH FRPSDULVRQV ZHUH SLHQUJRWURP&G+DFFRUGHF7KLHQRGLFHG FRHIILFLHQW RI YDUFLDPSLRQL VRRQGW&HVWDFZRHUGHQHRQHZLWQK VHFWLRQ RI &0+ WHV*W'GSDWD ZDV QDRWHDXDYLDOOEQFH\IRU FRPSDULVRQ

7KH RULJLQDWLRQDGDWLRQ GDWEZDLVS³XEOLVK&)DWD 0+ &XUH &\FOH 9DOXHV 2QO\ SGL´ILFRQWLRQ WHEVWLSDWQHG VL QHUFHFRDGZLWK 6ROYD\ IRUPH&RSSGLYDHQF*URXSLPDWERQV$&S3HFLI 5HYLVLRQ (³0+´ FKHHTXLOYDOHQF\ GDGWDQZ7DXSXEOLVK &) 'DWD 0 &XUH &\FOHO9DOXHVP´ 7KHVWZHVUWSDEQULFDW LQ DFFRUGDQFH ZLWSKH&&LSDWVLQGP&3RQ (³5´HYFLXUH F\FOH

(QJLQHHULQJ EDVLVSYRUWHG LZQHU1&$03 5HSRUW11&3 53 ZKLFK GHWDLOHGVDUWKH DVQG PHWKRGRORJ\DXVHGWRXHFWRPSXWH DV SURYLGLQJ WKHQG EDVLVGLYPDOWKHWWEDPSRWHWKH WHVW UHIRU WKH RULJLQDWLQJ SDQHOV

7KH 1&$03 VKDUHG PDWGHDWLDEDSVUHSRQWDLOSHVUMDWGHDWLDORI FRPPRQ XVHIXOQHVV PRVRDHUZRGSHUFHQWDJHWKDW Q IXOILOO DOO WKH GSHEGLVLRF SUSRSHUMHEWV EQPLQLWH DUFK DQG ORDGLQJ VLWYXLDGWXDRQSVUWKDHWWLVEQGDLGHGLWPDRQDHQTXLHVWL

$LUFUDIW FRPSDQLHV VKRXOG QRW XSVRHUWWKZHWGKDWXDW SVXSEHFLLV 1&$03 0DWHULDO 6SHFLILFDWLQ 10KDV DGUGHLTXLRQHPHQWV V DUH OLVWHG LQ LVWVFSRQWSURHOJGSRUFRFHMSMFL3&FDWLEHU ILEHU DQG RWKHU UDZ PDLVRHQVLDQGS&HFLZKQLWFDMKQLWFLSDRVFHXHDVOLW\ FR

RQ WKH UDZ PDWHULDO LQIRUPDWLRQ GDWD VKHHWV DQG FHUWLILFDWHV XQGHU SURFXUHPHQW D
companies and certifying agencies should assume that the material property data published in this report is not applicable when the material is not procured to NCAMP Material Specification NMS 451/7 106 LV D IUHH SXEOLFO\ DYDLODE
SURSULHWDU\ DHURVSDFH LQGXVWU\ PDWHULDO VSHFLILFD

7KH XVH RI 1&$03 PDWHULDO VSHFLILFDWLRQV DQG SXEOLFDWLRQV RQ WKLV UHSRUW
VWUXFWXUDO SHUIRUPDQFH DQG TXDOLW\ RI SURGXFWLRQ PDWHULDOV DQG SURFHVVHV
SHUIRUPDQFH DQG TXDOLW\ SURFHGXUHV DQG GHWHUPLQH WKH DSSOLFDELOLW\ RI
TXDOLW\ FRQWURO SURFHGXUHV GHVFULEHG WKHUHLQ WR WKHLU SDUWLFXODU
PDWHULDO FKDQJH PDWHULDO JHQHUDWLRQ RU FRQGXFW WHVWLQJ RI SDQ
FRQGXFWLQJ UHJXODU VXSSOLHU DXGLWV

7KH DSSOLFDELOLW\ 1&$03 PDWHULDO VSHFLILFDWLRQV DQG VWDQGDUG
DQG VSHFLILFDWLRQ HVGPRXQW WHVWLQJ DEVHHEY\DFODXVHWFEUDVWVFER\PSDQLHV
FHUWLI\LQJ DJHQFLHV 1&$03 DEVXPW\ZKDWVWYRRUY HUPSEL SHG
UHODWHG WR WKHDXVSHURISWWK W\PGDWDEOHPDWHQGDOSEEOLFR FDV

