TITAN® 3000
Matrix Blend Series

BULK SYSTEMS®

Description

TITAN 3000 matrix is a specialised explosive precursor providing superior energy and sensitivity for small to medium diameter open cut hard rock mining applications.

TITAN 3000 Heavy ANFO blends contain TITAN 3000 emulsion and ANFO manufactured from porous ammonium nitrate prill (DETAPRILL®). The blends provide minimal water resistance and are suitable for use in dry and dewatered blastholes.

TITAN 3000 Gassed Blends are emulsion rich, water resistant mixtures of TITAN 3000 emulsion and ANFO manufactured from porous ammonium nitrate prill. Gassed blends are pumped from an MPU through a loading hose to the bottom of wet blastholes.

Advantages

TITAN 3000 matrix may be used blended with ANFO as heavy ANFO, gas sensitised blends or as a straight gassed emulsion matrix.

The addition of ANFO provides the ability to vary the bulk strength and gas volume generated during detonation, which means you can match performance to desired blast requirements.

As the emulsion content of the blend increases, the water resistance of the product increases significantly.

Properties

TITAN 3000 Blend	3020	3030	3040	3050	3050G	3060G	3070G	3000G
Emulsion %	20	30	40	50	50	60	70	100
Cup Density (avg g/cm³) [1,2]	0.98	1.10	1.25	1.31	1.15	1.15	1.15	1.15
Min. Diameter (mm)	102	102	127	200	102	89	76	76
Energy (MJ/kg) [3]	3.5	3.4	3.3	3.2	3.2	3.1	3.0	2.7
VoD (m/sec) [4]	3400 – 5800							
RWS [5]	95	92	89	86	86	84	81	73
RBS [5]	108	123	136	139	121	118	114	102
CO₂ Emissions (tCO2e/t) [6]	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.14

NOTES:

1. For gassed products this is the nominal open cup density. For design purposes refer to the Dyno Nobel Gassing Tables for average in-hole densities.

2. Average in-hole density may be higher under real loading conditions.

3. All Dyno Nobel energy and gas values are calculated using a proprietary Dyno Nobel thermodynamic code – PRODET. Other programs may give different values.

4. The values stated are typical of those recorded for the product in various hole diameters, densities and ground. The Velocity of Detonation (VoD) is dependent upon many factors, including: the initiation system used, the product density, blasthole diameter and ground confinement.

5. For calculation of Relative Weight Strength (RWS) and Relative Bulk Strength (RBS); ANFO – density 0.82g/cm³ and an energy of 3.7MJ/kg was used.

6. CO_2 Emissions calculated as tonne of CO_2 equivalents per tonne of explosive. As per National Greenhouse Accounts; July 2012; Department of Climate Change and Energy Efficiency

Hazardous Shipping Description

Explosive, Blasting, Type E, 1.1D, UN 0241

EXPLOSIVES 1.1D 1

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TITAN® 3000
Matrix Blend Series

Application Recommendations

Priming: TITAN 3000 matrix blends are booster sensitive and require a minimum 400g cast booster when used in blastholes with diameters of 102mm or greater. For diameters less than 102mm, 150g cast boosters are recommended. Additional boosters should be used where there is a risk of column disruption. Contact your Dyno Nobel representative if you intend using detonating cord down lines.

Sensitisation: TITAN 3000 matrix blends containing 60% or more emulsion must be sensitised as the product is delivered to the blasthole. Incorrectly sensitised gassed blends may lead to poor explosive performance and the formation of excessive post blast fume (NOx).

TITAN 3050 Blends: Although not necessary in hole depths less than 11m, it is recommended that all 50% blends are sensitised. Over-sensitisation may lead to product collapse and formation of NOx. For depths exceeding 60m contact your Dyno Nobel representative.

Sleep Time: TITAN 3000 matrix blends have a maximum sleep time of 21 days under ideal conditions. Sleep time is influenced by factors including the ground conditions and initiating system.

Reactive Ground Conditions: Where reactive ground conditions exist please contact your Dyno Nobel representative.

Safe handling, transportation and storage

First Aid – You can find detailed first aid information on the relevant Dyno Nobel Safety Data Sheet. Refer to www.dynonobel.com for more information if required.

Safety - All explosives and explosive precursors are classified as dangerous goods and can cause personal injury and damage to property if used incorrectly.

Transportation and Storage - All explosives must be handled, transported and stored in accordance with all relevant regulations. Stock should be rotated such that older product is used first.

Product Selection Guide

TITAN 3000 matrix blends may be slept for a maximum of 21 days. Where there is a risk of post blast fume the sleep times should be reduced based on a blast specific risk assessment. For assistance please contact your Dyno Nobel representative.

