

VID BOI/VGRA Precision Matrix – Run Order

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The Matrix Design – Step 1

Stand 1	Stand 2	Stand 3	Stand 4
A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P
Q	R	S	T
X	X	X	X
A	A	C	C
D	B	B	D

- Two independent labs / 2 stands each
- Oils A-T & X are the 21 Oils from the BOI/VGRA Test Oil Matrix
- Oil X part of the BOI-VGRA matrix and is run on all 4 stands
- **Oils A-D & X will be pre-selected to represent all 5 viscosity grades**
- Run order to be established
- Provides Data for:
 - Establishing BOI/VGRA, within stand & stand to stand comparisons, Lab to Lab comparisons

The Matrix Design – Step 2

Stand 1	Stand 2	Stand 3	Stand 4
R1	R2	R1	R2
R2	R1	R2	R1
R3	R3	R3	R3

- ▲ To enhance the statistics, 3 of the 5 oils A, B, C, D, & X will be tested 4 more times. This gives a minimum of 7 runs on the 3 selected oils.
- ▲ The 3 oils are being called R1, R2 and R3 for Step 2.
 - ▲ R1, R2 & R3 will represent 0W, 5W, & 10W-30 in order to give better discrimination for VGRA.
 - ▲ One or more of these 3 oils will likely be selected as Sequence VID calibration/reference oil(s).
- ▲ These additional runs are required to establish future reference oil identity, reference oil means, & reference oil standard deviations. Run order to be established.
- ▲ Additional reference oil data will come from non-matrix lab/stand calibration runs. (Supplemental data from additional labs & stands deemed ready by ASTM will be included in development of the precision statement unless identified and confirmed as a statistical outlier by the industry statistician team, assuming the last test of part of the data submission has started by the end of step 2.)

Oil Mapping

ORIG. MATRIX DESIGNATION	Technology 1	Technology 2	Technology 3
ILSAC Technology Supplier Choice	1	3	2
ILSAC Level	GF-4	GF-5	GF-4
0W-20		IIIA=K, IIIB=X	IIIA=Q, IIIB=L
5W-20	IIA=A, IIIA=E	IIIA=M	
0W-30	IIIA=B, IIIB=F		IIIA=R
5W-30	IIA=G, IIB=H, IIIA=I, IIIB=J	IIA=N, IIB=C, IIIA=O	
10W-30		IIIA=P	IIA=S, IIB=D, IIIA=T

Original Step 1 Run Order

OIL	VISGRADE	BO	ILSAC TECHNOLOGY	STAND	LAB
A	5w20	IIA	1	1	IAR
E	5w20	IIIA	1	1	IAR
I	5w30	IIIA	1	1	IAR
M	5w20	IIIA	3	1	IAR
Q	0w20	IIIA	2	1	IAR
X	0w20	IIIB	3	1	IAR
A	5w20	IIA	1	1	IAR
D	10w30	IIB	2	1	IAR
B	0w30	IIIA	1	2	IAR
F	0w30	IIIB	1	2	IAR
J	5w30	IIIB	1	2	IAR
N	5w30	IIA	3	2	IAR
R	0w30	IIIA	2	2	IAR
X	0w20	IIIB	3	2	IAR
A	5w20	IIA	1	2	IAR
B	0w30	IIIA	1	2	IAR
C	5w30	IIB	3	3	SW
G	5w30	IIA	1	3	SW
K	0w20	IIIA	3	3	SW
O	5w30	IIIA	3	3	SW
S	10w30	IIA	2	3	SW
X	0w20	IIIB	3	3	SW
C	5w30	IIB	3	3	SW
B	0w30	IIIA	1	3	SW
D	10w30	IIB	2	4	SW
H	5w30	IIB	1	4	SW
L	0w20	IIIB	2	4	SW
P	10w30	IIIA	3	4	SW
T	10w30	IIIA	2	4	SW
X	0w20	IIIB	3	4	SW
C	5w30	IIB	3	4	SW
D	10w30	IIB	2	4	SW

COUNT per Variable	Stand	1	2	3	4	Sands 1,2	Sands 3,4	Sands 1,3	Sands 2,4
						IAR	SW	IAR	SW
Base Oil	IIA	2	2	2		4	2	4	2
	IIB	1		2	4	1	6	3	4
	IIIA	4	3	3	2	7	5	7	5
	IIIB	1	3	1	2	4	3	2	5
VisGrade	0w20	2	1	2	2	3	4	4	3
	0w80		4	1		4	1	1	4
	10w80	1		1	4	1	5	2	4
	5w20	4	1			5	0	4	1
	5w80	1	2	4	2	3	6	5	4
ILSAC Technology	1	4	5	2	1	9	3	6	6
	2	2	1	1	4	3	5	3	5
	3	2	2	5	3	4	8	7	5