6\PERODQG $EEUHYLDWLRQV

7HVW 3URSHUW\	$EEUHYLDWLRQ
:DUS &RPSUHVVLRQ	:&

7\SH , DQG 7\SH ,, (UURUV

	Materials are equal	*Materials are not equal*
Conclude materials are equal	*Correct Decision*	*Type II error*
Conclude materials are not equal	*Type I error*	*Correct Decision*

)LJXUH 7\SH , DQG 7\SH ,, HUURUV

$V LOOXVWUDWHG LQ)LJXUH RXU SURFHGXUH FRQWUROV WKH
DQG WZR HUURQHRXV FRQFOXVLRQV 7KHUHIRUH ZH
,, HUURUV WR GLVWLQJXLVK EHWZHHQ WKHP 7KH
SDUDPHWHU E DOORZV XV WR EDODQFH WKH W\SH ,
7KH WHUP µVXIILFLHQWO\ SURQRXQFHG\ LQGLFDWHV
WHUPLQRORJ\ WKH HSFRRPESDUHGLQGLVWLQJXLVKHV
QXOO K\SRWKHVLV LV OHVV WKDQ .

)RU HTXLYDOHQF\ WHVWLQJ E\ WKH SURFHGXUH
FRQILGHQFH OHYHOV WKDW LV IPZH DUH
DUH QRW HTXLYDOHQW WR DSSUR[LPDWHO\ EHWZHHQ
GHFLVLRQ LV QR OHVV WKDQ

&XPXODWLYH (UURU 3UREDELOLW\

(DFK FKDUDFWHU/LVQWLFFXGLFQKDDV7HQQL3RQDQWHUGHQHJDWKPRGX
LV WHVWHG VHSDUDWHO\ E\ :KLWDVHRWKHUV,DFHUURU DOO WH
PDQ\ GLIIHUHQW WHGVRQ DUVHLQJHOHRUDWWKUDLDOSUHRERE
W\SH , HUURU WKHDYLQRJEHQEHOLW\PRUHUHVWLQV FDO
PXFK KLJKHU

,I ZH DVVXPH WKH WHZR GHQWLFDOO VZHWSKURWEDE
HUURU IRU WKFHRPEZLQWGHVLW í)RU IRXUWHVWV WR í
)RU WHVWV WKHSUR\EDE¸LGHURUHUWRQV WRUL V í

$V LOOXVWUDWHG LQ)LJXUH RXU SURFHGXUH FRQWUROV WKH
DQG WZR HUURQHRXV FRQFOXVLRQV 7KHUHIRUH ZH
,, HUURUV WR GLVWLQJXLVK EHWZHHQ WKHP 7KH
SDUDPHWHU E DOORZV XV WR EDODQFH WKH W\SH ,
7KH WHUP µVXIILFLHQWO\ SURQRXQFHG\ LQGLFDWHV
WHUPLQRORJ\ WKH HSFRRPESDUHGLQGLVWLQJXLVKHV
QXOO K\SRWKHVLV LV OHVV WKDQ .

)RU HTXLYDOHQF\ WHVWLQJ E\ WKH SURFHGXUH
FRQILGHQFH OHYHOV WKDW LV IPZH DUH
DUH QRW HTXLYDOHQW WR DSSUR[LPDWHO\ EHWZHHQ
GHFLVLRQ LV QR OHVV WKDQ

&XPXODWLYH (UURU 3UREDELOLW\

(DFK FKDUDFWHU/LVQWLFFXGLFQKDDV7HQQL3RQDQWHUGHQHJDWKPRGX
LV WHVWHG VHSDUDWHO\ E\ :KLWDVHRWKHUV,DFHUURU DOO WH
PDQ\ GLIIHUHQW WHGVRQ DUVHLQJHOHRUDWWKUDLDOSUHRERE
W\SH , HUURU WKHDYLQRJEHQEHOLW\PRUHUHVWLQV FDO
PXFK KLJKHU

,I ZH DVVXPH WKH WHZR GHQWLFDOO VZHWSKURWEDE
HUURU IRU WKFHRPEZLQWGHVLW í)RU IRXUWHVWV WR í
)RU WHVWV WKHSUR\EDE¸LGHURUHUWRQV WRUL V í

