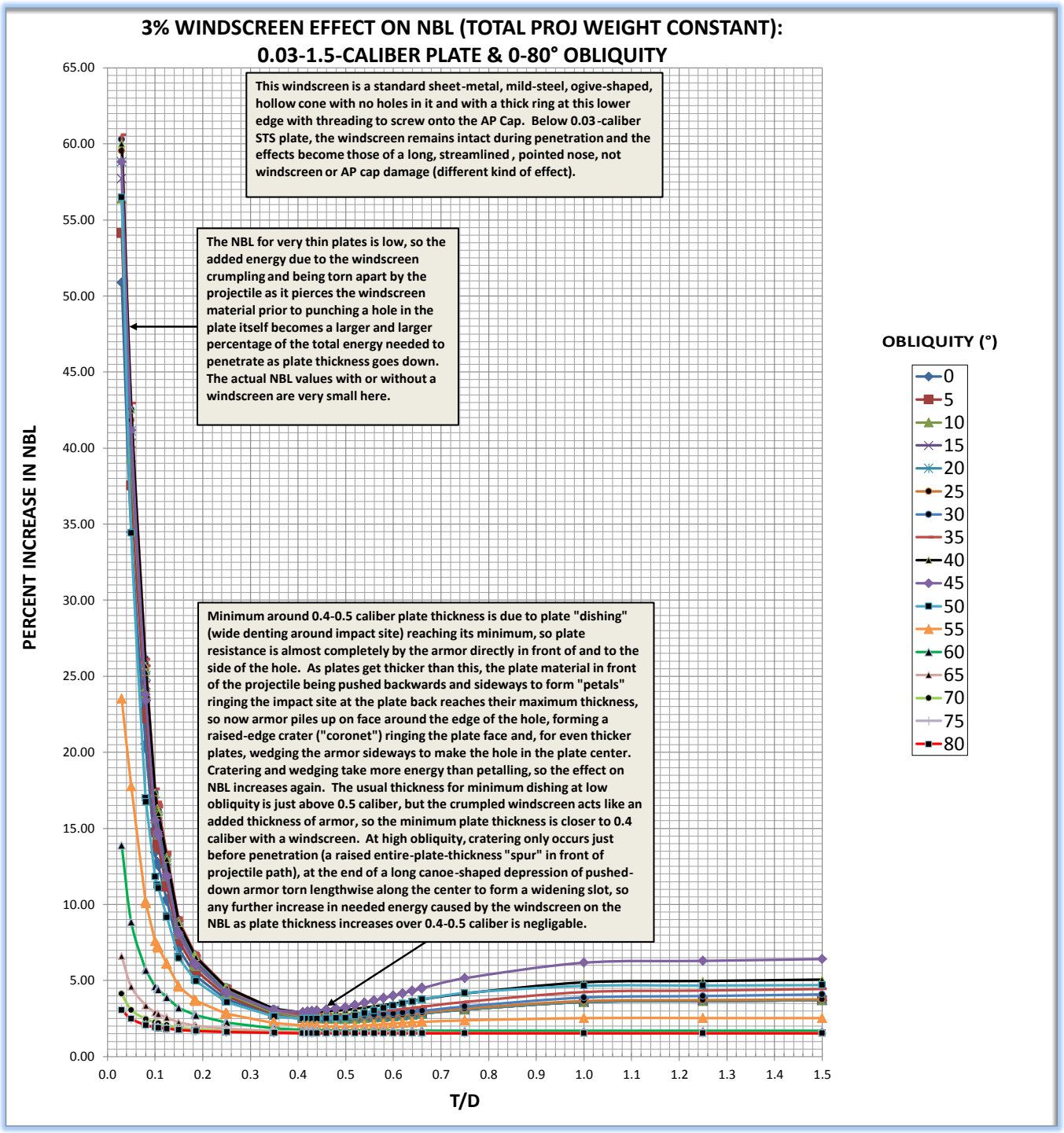
3% WINDSCREEN EFFECT ON NBL (TOTAL PROJ WEIGHT CONSTANT):
0.03-1.5-CALIBER PLATE & 0-80° OBLIQUITY
This windscreen is a standard sheet-metal, mild-steel, ogive-shaped, hollow cone with no holes in it and with a thick ring at this lower edge with threading to screw onto the AP Cap. Below 0.03-caliber STS plate, the windscreen remains intact during penetration and the effects become those of a long, streamlined , pointed nose, not windscreen or AP cap damage (different kind of effect).
The NBL for very thin plates is low, so the added energy due to the windscreen crumpling and being torn apart by the projectile as it pierces the windscreen material prior to punching a hole in the plate itself becomes a larger and larger percentage of the total energy needed to penetrate as plate thickness goes down. The actual NBL values with or without a windscreen are very small here.
Minimum around 0.4-0.5 caliber plate thickness is due to plate "dishing" (wide denting around impact site) reaching its minimum, so plate resistance is almost completely by the armor directly in front of and to the side of the hole. As plates get thicker than this, the plate material in front of the projectile being pushed backwards and sideways to form "petals" ringing the impact site at the plate back reaches their maximum thickness, so now armor piles up on face around the edge of the hole, forming a raised-edge crater ("coronet") ringing the plate face and, for even thicker plates, wedging the armor sideways to make the hole in the plate center. Cratering and wedging take more energy than petalling, so the effect on NBL increases again. The usual thickness for minimum dishing at low obliquity is just above 0.5 caliber, but the crumpled windscreen acts like an added thickness of armor, so the minimum plate thickness is closer to 0.4 caliber with a windscreen. At high obliquity, cratering only occurs just before penetration (a raised entire-plate-thickness "spur" in front of projectile path), at the end of a long canoe-shaped depression of pushed-down armor torn lengthwise along the center to form a widening slot, so any further increase in needed energy caused by the windscreen on the NBL as plate thickness increases over 0.4-0.5 caliber is negligable.
PERCENT INCREASE IN NBL
65.00
60.00
55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
T/D
OBLIQUITY (°)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80