Proposal 1: Step 1 Run Order

OIL	VISGRADE	BO	ILSAC TECHNOLOGY	STAND	LAB
A	5w20	IIA	1	1	IAR
O	5w30	IIIA	3	1	IAR
Q	0w20	IIIA	2	1	IAR
N	5w30	IIA	3	1	IAR
M	5w20	IIIA	3	1	IAR
X	0w20	IIIB	3	1	IAR
A	5w20	IIA	1	1	IAR
D	10w30	IIB	2	1	IAR
B	0w30	IIIA	1	2	IAR
T	10w30	IIIA	2	2	IAR
H	5w30	IIB	1	2	IAR
L	0w20	IIIB	2	2	IAR
P	10w30	IIIA	3	2	IAR
X	0w20	IIIB	3	2	IAR
A	5w20	IIA	1	2	IAR
B	0w30	IIIA	1	2	IAR
C	5w30	IIB	3	3	SW
J	5w30	IIIB	1	3	SW
S	10w30	IIA	2	3	SW
E	5w20	IIIA	1	3	SW
I	5w30	IIIA	1	3	SW
X	0w20	IIIB	3	3	SW
C	5w30	IIB	3	3	SW
B	0w30	IIIA	1	3	SW
D	10w30	IIB	2	4	SW
R	0w30	IIIA	2	4	SW
G	5w30	IIA	1	4	SW
F	0w30	IIIB	1	4	SW
K	0w20	IIIA	3	4	SW
X	0w20	IIIB	3	4	SW
C	5w30	IIB	3	4	SW
D	10w30	IIB	2	4	SW

COUNT per Variable	Stand	1	2	3	4	Stands 1,2	Stands 3,4
						IAR	SW
Base Oil	IIA	3	1	1	1	4	2
	IIB	1	1	2	3	2	5
	IIIA	3	4	3	2	7	5
	IIIB	1	2	2	2	3	4
VisGrade	0w20	2	2	1	2	4	3
	0w30		2	1	2	2	3
	10w30	1	2	1	2	3	3
	5w20	3	1	1		4	1
	5w30	2	1	4	2	3	6
ILSAC Technology	1	2	4	4	2	6	6
	2	2	2	1	3	4	4
	3	4	2	3	3	6	6

More balanced in terms of Technologies, Visgrades and Base Oils tested in each Stand and Lab.

Proposal 2: Step 1 Run Order

RUN	OIL	VISGRADE	BO	ILSAC TECHNOLOGY	STAND	LAB
1	A	5w20	IIA	1	1	IAR
2	R	0w30	IIIA	2	1	IAR
3	J	5w30	IIIB	1	1	IAR
4	K	0w20	IIIA	3	1	IAR
5	P	10w30	IIIA	3	1	IAR
6	C	5w30	IIB	3	1	IAR
7	A	5w20	IIA	1	1	IAR
8	D	10w30	IIIB	2	1	IAR
1	B	0w30	IIIA	1	2	IAR
2	N	5w30	IIA	3	2	IAR
3	T	10w30	IIIA	2	2	IAR
4	L	0w20	IIIB	2	2	IAR
5	O	5w30	IIIA	3	2	IAR
6	C	5w30	IIB	3	2	IAR
7	A	5w20	IIA	1	2	IAR
8	B	0w30	IIIA	1	2	IAR
1	X	0w20	IIIB	3	3	SW
2	I	5w30	IIIA	1	3	SW
3	S	10w30	IIA	2	3	SW
4	E	5w20	IIIA	1	3	SW
5	Q	0w20	IIIA	2	3	SW
6	C	5w30	IIB	3	3	SW
7	X	0w20	IIIB	3	3	SW
8	B	0w30	IIIA	1	3	SW
1	D	10w30	IIIB	2	4	SW
2	G	5w30	IIA	1	4	SW
3	F	0w30	IIIB	1	4	SW
4	H	5w30	IIB	1	4	SW
5	M	5w20	IIIA	3	4	SW
6	C	5w30	IIB	3	4	SW
7	X	0w20	IIIB	3	4	SW
8	D	10w30	IIIB	2	4	SW

COUNT per Variable	Stand	1	2	3	4	Stands 1,2	Stands 3,4
						IAR	SW
Base Oil	IIA	2	2	1	1	4	2
	IIIB	2	1	1	4	3	5
	IIIA	3	4	4	1	7	5
	IIB	1	1	2	2	2	4
VisGrade	0w20	1	1	3	1	2	4
	0w30	1	2	1	1	3	2
	10w30	2	1	1	2	3	3
	5w20	2	1	1	1	3	2
	5w30	2	3	2	3	5	5
ILSAC Technology	1	3	3	3	3	6	6
	2	2	2	2	2	4	4
	3	3	3	3	3	6	6

-More balanced in terms of Technologies, Viscosity Grades and Base Oils tested in each Stand and Lab.

-All stands see all Technologies, Viscosity Grades and Base Oils