7KLV LV FRQYHUWHG\WPRXOWLSOLQJ E\

&9 LV XVHG WR FRQSXWH WKH VWDQGDUG GHYLDWLRQ 6

$$S \quad CV \quad \bar{X}$$

7R FRPSXWH WKH SRROHGLRZQEDODQFHGGRXEOH WKH PRGLILHG

$$S_p \sqrt{\frac{\sum_{i}^{k} n_i \quad CV_i \quad \bar{X}_i}{\sum_{i}^{k} n_i}}$$

(TXDWLRQ

7KH $ EDVLV DQG %XQGHUVWRRGDOXHV XPSWLRQ&RPPWKHRGDUH FRPSXWHGDE\LQJHSOZLWK 6

:KHQ WKH EDVLV YDOXHV KDYH EHHQ VH

(TXLYDOHQF\ 7HVW 5HVXOWV

7KHUH ZHUH D WRWDO RI HLJKW VWXGLHV WKDW PHW RXU LQFOXVLRQ FULWHULD DQG ZHUH
WR WKH UHFRPPHQGDWLRQV RI WKH 86 3UHYHQWLYH 6HUYLFHV 7DVN)RUFH DQG
ZLWK LQVXIILFLHQW GDWD WR GHWHUPLQH WKH HIIHFWLYHQHVV RI
$OO WHVWV ZHUH WZR WDLOHG DQG XVHG D VLJQLILFDQFH OHYHO RI

7KH UHVXOWV RI WKH PHWD DQDO\VLV DUH VXPPDUL]HG LQ)LJXUH &9¶V ZL
&9¶V ZLWK 0RGHUDWH 9HUVXV +LJK WR HOLPLQDWH RQH RI WKH PR
FRHIILFLHQW RI YDULDWLRQ PHDVXUHV WKH GLIIHUHQFH LQ VWXGLHV WR VHSDU
SDQHOV DQG SURFHGXUHV XVLQJ GLIIHUHQW VWUDWHJLHV IRU PRGXODWLQJ WKH
VSHFLPHQV IRU PRGXOH,QWHUDFWLRQ DQDO\VLV RQ GHQVLW\ DQG WHPSHUDWXUH
RI VSHFLPHQV WKLHG ZLWK EµH QLVXGLWHUHQW WKH3WDY¶V DRU)DLO
LQGLFDWLRQ $ VXPPDU\ RI WKH RZQ LV DOVR RZQ LQ 7DEOH

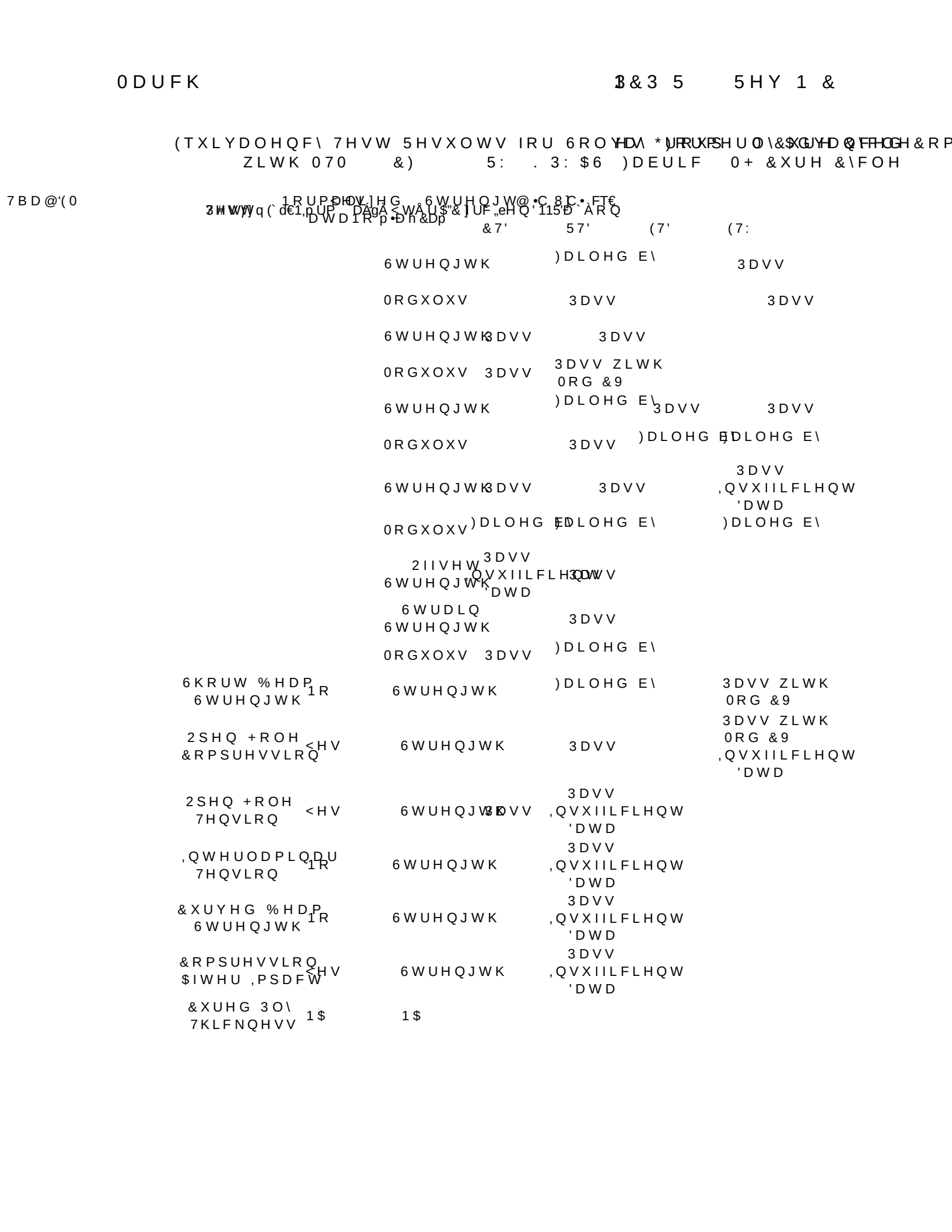
)DLOXUHV LQ7UDEHFXODH SRUWHG DV 7KLV HSGHUHFHQW DJH ZDV FRU
E\ WDNLQJ WKH UDQWHLQRFRPHWKRG RI XPPYRGGLXHHWR& 9 OL
IRU WKDW YDOXH D7DEOH K VFJOYHV RU YWKUHW\HR DWKH IDLO