	Emulsion Content % w/w		10	20	30	40	50	60	70	80	90	100
Blasthole Condition	Dry[1]	Use										
	Delivery Method[2]		A	A	A	A	A	A/P	A/P	A/P	A/P	A/P
	Dewatered [3]	Use	NO			YES						
	Delivery Method					A	A	A/P	A/P	A/P	A/P	A/P
	Wet [4]	Use	NO					YES				
	Delivery Method							P	P	P	P	P
	Dynamic [5]	Use	NO					YES				
	Delivery Method								P	P	P	P
Sensitisation Required			NO				Note 6	YES [7]				

NOTES:

1. Dry hole is defined as a blasthole containing no water including no wet walls. **2.** A – Auger, P – Pumped.

3. A dewatered hole is defined as not recharging with water. **4.** A wet hole is defined as a blasthole containing static water or has a recharge rate of <1m in 30 minutes. **5.** Dynamic water is defined as a recharge rate of >1m in 30 minutes. If the level of dynamic water is such that product damage is suspected or observed, the suggested recommended sleep time should be reduced. **6.** This product has reduced sensitivity and sensitisation is recommended for all holes. Please consult your Dyno Nobel representative to check which delivery options are available at your location. **7.** The TITAN Matrix Blend Gassing Table should be used to determine the appropriate open cup density for the hole depth.

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Version 2 November 2017

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TITAN® Matrix Blend Gassing Table
TITAN 3050 and TITAN 3050G

Technical Information

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USE OF TABLE

1. The left hand column in this table (Depth) indicates the height of the product column under **dry or dewatered hole conditions.**

2. This table applies for TITAN 3000 Matrix blends with an emulsion content of **50% w/w ONLY, i.e. T3050G and T3050.**

3. Emulsion explosives behave as liquids when subjected to the gravitational stress in a vertical blasthole, and a pressure gradient in the explosive will be established. The higher the explosive column in the blasthole, the higher the internal pressure at the bottom of the column, and the larger the quantity of gassing chemicals that need to be added to provide sensitisation.

4. The open cup density is a measure of the level of sensitisation of the product. It is necessary to choose an open cup density to ensure that the density of the explosive at the bottom of the blasthole is less than the critical density. Inappropriate sensitisation may lead to poor detonation, fragmentation and generation of excessive post blast fume.

   Blacked out areas indicate where critical density is reached or exceeded.

5. For example, **to determine the required open cup density for an explosive** column of 40m, find 40m in the Depth column. Moving to the right, read off the density in the unshaded column under the required open cup density (a **TOE** density of 1.40g/cm³ in the 1.10g/cm³ open cup density column). This indicates that sufficient gassing chemicals should be added to the gassed explosive blend during delivery so that an open cup density of 1.10g/cm³ is achieved.

   This level of gassing chemicals will ensure that the density at the bottom of the column will be below the critical density, and the column will detonate at full order upon initiation.

6. For example, **to determine the approximate average in-hole density** in a column of 40m find 40m in the Depth column. Moving to the right, read off the density in the shaded column (an **AVG. IN-HOLE** density of 1.31g/cm³ in the 1.10 g/cm³ open cup density column).

   For depths that are not listed, Dyno Nobel recommends rounding up to the next highest depth e.g. a 25m deep hole should be rounded to 26m and corresponding densities applied.

7. Blast design should be based on average in-hole density whilst blasthole loading requires the MPU operator to achieve the associated open cup density.

8. The gassing reaction takes 30-40 minutes to achieve the desired open cup density at 20°C. It is necessary to allow at least this time to elapse following completion of loading and before stemming the charged blasthole. A longer period should be allowed at lower temperatures.

9. The density values shown were calculated using a laboratory mathematical model that was validated using a specially designed fit-for-purpose pressure-volume apparatus.

Depth (m)	TITAN 3050G Density g/cm³						Ungassed	
	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe
Open Cup	1.10	1.10	1.15	1.15	1.20	1.20	1.31	1.31
1	1.12	1.13	1.17	1.18	1.21	1.23	1.33	1.34
2	1.13	1.16	1.18	1.21	1.23	1.25	1.33	1.35
3	1.15	1.19	1.19	1.23	1.24	1.27	1.34	1.36
4	1.16	1.21	1.20	1.25	1.25	1.28	1.35	1.37
5	1.17	1.23	1.21	1.26	1.25	1.30	1.35	1.37
6	1.18	1.25	1.22	1.28	1.26	1.31	1.36	1.38
7	1.19	1.26	1.23	1.29	1.27	1.32	1.36	1.39
8	1.20	1.27	1.24	1.30	1.28	1.33	1.36	1.39
9	1.21	1.28	1.25	1.31	1.28	1.34	1.37	1.40
10	1.22	1.29	1.25	1.32	1.29	1.34	1.37	1.40
11	1.22	1.30	1.26	1.33	1.29	1.35	1.37	1.40
12	1.23	1.31	1.26	1.33	1.30	1.36		
13	1.24	1.32	1.27	1.34	1.30	1.36		
14	1.24	1.32	1.27	1.35	1.31	1.37		
15	1.25	1.33	1.28	1.35	1.31	1.37		
16	1.25	1.34	1.28	1.36	1.31	1.37		
17	1.26	1.34	1.29	1.36	1.32	1.38		
18	1.26	1.35	1.29	1.36	1.32	1.38		
19	1.27	1.35	1.30	1.37	1.32	1.38		
20	1.27	1.36	1.30	1.37	1.33	1.39		
22	1.28	1.36	1.30	1.38	1.33	1.39		
24	1.28	1.37	1.31	1.38	1.33	1.40		
26	1.28	1.37	1.31	1.39	1.34	1.40		
28	1.29	1.38	1.31	1.39	1.34	1.40		
30	1.29	1.38	1.32	1.40				
32	1.29	1.39	1.32	1.40				
34	1.30	1.39	1.32	1.40				
36	1.30	1.39	1.33	1.40				
38	1.30	1.40						
40	1.31	1.40						
45	1.31	1.40						
50	1.31	1.40						
55	1.32	1.40						
60	1.32	1.40						

