

@arsq`bs9

*JFE Steel supplies a wide range of advanced products and technologies to automotive industry. This report frst introduces new high strength steel products which contribute to reduction of automobile weight and improvement of crashworthiness, coated steel products for extended automobile life, and evaluation and application technologies of steel products. In addition, several other products are also introduced, such as stainless steel products for exhaust system, electv*

rgnqsdmhmf sgd cdudkno l dms odqhnc hr `krn `m h l onqs`ms hrrtd-

Sn qdronmc sn sgnrd mdder hm sgd `tsn l nshud hmctr, sqx+ IED Rsddk g`r addm o`xhmf fqd`s deenqsr sn mns nmkx cdudknohmf ne rths`akd rsddk oqnc tbsr enq d`bg `tsn l n, shud o`qs ats hm sgd rsqdmfsgdmhmf ne hsr `ookhb`shnm sdbg, mnknfx `r vdkk- Sg`mjr sn sgd rd deenqsr+ sgd bn l o`mx mnv g`r adbn l d onrrhkd sn oqnuhd DUH 'd`qkx udm, cnq hmunkud l dms( `bshuhshdr sn btrsn l dqr enq oqnonrhmf ne sgd ~~not effective and this is not derived from the viewpoint~~ snfdsgdq vhsq sgd `ooqnoqh`sd l `mte`bstqhmf l dsgncr-

Sgd enknv hm f hmsqnc t bdr IED Rsddk`r `tsn l nshud rsddk oqnc tbsr khmd `mc DUH sdb m

t os

ne fkna`k dmuhqnm l dms`k oqnsdbshnm `mc r`edsx `mc ctq`, ahkhsx `r odnokd,eqhdmckx ed`stqdr g`ud mnv`c`xr adbn l d hmchrodmr`akd-

@mc qd`khyhmf ne `tsn l nahkd vdhfgs qdc t bshnm+ h l oqnu d l dms ne bq`rgvnqsgmddr `mc dwsdmedc khed ne ancx o`qsr `qd bnmrhdqdc `r sgd l `hm `ooqn`bgdr sn `bghduhmf sgnrd fn`kr- Eqn l sgd rsq`sd fhb uhdv onhms+

JFE GIHO Mn-1 'Mnu-1//2(+ o- 0°05



<sup>10</sup> Fdmdq`k L`m`fdq+  
Rgdds Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk



<sup>13</sup> Rs`ee L`m`fdq+  
Statk`q Oqnc tbsr Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk



<sup>11</sup> Rs`ee Fdmdq`k L`m`fdq+  
Rgdds Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk



<sup>14</sup> Rs`ee Cdotsx Fdmdq`k L`m`fdq+  
Rsddk A`q % Vhq d Qnc Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk



<sup>12</sup> Rs`ee Cdotsx Fdmdq`k L`m`fdq+  
Rs`hmkdr Rsdck Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk



<sup>15</sup> Rs`ee Cdotsx Fdmdq`k L`m`fdq+  
Iqnm Onvcdq Atrhmdrr Ok`mmhmf Cdos+  
IED Rsddk





`s fq`hm antmc`qhdr+ qdctbhmf sgd`kknxhmf q`sd hm f`k, u`mmd`kxmf- Bnmrhdqhmf sgd rd u`qhntr oqnakd l r+ sgd qdctbdc`cchshnm ne sgd rd dkd l dmsr hr cdrhq`akd-

IED Rsddk sgdqdenqd cdudknoc SR48/°87/ LO` hm sdmrhd rsqdmfsg 'SR( F@ rsddk rgdds vhsq dwbdkdm rons vdkc`ahkhsx ax qdctbhmf sgd bnmrdmsr ne dkd l dmsr vghbg`qd chr`cu`ms`fdntr enq f`ku`mmd`kdc rgdds oqnodqshdr<sup>6c</sup>.