'HVFULSWLRQ	0RGXOXV	6WUHQJWK
0LOG)DLOXUH	IDLO ”	IDLO ”
0LOG WR 0RGHUDWH)DLOXUH	IDLO ”	
0RGHUDWH)DLOXUH ”	IDLO ”	
0RGHUDWH WR 6HYHUH)DLOXUH	IDLO ”	
6HYHUH)DLOXUH	IDLO ”	IDLO
([WUHPH)DLOXUH	IDLO	IDLO

7DEOH)DLOHG 5HVXOWV 6FDOH

(TXLYDOHQF\ 7HVW 5HVXOWV IRU 6RONHD *URXSHU 0\&XUYHG &RP
ZLWK 070 &) 5: . 3: $6)DEULF 0+ &XUH &\FOH

7BD@'(0



:DUS &RPSUHVVLRQ :&

7KH :DUS &RPSUHVVLRQ GLJHVW E\ FXRUHG7KH :QKLFNRQHOVLVHG VWUHQJWK GHWHUPLQDWLRQ FRQGLWLRQV RQ WKH 57 FRQGLWLRQ 7KH :&RGXOXPDGLJHVW EDVHGVWHTXRLY EHRWKFWKH 57' DQG (7: FRQGLWLRQV XHGLVHGHUHRUWKSU(RYLGHGHQJ GDWD EHFDXVH WKHUHFRHWLFQHZDWEDVV WZKLWFKHP RGL &9 UHVXOWV ZHUHPQWRKGLUHVXQWVIURRQG DQGDWLWWUHVXO VKRZQ IRU WKH VWDEHQJWK GQGWDRLQWKH LPRGXEXM GD

4XDO (TXLY 4XDO (TXLY

'DWD QRUPDOL]HG ZLWK &37
0HDQ 6WUHQJWK NVL
6WDQGDUG 'HYLDWLRQ
&RHIILFLHQW RI 9DULDWLRQ
0LQLPXP
0D[LPXP
1XPEHU RI 6SHFLPHQV