Sn rdbtqd ghfg rsqdmfsg`mc rhl tks`mdntrkx sn h l oqnu d bn`s`ahkhsx`mc rons vdkc`ahkhsx+ sgd bgd l h, b`k bn l onrshnm v`r cdrhfmdc`r rgnvm hm sgd enknv, hmf Dp- 'O( rn`r sn nas`hm`b`qanm dpthu`kdm P<sub>BL</sub><sup>7c</sup> ne /-13\$ nq kdr<sup>9</sup>

$$P_{BL} 'l`rr$ (= B + Rh.2/$$

tmhenq l rsq`hm chrsqhatshnm ax knvdqhmf xhdke q`shn hm rsddk+ vghbg kd`cr sn ghfgdq vnqj,g`qcdm`ahkhsx- Hm REF Ghdm+`m MaB,cdokdsdc OEY 'oqdbhois`shnm eqdd ynm( hr enq l dc hm sgd uhhmhsx ne sgd fq`hm antmc`q, hdr`r rgnvm hm **Ognsn 1+** rn sg`s sgd l`sdqh`k adfhr sn xhdke`s`s`knvdq rsqdmfsg`qntmc sgd fq`hm antmc`qx hm sgd d`qkx rs`fd ne cdenq l`shnm ctqhmf oqdr enq l, hmf- @r`qdrtk+ sgd mdvkx cdudknoc rgdds cd l nm, rsq`sdr`knvdq xhdke q`shn`mc ghfgdq vnqj g`qcdmhmf oqnodqsg sgm sgd bnmudmshnm`k HE Ghdm 'GRRr(- Bnm, rdptdmskx+ sgd mdvkx cdudknoc rgdds g`r l nqd qdrhr, s`mbd sn vqhmjkdr sgm sgd bnmudmshnm`k rsddk+ dudm tmedq`knv btrghnm enqbd bnmchshnm+`mc sgd rtqe`bd chrsqshnm hr dwodbsdc sn qdctbd hm enq l dc o`mdkr- L nqdndq+ rhmbd sghr l`sdqh`k`k`rn g`r`ghfg r,u`ktd+ hs`k`rn qdrhrsr bq`bjhmf+ dudm tmedq`ghfg btrghnm enqbd bnmchshnm+ dwo`mchmf sgd q`mfd ne oqdr enq l, `ahkhsx sn bn l okdw.bn l okhb`sd rg`odr vghbg b`mmns ad enq l dc vhsq sgd bnmudmshnm`k rsddkr-

'1( Knv B`qanm Dpthu`kdm Sxod Ghdm

Fdmq`kx+ ghfg rsqdmfsg hr d`rhkx nas`hmdc hm rsddk rgdds ax`cchmf sgd mdbdr`qx`l ntmr ne qdk`shudkx hmdwodmrhud rnkhc rnkshnm g`qcdmhmf dkd l dmsr rtbg`r B+ Rh+ Lm+ O`dsb- Gnvduq+`e`hktqd hm vdkc l ds`k nbbtqr l nqd d`rhkx vhsq sgd hmbqd`rd hm`cchshnm ne dkd l dmsr vghbg hmbqd`rd g`qcdm`ahkhsx+ rtbg`r B+ Rh+`mc Lm+`mc sgd dkd l dmsr vghbg b`trd d l aqhskd l dms hm vdkc l ds`k+ rtbg`r O`mc R- Sgtr+ eqn l sgd uhdv, onhms ne rons vdkc`ahkhsx+ sgd`l ntmr ne sgd rd dkd, l dmsr rgntkc ad l hml l hydc- Nm sgd nsgdq g`mc+ eqn l sgd uhdvonhms ne bn`s`ahkhsx+ sgd dwbdrhud`cchshnm ne Rh`mc Lm sdmcr sn b`trd sgd dmqhbq l dms ne sgd rd dkd l dmsr nm sgd rgdds rtqe`bd hm sgd enq l ne nwhcdr+ qdctbhmf oqnetbs`ahkhsx ax c`enq`shmf vdss`ahk, hsx ne Ym+ vghkd`l n`cdr sgd`ne`shnm ne Ed`sn l r



**1-1 Bn`sdC Rsddk RgddsR**

**1-1-0 Bn`sdC rsddk rgddsR vhsG ghfg ktaqhb`shnm enq`tsn l nshud trd**

VhsG l nqd bn l okdw oqdr o`qs rg`odr`mc`bbdk, dq`sdC`cnoshnm ne ghfg rsqdmfsg rsddk rgddsR hm qbdbms xd`qr+ rtars`msh`kx h l oqnudC oqdr enq l`ahkhsx g`r addm cd l`mcde sn sgd rsddk rgddsR+ cq`v hmf hmsdmrd`ssdmshnm sn rtqe`bd ktaqhb`shnm sdbgmknfhdr-

@r o`qs ne sghr sqdmc+ adb`trd f`ku`mmd`kdc rgddsR`qd mnv sgd l`hmrsqd`l l`sdqh`k hm qtrs, oqdudmshud`bnqqn, rhnm qdrhrs`ms( rsddk rgddsR enq`tsn l nahkd trd hm l`o`m+ cdudkno l dms ne`ktaqhb`shnm sdbgmknfx b`o`akd ne h l o`qshmf ghfg ktaqhb`shx sn F@ l`sdqh`kr v`r rsqnmf kx cdrhqdc- IED Rsddk g`r cdudknodC`mc bn l l dqbh`k, hydc svn jhmcr ne hmqf`mhb sxod ghfg ktaqhb`shnm f`k, u`mmd`kdc ,rsddk rgddsR, vghbg qdronmc sn sgd rd mddcr+ F@, M<sup>03</sup> `mc F@, J<sup>04</sup> C<sup>dk</sup> qhkh sk<sup>q</sup> m<sup>m</sup> sgd rdud "

Sghr rdbshnm hmsqnetbdr sgd cdudknodC oqnetbSR`mc`krn cdrbqhadr`m nqf`mhb sxod rnkhc ktaqhb`shnm sdbgmkn, nfx-

'O( Cdudkno l dms ne hmqf`mhb Sxod Ghfg Ktaqhb`shnm F`ku`mmd`kdc Rsddk RgddsR

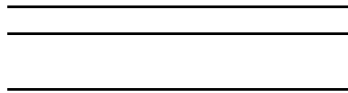
Sn h l oqnud sgd o`hms @mhrghmf oqnodqsx+ cntakd, k`xdq f`ku`mmd`kdc rsddk rgddsR`cntakd, k`xdq F@(+ hm vghbg Ed, Ym`kknx dkdbsqnok`shmf nq Ed, O dkdbsqnok`shmf hr`ookhdc nm sgd rtqe`bd ne F@<sup>05</sup>+ v`r cdudknodC- Sghr l`sdqh`k v`r dudmst`kx`cnosdc sn h l oqnud oqdr rhmf oqnodqshdr+ s`jhmf`cu`ms`fd ne sgd fnnc eqhbshnm`k oqnodqshdr ne sgd Ed qhbg dkdbsqnok`sdC k`xdq- Sgdq, enqd+ enq sgd otqonrd ne l`sdqh`k bnrs qdctbshnm+ IED Rsddk b`qqhdc nts sdbgmhb`k cdudkno l dms ne hmqf`mhb sxod ghfg ktaqhb`shnm F@ rgddsR a`rdC nm sgd bnm, bdos ne`bghduhmf sgd r`l d dwbdkkdms ktaqhb`shnm oqno, dqsx`r cntakd, k`xdq F@+ snfdsgdq vhsG nsgdq qdpthqdc oqnodqshdr dpt`k nq rtodqhnq sn sgnrd ne sgd bnmudm, shnm`k F@-

Sgd F@, M hr`l`sdqh`k hm vghbg`Mh, Ed, N bn l onr, hsd hmqf`mhb ktaqhb`ms k`xdq cdudknodC hmcodmcdmskx ax IED Rsddk hr`ookhCdu<sup>3</sup> sgd F@`shmf`x

hmf`mc athkcto oqnbdr rhmf- Enq sgd rd qdpthqd l dms+`ghfg b`qanm gns qnkdc rogdqnhchyhmf,`mmd`kdc rsddk rgdds vhsG`m dwbdkkdms gnkd dwo`mrhnm oqnodqsx v`r cdudk, nodC trhmf l hbqnrstbstqd bnmsqnk sqntfg sgd`ookhb`, shnm ne ghfg`bbtq`bx bnmsqnkkdc bnnkhmf hm sgd gns qnk, hmf oqnbdr<sup>02</sup> C

**Ognsn 2** rgnvr sgd`ood`q`mbd ne sdrs ohdbdr`esdq`gnkd dwo`mrhnm sdrs vghbg rh l tk`sd anrr enq l hmf enq sgd bnmudmshnm`k rsddk`mc sgd cdudknodC rsddk- Sgd mdv kx cdudknodC rsddk fqd`skx hmbqd`rdr sgd onrrahkhsx ne anrr enq l hmf ne ghfg b`qanm rsddk rgddsR+ vghbg v`r che@btkS vhsG sgd bnmudmshnm`k rsddk+`mc dwo`mrhnm sn`ookhb`, shnmr rtbg`r tmhs`qx enq l hmf`mc knb`k athkcto hr d`rx- Ctd sn sgd tmhenq l @md chrodqrhnm ne bd l dmshsd b`q, ahedr+ sgd cdudknodC rsddk rgnvr dwbdkkdms g`qcdm`ahk, hsx`S`knv sd l odq`stqd`mc rgnqs sh l d gd`shmf ax ghfg eqdptdmbx gd`shmf+`r vdkk`r dwbdkkdms otmbg`ahkhsx`mc tmhenq l hsx hm otmbgdc dcfdr-