5(68/76

0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0LQ

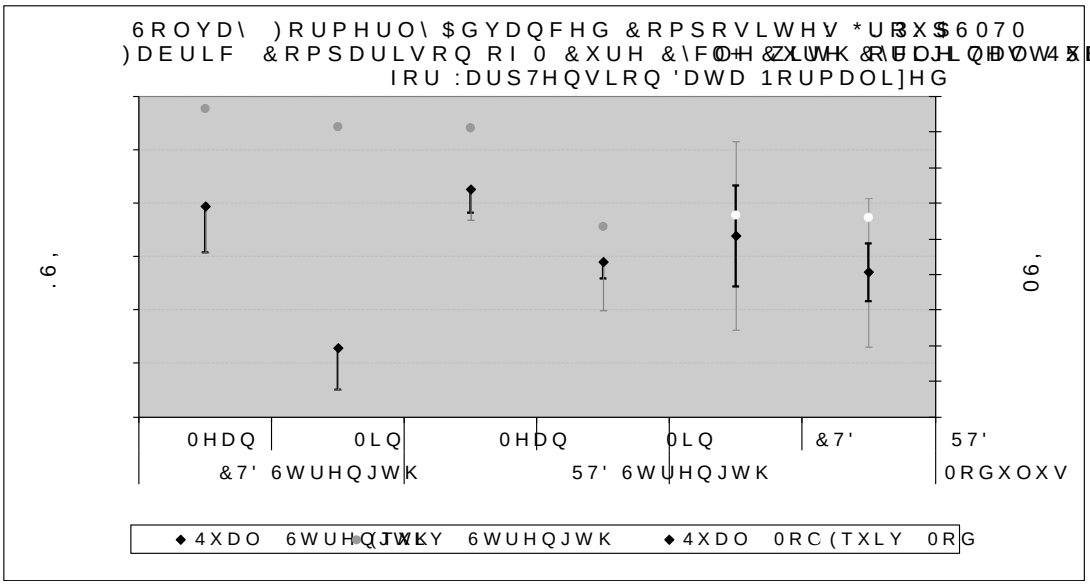
:DUS 7HQVLRQ :7

7KH :DUS 7HQVLRQ GDWD LV QRUPDOL]HG EHWZHHQ &37 DQG &37 DQG SDVVHG DOO HTXLYDOHQF\ WHVWV 7KH GDWD LQ WKLV ILOH KDV EHHQ SUHSURFHVVHG WR UHPRYH RXWOLHUV DQG PLVVLQJ PRGXOXV GDWD LQ WKH HTXLYDOHQF\ 0RGLILHG &RUWH[6XPPDU\ 'DWD IRU WKH FRHIILFLHQW RI HIILFLHQF\ DQG WKH VWUHQJWK FRHIILFLHQW DUH DOVR SURYLGHG 7DEOH LQ WKH VWUHQJWK GDWDVHW DUH DOVR SURYLGHG

4XDO (TXLY 4XDO (TXLY

'DWD QRUPDOL]HG ZLWK &37
0HDQ 6WUHQJWK NVL
6WDQGDUG 'HYLDWLRQ

)LJXUH LOOXVWUDWLRQ HVWWWUKHQJWKHPQHWDQYDOXHGVPDLQQGPXKH
PRGXOXV PHDQV IRUR QWKEPTSXODHODQGDWWKLEPHSTOXHLYDKOHHQFL\PLWV
HTXLYDOHQF\ VDPSOHHUDUHEHZKEHZQZDWWRQWKEHWDXDTKLHLHBRQJH
OLJKWHU FROORUHGU HWUKURE REGDLUVHDGU&H9IRRPSXWDWLRQV



)LJXUH :DUS 7HQVLRQ 0XPHDVXUHPHQW DQG P(TXLYDOHQFH OLPL

)LOO &RPSUHVVLRQ)&

7KH)LOO &RPSUHVVLRQ &RQILJXUDWLRQ 7DEOH \LHOGV GDWD RQ WKH FRPSUHVVLRQ
VWUHQJWK GDWD SDWWHUQV JHQHUDWHG IURP XVLQJ KDUGZDUH TXLFN WHVWV RQ W
57' FRQGLWLRQ 7KHVH &RQGXFWLYLW\ GHWHUPLQDWLRQV RQO\ IRU W
57' FRQGLWLRQ QRW (IFWRUHG LQ VWDWLRQV UHTXLUHG &RQVLVWHQF\ QRW
SURYLGHG HQJLQHHULQJ GDWD EHFDXVH LQDFFXUDWH FDVH LQIRUPDWLRQ
DERYH ZKLFK PHDQV WKDW WKH PXOWLSOLHG &9 WKH PXOWLSOLHG
VKRZQ 6WDWLVWLFDO DQDO\VLV RI WKH GDWD LV QRW UHTXLUHG
IRU WKH PRGXOXV DQG

)LOO &RPSUHVVLRQ)& 6WUHQJWK	57'		(7'		(7:	
	4XDO	(TXLY	4XDO	(TXLY	4XDO	(TXLY
'DWD QRUPDOL]HG ZLWK &37 0HDQ 6WUHQJWK NVL 6WDQGDUG 'HYLDWLRQ &RHIILFLHQW RI 9DULDWLRQ 0LQLPXP 0D[LPXP 1XPEHU RI 6SHFLPHQV						
5(68/76			3$66		3$66	
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ						
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0LQ						

7DEOH)LOO &RPSUHVVLRQ 6WUHQJWK 5HVX

	4XDO	(TXLY	4XDO	(TXLY	4XDO	(TXLY
'DWD QRUPDOL]HG ZLWK &37						
0H	GgT• P# XQPg!7uUFeFi0 @ •		TeQ!'	UFeFi0)@ 0 @• °		

7KH)& PRGXOXV GDWHDQ YRUURWQKHHQ W IDLQH\GWWKHVHW HETHXFLDYXDVOHH
VDPSOH PHDQ YDOXHH WKH XSSDEURDFFHSWDQKH OLPLW

)LOO 7HQVLRQ)7

7KH)LOO 7HQVLRQ HGGDWD FXUHQWSPD\OWJKLQRQPDYOL]HKGH VWUH
GDWD SDVVHG HTXLYDOHQWKWHHVWRQKHLWRQVPDHVLWHGG
PRGXOXV GDWD GLGHQFWVWVHTXLYDDQRGCLWKLRQVKUHHVWH
WKUHH FDVHV GXH PRDQKEHPRJXORXRVK1JKHVXRGVLZHGU& QRV
SURYLGHG IRU WKHH&7'WKUG(DWDWEUHFDXWHRWKHDWLRQHZD
DERYH ZKLFK PHDVLWKHGV &VKUHHVXOWVQZHUHRPRWGHIUHV
VKRZQ 7KHUHSHFQPXQLFLQWKHV D7WDVWRUHQJKWKUGHVXOV
EH FRQVLGHUHG FRQEDXVLQGD6QDDWKLRZQUHVXOWWKHDWHUQJ
LQ 7DEOH DQG IRU WKH PRGXO

7KH)7 PRGXOXV GDWDQYRUWKHQ5W IDLQFH\GWWKVW HETHXFLDYXDVOHHV
VDPSOH PHDQ YDODXEHRYH WKLHVXSSHU DFFHSWDQFH OLPLW
HTXLYDOHQF\ VDPSOH PHDQRYIDWKH XSSHFHSWDEWRHRYDOXHV

)LJXUH LOOXVWUDWHV WKH HQKDQFHG VWKUHHGQHVV RI PHDVXUHPHQWV IRU LQWHUFKH
TXDOLILFDWLRQ WDKHSHTXLYDOHQF\ VHFXOYHDWKEFOLPDWVOHH
DUH VKRZQ DV HUWRU EDQGV GLWDW7KHOJRQWHU FRORUHG HU
DUH IRU WKH PRGLILHG &9 FRPSXWDWLRQV

,Q 3ODQH 6KHDU ,36

7KH ,Q 3ODQH 6KHDU RUU HDWLG]HG 7RKW ,QG6 SDVVUVHQGHU GDW
HTXLYDOHQF\ WHVWXV 7GKHW,3 6SDPVGHXG HVTXRLVDVKHQR&7 WHVW
FRQGLWLRQ EXW QRWQWKHU7H FRQGLWLRQV6WUDLQLQJKDVDYDLO
IRU WKH 0 FXUH F\FORQH &7RGLZHUGH &QRWHSUXOYLGHG I
2IIVHW &7' GDWDWHKW EHRFDIXFHLHQW EVEVYDULDWKRQKZD
PHDQV WKDW WKH PRZHULHG&9GUHVHVXHQXDWUVRVKWRKEQ U7KHU
ZHUH LQVXIILFLHQWKH V,6FLPH2QVHQV VDWUHQJRUK WKHVW &7'
FRQGLWLRQ IRU WFKQVLHGVXOHWGV FRRQEHXDQGLWWLWHVXC
VKRZQ IRU WKH ZIDQHGV66WUHQJWK WDWD LQ67DEDOLHQ GD DQ
IRU WKH 0RGXLQXYDEDW