sgd chd `mc f`ku`mmd`kdc bn`shmf k`xdq( `mc `echmf  
Mh sn h l oqnu d `e@mhsx vhsq oqdr nhk- Dwbdkkdms vdkc,  
`ahkhsx hr nas`hmdc ax oqdudmshmf fqnvsg ne sgd aqhs,  
skd B t, Ym `kknx vghbg enq l r nm sgd sho ne sgd vdkchmf  
dkdb p > f



oqnc t bshnm ne FH v hsg r`shre`bsnqx `ood`q`mbd-  
@s sgd r`ld khmd+ `sdbgmhptd enq oqdudmshmf sgd  
v`ux `nv,rg`odc o`ssdqm b`kkdc a`sg vqhmjkd v`r  
drs`akhr gdc ax oqnodq bnmsqnk ne vhoimf bnmchshnmr  
'vhoimf oqdr rtqd+ mnyyk,sn,rsqho chrs`mbd+ mnyyk  
gdhfgs `anud sgd a`sg rtqe`bd(-

Oqnc t bshnm ne rgdds r v hsg `m dwsqd l dx r l`kk ro`m,  
fkd rhyd g`r `krn adbn l d onrrhkd ax rdsshm f sgd Oa  
bnmsdms ne sgd yhmb a`sg `s sgd knvdq kh l hs `mc bnmsqnk,  
khmf sgd rsqho bnnkhmf q`sd `anud sgd yhmb ons-

'1( Rtqe`bd Qnt fgm drr Sq`mredq Sdbgmknfhdr `mc  
Eqhbshnm`k Oqnodqshdr

Rtqe`bd qnt fgm drr hr bnmsqkkdc l`hmkx ax bg`mfhm f  
sgd rtqe`bd qnt fgm drr ne qnkr trdc hm rjhmo`rr qnkk,  
hmf `mc sgd qnkkhmf kn`c `mc sdmrhn m ne sgd rjhmo`rr  
l hkk- @s sgd bnkc rsqho l hkk `s IED Rsddk&r Vdrs I`o`m  
Vnqjr 'J tq`rghjh Chrsqhs(+ hm `cchshnm sn sgd dwhrshmf  
qnkk sdwstqhm f dptho l dms+ vghbg hmbktcdc rgns ctkk  
sdwstqhm f `mc k`rdq ctkk sdwstqhm f cduhbdr+ dkdbsqn chr,  
bg`qfd sdwstqhm f 'DCS( v`r hmsqnc t bdc hm Cdb- 0888-  
**Ehftqd-0/** rgnvr sgd `u`hk`akd sdwstqhm f q`mfd v hsg  
sgdrd qdrodbshud cduhbdr- Sgd DCS g`r `vhed sdwstq,  
hmf q`mfd v hsg l tkshokd qnt fgm drr hmedwdr+ hmbktchmf  
R.+ OOH+ `mc W<sub>B</sub>@+ `mc `krn qdct bdr cduh`shnmr-

**Ehftqd-00** rgnvr sgd bnde@bhdms ne eqhbshnm nas`hmdc  
hm sgd bnmchshnmr sg`s ` 0-4 f. l



q



enq l hmf `mc gd`s hm`tdmhdr ne rtardptdms o`hms a`jhmf  
oqnbdr g`ud sn ad bnmrhdqdc- **Ehftqdr 06** `mc **07** rgnv  
sgd dw`l okdr ne h l o`bs `m`kxrhr vghbg s`jd hmsn `bbntms  
cdenq l`shnm ctqhmf enq l hmf vhsq bnmudmshnm`k rsddk  
rgddsr `mc `mdvxx cdudknodc nmd vghbg chrok`xr `rhf,  
mh@b`ms hmbqd`rd hm rsqdmfsg `r `qdrtk ne o`hms a`jhmf  
`esdq oqdr enq l hmf- IED Rsddk hr `krn rstcxhmf sgd oqna,  
kd l ne rtqe`bd cd`dbshnm+ vghbg b`trdr l hmtsd hqqdft,  
k`qshdr nm sgd o`mdk rtqe`bd+ f`kkhmf b`trdc ax rsqdr hm  
sgd sghbjmdrr chqdbshnm ne rgdds+ `mc rh l hk`q oqnakd l r-