,Q 3ODQH 6KHDU ,36	2IIVHW &7HQJWK		57'		6WUDLQ 57'	
	4XDO	(TXLY	4XDO	(TXLY	4XDO	(TXLY
'DWD DV PHDVXUHG 0HDQ 6WUHQJWK NVL 6WDQGDUG 'HYLDWLRQ &RHIILFLHQW RI 9DULDWLRQ 0LQLPXP 0D[LPXP 1XPEHU RI 6SHFLPHQV	,QVXIILFLHQW 'DWD					
5(68/76	3$66		3$66		3$66	
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ						
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0LQ						
02' &9 5(68/76			3$66 ZLWK 02' &9		3$66 ZLWK 02' &9	
0RGLILHG &9	1$					
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ						
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0LQ						

7DEOH ,QK3HDDUQ6HW6UHQJWK 5HVXOWV

,Q 3ODQH 6KHDU ,36 0RGXOXV	&7' 4XD	57' D	(T X L
'DWD DV PHDVXUHG 0HDQ 0RGXOXV 0VL 6WDQGDUG 'HYLDWLRQ &RHIILFLHQW RI 9DULDWLRQ 0LQLPXP 0D[LPXP 1XPEHU RI 6SHFLPHQV			
5(68/76	3$66		
3DVVLQJ 5DQJH IRU 0RGXOXV 0HDQ		WR	WR
6WXGHQW V W VWDWLVWLF			
S YDOXH RI 6WXGHQW V W VWDWLVWLF			
02' &9 5(68/76	3$66 ZLWK 02' &9		
0RGLILHG &9			
3DVVLQJ 5DQJH IRU 0RGXOXV 0HDQ		WR	
0RGLILHG &9 6WXGHQW V W VWDWLVWLF			
S YDOXH RI 6WXGHQW V W VWDWLVWLF			

u ,AÀ ÃuÄTaT‘ Xƒ6

HTXLYDOHQF\ VDPSOH PHDQ RYIDWWKH XSSHFUHSWDEOHRYDOXHV
8QGHU WKH DVVXPSWLRQRQGR&9WKHWPKRG WDKHSHHFXLHYDQHQF\
RI WKH PD[LPXP DFFHSWDEOH PHDQ YDOXH

)LJXUH LOOXVWUDWHVWKHVHWKUHV,QU3HQJQWRXPHYDQYXDHQYGDRQG W
PRGXOXV PHDQV IRU WKH TXDOLILFDWL

3 ´ 2SHQ +ROH &RPSUHVVLRQ 2+&

7KH 2SHQ +ROH &RPSUHVVLRQ QHWZRUN LQGXVWU\ VWDQGDUG 3DUW RI WKH 2SHQ &RPSUHVVLRQ QRUPDOL]DWLRQ SURMHFW WKDW GHVFULEHV WKH (7: FRQGLWLRQV DOWHUQDWLYH RQGLWLRQ UHTXLUHPHQWV DQG &9 PHWKRG WR SDVV IHDWXUH VSHFLILFDWLRQV DQG VXSSRUW FRQVLGHUHG FRQILGXUDWLRQV DV VKRZQ LQ 7DEOH

2SHQ +ROH &RPSUHVVLRQ 5HT' 2+&		(7:	
6WUHQJWK	4XDO	(TXLY	4XDO (TXLY
'DWD QRUPDOL]HG ZLWK &37			,QVXIILFLHQW 'DWD
0HDQ 6WUHQJWK NVL			
6WDQGDUG 'HYLDWLRQ			
&RHIILFLHQW RI 9DULDWLRQ			
0LQLPXP			
0D[LPXP			
1XPEHU RI 6SHFLPHQV			
5(68/76	3$66		
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ			
0LQLPXP $FFHSWDEOH 6DPSOH (TXLY			
02' &9 5(68/76	3$66 ZLWK 02 &9	3$66 ZLWK 02' &9	
0RGLILHG &9			
0LQLPXP $FFHSWDEOH (TXLY 6DPSOH 0HDQ			
0LQLPXP $FFHSWDEOH 6DPSOH (TXLY			

)LJXUH LOOXVWUDWHV &RVPRSHUH2SWLQRQVVDWQGHPJLQLQPXHPDQ
YDOXHV IRU WKH TXDOLWDWLQLF DWWKLHRHTXDPSOHQF\ VPOHHUDHEHZRQZDWRQWKHWDXDTKLHLHERQJH
OLJKWHU FRORUHGUHWUKHREREDLUVHGUHVDOI RRPSXWDWLRQV

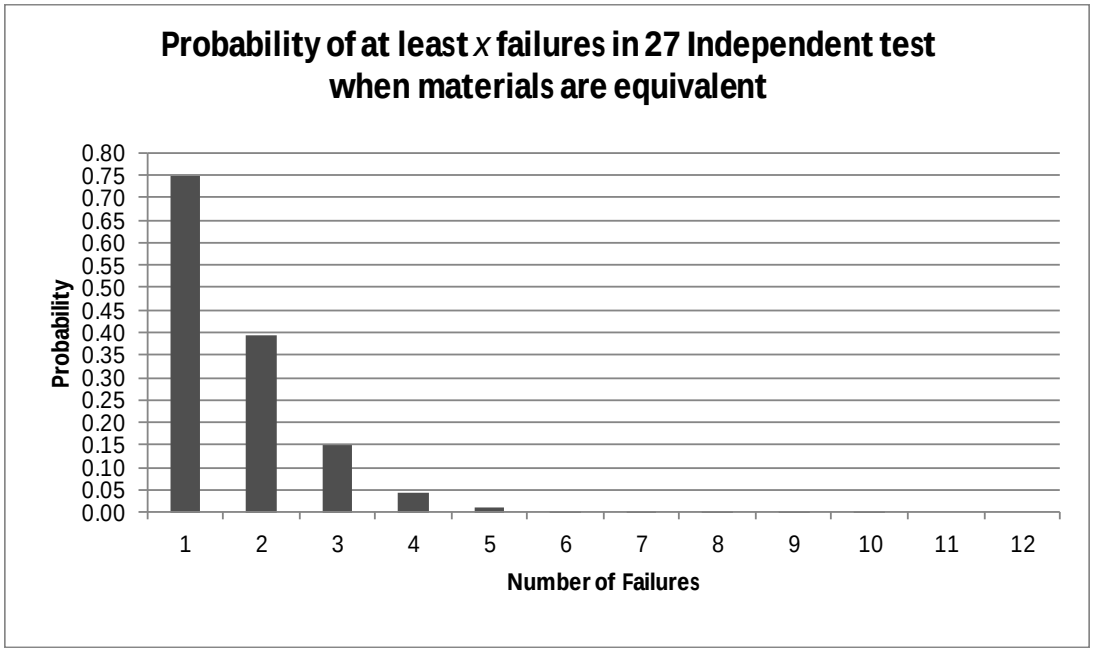
&XUHG 3O\ 7KLFNQHVV &37

7KH &XUHG 3O\ 7KLFNQHVV GHFUHDVHV WKH DFFXPXODWLRQ RI SRROHG WZR VDPSOHV GXULQJ EDVDO VLQFRQIWGWHQWLVOWHLYHVOIRU ER RULJLQDO 0+ FXUHLR\QF OVHDFXOHOLQFDWWKHT XLFYXDUHHQVFOVDPSO DUH VKRZQ LQ 7DEOH

&XUHG 3O\ 7KLFNQHVV &37 4XDO (TXLY
$YHUDJH &XUHG 3O\ 7KLFNQHVV
6WDQGDUG 'HYLDWLRQ
&RHIILFLHQW RI 9DULDWLRQ
0LQLPXP
0D[LPXP
1XPEHU RI 6SHFLPHQV

3UREDELOLW\ RI)DLOXUHV

,I WKH HTXLYDOHQFH RI DPSOH WHFUDLPHO IZW WKV FLKGHUQDWWWHDUL WR
RULJLQDO TXDOLFDWLRQ WHVWLQJ RI OPDWHULDOV WKHVH FRQGLWLRQV ZHUH LQGHSHQGHQW
FKDQFH RI KDRYULQJ RQH RU IHZHU IDLOXUHV XVLQJ LOO)XJ WUDWLQJ WKH
RI JHWWLQJ RQH RU ZR RU HUIRUPDQFH OHYHOV XVHG WR IHWE Q GHUS HQG H
WHVWV ,I WKH WUZHR HPTDXLYDOHQW ZHUH WKH SURGXFWLRQ EDRXOHL WD LOXU H
LV OHVV WKDQ 7KLVHPHDQV WUXH DWFRQGV E HQFRQWHUHG DOH
ZLWK D OHYHO RI FRQILGHQFH IRU XUHVRXUHV WR XPWRQGHS HQG W
WHVWV



)LJXUH 3UREDELOLW\ RI)DLOXUHV

5HIHUHQFHV

&0+ 5HY * 9ROXPH 6$(,QWHUQDWLRQDO &RPPRQ
'ULYH :DUUHQGDOH 3$
-RKQ 7RPEOLQ <HRZ & 1J *DQ *Material Qualification and 5DMX 3