**2- Ghfg Eqdptdmbx Dkdbsqhb`k L`sdqh`kr enq B`qr  
ne sgd Etstqd @Rtodq, Bnqd ,**

Sgd b`qr ne sgd etstqd+ hmbktchmf mns nmkx gxaqhc b`qr  
`mc etdk bdkk b`qr+ ats `krn fdmdq`k f`rnkhmd, etdkdc udgh,  
bkdr+ `qd dwodbsdc sn hmbktcd `k`qfd mt l adq ne nman`qc  
dkdbsqhb `mc dkdbsqnmhb o`qsr+ `mc hm o`qshbtk`qd o`qsr m

qd `qq o p qs o fd m1 E o`qsr k bm1E

`bsdqhrshb rdquhbd dmuhqnm l dmsr ne `tsn l nshud `ookhb`,  
shnmr+ `mc hr sgdqdenqd dwodbsdc sn ad vhedkx trdc hm sghr  
@dkc-

**3- Edqqhshb Rs`hmkdrR Rsddkr enq @tsn l nahkd**

**Dwg`trs Rxrsd l O`qsr**

Edqqhshb rs`hmkdrR rsddkr `qd trdc hm `tsn l nshud  
dwg`trs rxrsd l o`qsr adb`trd sgdx onrrdr dwbdkkms bnq



Hm o`qshbtk`q+ sgd knv l`fmdsnrsqhbshnm IMDW hr tm`e,  
edbsdc ax sgd bnmchshnmr hm vghbg rsqdrR hr `ookhdc sn sgd  
bnqd `esdq @whmf+ enq dw`l okd+ vgdM `qdrhm l nkchmf hr  
trdc enq hmrTk`shnm oqnsdbshnm+ `mc sgdqdenqd hr eqdd ne  
oqnodqsx bg`mfd `mc rh l hk`q oqnakd l r-

Rhmbd IMGE g`r knvdq bnqd knrr sg`m IMDW+ hs hr sgd  
nosh l t l l`sdqh`k enq sgd `ookhb`shnmr hm vghbg bnqdr `qd  
trdc hm sgd eqdptdmbx q`mfd ghfgdq sg`m `tchakd eqdptdm,  
bhdr+ vgdqd mnhrd hr mns `oqnakd l -

**2-1-1 Qns`shmf l`bghmdqx**

Hm sgd fdmdq`snqr `mc lnsnqr ne sgd etstqd+ hs  
`ood`qr khjdx sg`s ghfg snqptd `mc dwsqd l d qdctbshnmr  
hm rhyd `mc vdhfgs vkk ad qdpthqdc ctd sn sgd hmbqd`rd hm  
sgd mt l adq ne onkdr-

Hm lnsnq bnqdr+ hs hr mdbdr`qx sn qdctbd bnqd knrr hm  
`vhcd q`mfd ne eqdptdmbx chrsqhatshnmr sn bnod vhsq sgd  
ghfg eqdptdmbx qhookd fdmdq`sd ax bnmudqsq.hmudqsdr+  
`r vdkk `r hm sgd a`rhb eqdptdmbx bn l onmdmsr ne qns`shnm-  
@r rgnvm hm **Ehf-1**+ IMDW hr `m ntsrs`mchmf oqnetbs  
enq sghr otqonrd vhsq knv bnqd knrr nudq sgd q`mfd eqn l  
0 jGy sn 1/ jGy- Sgd /-0 l l sghbj IMDW hr `kqd`cx  
trdc hm sgd bnqdr ne l hbqn stqahmd fdmdq`snqr-

**2-1-2 Nsgdq dkdbsqhb`k `ookhb`shnmr**

Sgd bnmudmshnm`k l dbg`mhbk `mc gxcq`tkhb cqhud  
cduhbdr `qd btqqdmskx adhmf rtodqrddc ax dkdbsqn l`f,  
mdshb `bst`snqr+ `mc `r gxcq`tkhb ohohmf hr qdok`bdc ax  
bnoodq vqhmf+ btqqdms sq`mrenq l dqr 'BS( `qd mnv drrdm,  
sh`k hsd l r- Sgd btqqdms sq`mrenq l dqr l trs l d`rtqd CB  
btqqdms u`ktdr hmbktchmf ghfg eqdptdmbx bn l onmdmsr  
tmedq rdudqd sd l odq`stqd bnmchshnmr- Sgd IMDW hr `krn  
dwodbsdc sn cd l nmrsq`sd dwbdkkms oqnodqshdr hm bnqdr enq  
BS-

**2-2 Rt l l`qx**

@m hmbqd`rhmfkx chudqrd q`mfd ne dkdbsqhb `mc dkdb,  
sqnmhb o`qsr `qd mnv adhmf trdc hm k`qfd mt l adqr hm  
`tsn l nahkdr+ hm `ookhb`shnmr eqn l cqhud sq`hmr sn khfgs,  
mhmf `mc `tchn dptho l dmsr- @r `m hqnm bnqd l`sdqh`k enq  
ghfg eqdptdmbx cduhbdr+ IED Rsddk&Rt odq, Bnqd mns nmkx  
oqnuhcd r ntsrs`mchmf odqenq l`mbd hm drrdmsh`k l`fmdshb  
oqnodqshdr+ ats `krn g`r dwbdkkms oqnodqshdr hm sgd bg`q,

Si	l`rr \$ (
0.30.10.10.20.30.30.30.9	
JFE3/8K	Sh./-10
JFE328K	Sh./-18Ma./-33Ma./-25Ma./-4
JFE321KSL	Sh./-18
JFE325KS	Sh./-18
JFE318DW	
JFE, LGO	
JFE4 2/KML	0.51.10.51.61.8
JFE323KM1	
1/,4TRQ	@k.4-7+ K`+ Yq

qdpthqdc hm nqcdq sn cdrhfm bn lokdw l`mhenke rg`odr sn @s sgd kh l hsdce ro`bd ne sgd `tsn ancx- Hm qdronmrd sn sghr mddc+ IED Rsddk drs`akhrqdc `ghfg r,u`ktd sdbgmkn, nfx enq edqqshb rs`hmkdr r sddk `mc cdudknoc IED318DW vhsq `cq`l`shb`kkx h l oqnude r,u`ktd<sup>14-15</sup>. A`rdc nm sgd bn l onrshnm ne IED318DW+ sgd bn l o`mx `krm cdudknoc IED, LGO+ hm vghbg ghfg sd lodq`stqd rsqdmfsg hr etq, sgdq h l oqnude ax Ln `cchshnm `mc nosh l hy`shnm ne sgd Rh bnmsdms<sup>16-17</sup>. Sgdrd cdudknoc rsddk `qd adfhmmhmf sn ad `cnosdc ax b`q l `jdqr-

Sgdrd rsddk fq`cdr `qd rths`akd mns nmkx enq dwg`trs l`mhenker+ ats `krm enq nsgdq ghfg sd lodq`stqd o`qsr rtbg `r sgd eqnms ohod `mc bnmudqsdq b`rd-

**3-2 Rsddk enq B`s`kxshb Bnmudqsdq Rtarsq`sd**

Bnmudmshnm`kkx+ bdq`l hbr v dqd sgd l`hmrsqd`l l`sd, qh`k enq b`s`kxshb bnmudqsdq rtarsq`sd- Gnvdudq+ sn l dds

**3-1 Rsddk enq Dwg`trs L`mhenker**

Sgd dwg`trs l`mhenke bnkkdbsr ghfg sd lodq`stqd bn l , atrshnm f`r chrbg`qfde eqn l dmfhmd bxkhmedqr `mc kd`cr hs sn sgd eqnms ohod- Sgdqdenqd+ hm bn l o`qhrnm vhsq nsgdq o`qsr+ ghfgdq sd lodq`stqd oqnodqshdr `qd qdpthqdc- B`q l `jdqr `qd rsqnmfkk oqn l nshmf h l oqnude dwg`trs f`r otq@b`shnm odqenq l`mbd `mc etdk dbnmnlx+ vghbg b`m ad `bghdude deedbshudkx ax hmbqd`rhmf dmfhmd bn l atrshnm sd lodq`stqd `mc vdhfqs qdctbshnm- @ksqntfg b`rshmf g`ud bnmudmshnm`kkx addm trdc `r dwg`trs l`mhenker+ `f`hmrs sgd enqdfnhmf a`bjfqntmc+ b`q l `jdqr `qd oqn, fqdrhhdqx rtarshtshmf ghfg gd`s, qdrhrs`mbd+ sghm, f`tfd rs`hmkdr r sddk ohodr nq oqdr enq l de oqnetbsr hm ok`bd ne b`rs hqnm oqnetbsr<sup>13</sup>. **Ehftqd 11** rgnvr sgd qdk`shnm, rgho adsvddm sgd r,u`ktdr `mc sgd oqne rsqdr `s 7//âB enq sgd rs`hmkdr r sddk trdc `r `m dwg`trs l`mhenke- Sgd IED3/8K hr trdc hm knv sd lodq`stqd `ookhb`shnmr+ vghkd IED32/KML vhsq h l oqnude ghfg sd lodq`stqd rsqdmfsg nas`hmdc ax Ma `cchshnm hr trdc hm ghfg sd lodq`stqd `ookhb`shnmr- Hm l`mx b`rdr+ ghfg enq l`ahkhsx hr `krm











shud oqncbtbsr `mc sdbgmknfhdr hm IED Sdbgmhb`k Qdonqs Mn- 3- IED Rsdck vntkc khjd sn hmuhsdr `kk ne qd`cdqr sn qd`c sg`s hrrtd-

**Qdedqdmbr**

- 0( Sn l hs`+ J- ds `k- Gns qnkdc ghfg rsqdmfsg rsddk rgdds rsqdmfsg, dmdc ax m`mn rhyd oqdbhois` sdr,cdudkno l dms ne 67/ LO` fq`cd M@MN Ghsdm- L`sdqh` Iom- unk-31+ mn-0+ 1//2+ o-6/°61-
- 1( Etm`j`v`+ X- ds `k- Cdudkno l dms ne ghfg rsqdmfsg gns,qnkdc rsddk rgdds bnmrhrshmf ne edqhsd `mc m`mn, l dsdq,rhydc oqdbhoi, s` sdr- HRHI Hms- sn ad ot akhrgdc-
- 2( J`mdjn+ R- ds `k- SR33/ LO` fq`cd gns,qnkdc rgdds rsddk vhsq k`qfd b`o` ahkhsx ne `arnqadc dmdqfx `s ghfg rsq`hm q` sdr+ hmctbdc ax rsq`hm `fhmf g`qcdm` ahkhsx- J`v`r`jh Rsdck Fhgn- unk-21+ mn-0+ 1//+ o-56°57-
- 3( J`mdjn+ R- ds `k- @Cdudkno l dms ne gns,qnkdc rgdds rsddk vhsq dwbdkkms rsq`hm,`fd g`qcdm` ahkhsx 0,- Oqnb- ne 1//0 IR@D @mmt`k Bnmf- Mn-00,/0+ 1//0403/+ 1//0-
- 4( Ghq`l nsn+ I- ds `k- @Cdudkno l dms ne gns,qnkdc rgdds rsddk vhsq dwbdkkms rsq`hm,`fd g`qcdm` ahkhsx 1,- Oqnb- ne 1//0 IR@D @mmt`k Bnmf- Mn-00,/1+ 1//04027/+ 1//0-
- 5( Jhs`mn+ E- ds `k- Mdv sxod ne HE,ghfg rsqdmfsg rsddk vhsq rtod, qhnq `msh,rdbnmc`qx vngj d l aqhsdk l dms- Sq`mr- HRHI- unk-30+ mn-00+ 1//0+ o-03/1-
- 6( Ngr`v`+ J- ds `k- SR48/°87/ LO` fq`cd knv,b`qanm dpthu`, kdms sxod f`ku`mmd`kdc rgdds rsddk vhsq rtodqhnq rons,vdkc`ahk, hsx- J`v`r`jh Rsdck Fhgn- unk-23+ mn-1+ 1//1+ o-48°54-
- 7( R`hsng+ S- ds `k- Vdkchmf Sdbgmknf- unk-2/+ mn-2+ 0871+ o-23° 27-
- 8( M`f`s`jh+ X- ds `k- Cdudkno l dms ne tksq` ghfg rsqdmfsg rsddk rgdds vhsq sdmrhd rsqdmfsg ne 0 26/ `mc 0 45/ LO`- Atkk- ne sgd Iom- Hms- ne Lds`kr- unk-21+ mn-3+ 0882+ o-127°13/-
- 0/( M`j`l tq`+ M- ds `k- Deedbsr ne lhbqnrstbstqdr nm rsqdsbg, `mfd` ahkhsx ne tksq` ghfg rsqdmfsgdmdc bnkc,qnkdc rsddk rgdds- B@LO,HRHI- unk-02+ 1//+ o-280°283-
- 00( G`rdf`v`+ J- ds `k- @Cdudkno l dms ne 87/ M. l l`l` bk`rr tksq` ghfg rsqdmfsg rsddk rths`akd enq l dbg`mhb`k inhmf,- @SSBD 1//0 Oqnb- unk-3+ 1//0+ o-064°070-
- 01( Etihs`+ S- ds `k- Cdudkno l dms ne mnm,nqidmsdc bnkc,qnkdc ghfg, b`qanm rsddk rgdds- L`sdqh` Iom- unk-3/+ mn-2+ 1//0+ o-172° 174-
- 02( Etihs`+ S- ds `k- @Sgd `oohb`shnm ne rsddk rgdds `mc cdudkno, l dms ne ghfg,b`qanm rsddk rgdds enq onvdq sq`mr l hrrhnm,- Oqnb- ne 1//0 IR@D L`sdqh`k Enqt l - 1//2+ o-12°17-
- 03( R`j`jtq`h+ L-: Hm`f`jh+ I-: X`l`r`jh+ L-: Sn l nm`f`+ M-: Jnih l`+ L- L`sdqh` Iom- unk-3/+ mn-1+ 1//1+ o-08/-
- 04( M`j`ih l`+ R-: J`s`fhq+ S-: J`sn+ B- J`v`r`jh Rsdck Fhgn-

- unk-23+ mn-1+ 1//1+ o-65°7/-
- 05( J`tqnj`v`+ R-: X`l`l nsn+ J-: Hbgc`+ S- ds `k- Sdsrt,sn,G`f`m`- unk-61+ 0875+ o-0220-
- 06( L`srct`+ G-: H`l`nj`v`+ S-: R`jtq`h+ L-: Nmn+ L-: Hm`f`jh+ I- B`l o,HRHI- unk-01+ 0888+ o-0234-
- 07( Ghf`h+ J-: Jxnmn+ J-: J`sn+ B- J`v`r`jh Rsdck Fhgn- unk-23+ mn-1+ 1//1+ o-60°64-
- 08( X`l`ftbgh+ G-: Ghr`l`sr+ X- Sdsrt,sn,G`f`m`- unk-5/+ 0863+ o-85-
- 1/( Nnh+ S- ds `k- B@LO,HRHI- unk-4+ 0881+ o-0625-
- 10( Jnt l tq`+ G-: J`sn+ B-: Lnbghytjh+ J-: Lnqhsn+ M- Sdsrt,sn, G`f`m`- unk-70+ mn-7+ 0884+ o-32-
- 11( Tihqn+ S-: Jhs`y`v`+ L-: Snf`rgh+ E-: Xnrghnj`+ J- B@LO,HRHI- unk-3+ 0880+ o-0724-
- 12( X`y`v`+ X-: Tihqn+ S-: Snbghg`q`+ L-: R`sng+ R- Oqnb- ne 05sq Anrdh Anrgnjt Fhihsxt G`ooxn S`hj`h- 0885+ o-006-
- 13( Gnm l`+ L- I- ne Rnb- ne @tsn l nshud Dmfhmdqr ne Iom- unk-32+ mn-8+ 0878+ o-44-
- 14( Lhx`y`jh+ @-: Ghq`r`v`+ I-: Etqtjhlh+ N- I- ne Rnb- ne @tsn, l nshud Dmfhmdqr ne Iom- unk-44+ mn-0/+ 1//0+ o-14-
- 15( Lhx`y`jh+ @-: Ftmiht+ L-: A`a`+ X- J`v`r`jh Rsdck Fhgn- unk-22+ mn-1+ 1//0+ o-61-
- 16( Lhx`y`jh+ @-: Ghq`r`v`+ I-: Etqtjhlh+ N- J`v`r`jh Rsdck Fhgn- unk-23+ mn-1+ 1//1+ o-70-
- 17( Lhx`y`jh+ @-: Ghq`r`v`+ I-: Etqtjhlh+ N- L`sdqh`- unk-31+ mn-1+ 1//2+ ? -: Ghq`r` : (Fh