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TITAN® Matrix Blend Gassing Table
TITAN 3060G

Technical Information

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USE OF TABLE

1. The left hand column in this table (Depth) indicates the height of the product column under **dry hole conditions.** In **wet hole** conditions, the value selected from the left hand column must be the sum of the product column and the height of the water column in the hole. If the length of the product and water column exceeds the depth of the hole then the value selected from the left hand column must be the hole depth.

2. This table applies for TITAN 3000 Matrix blends with an emulsion content of **60% w/w ONLY, i.e. T3060G.**

3. Emulsion explosives behave as liquids when subjected to the gravitational stress in a vertical blasthole, and a pressure gradient in the explosive will be established. The higher the explosive column in the blasthole, the higher the internal pressure at the bottom of the column, and the larger the quantity of gassing chemicals that need to be added to provide sensitisation.

4. The open cup density is a measure of the level of sensitisation of the product. It is necessary to choose an open cup density to ensure that the density of the explosive at the bottom of the blasthole is less than the critical density. Inappropriate sensitisation may lead to poor detonation, fragmentation and generation of excessive post blast fume.

   Blacked out areas indicate where critical density is reached or exceeded.

5. For example, t**o determine the required open cup density for an explosive** column of 40m, find 40m in the Depth column. Moving to the right, read off the density in the unshaded column under the required open cup density (a **TOE** density of 1.38g/cm³ in the 1.10 g/cm³ open cup density column). This indicates that sufficient gassing chemicals should be added to the gassed explosive blend during delivery so that an open cup density of 1.10g/cm³ is achieved.

   This level of gassing chemicals will ensure that the density at the bottom of the column will be below the critical density, and the column will detonate at full order upon initiation.

6. For example, **to determine the approximate average in-hole density** in a column of 40m find 40m in the Depth column. Moving to the right, read off the density in the shaded column (an **AVG. IN-HOLE** density of 1.30g/cm³ in the 1.10 g/cm³ open cup density column).

   For depths that are not listed, Dyno Nobel recommends rounding up to the next highest depth e.g. a 25m deep hole should be rounded to 26m and corresponding densities applied.

7. Blast design should be based on average in-hole density whilst blasthole loading requires the MPU operator to achieve the associated open cup density.

8. The gassing reaction takes 30-40 minutes to achieve the desired open cup density at 20°C. It is necessary to allow at least this time to elapse following completion of loading and before stemming the charged blasthole. A longer period should be allowed at lower temperatures.

9. The density values shown were calculated using a laboratory mathematical model that was validated using a specially designed fit-for-purpose pressure-volume apparatus.

Depth (m)	TITAN 3060G Density g/cm³													
	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe
Open Cup	0.90	0.90	0.95	0.95	1.00	1.00	1.05	1.05	1.10	1.10	1.15	1.15	1.20	1.20
1	0.92	0.94	0.97	0.99	1.02	1.04	1.07	1.09	1.12	1.13	1.16	1.18	1.21	1.22
2	0.94	0.98	0.99	1.03	1.04	1.07	1.08	1.12	1.13	1.16	1.18	1.20	1.22	1.25
3	0.96	1.02	1.01	1.06	1.05	1.10	1.10	1.14	1.14	1.18	1.19	1.22	1.23	1.26
4	0.98	1.05	1.002	1.09	1.07	1.13	1.11	1.17	1.16	1.20	1.20	1.24	1.24	1.28
5	0.99	1.07	1.04	1.11	1.08	1.15	1.12	1.19	1.17	1.22	1.21	1.26	1.25	1.29
6	1.01	1.10	1.05	1.13	1.09	1.17	1.14	1.20	1.18	1.24	1.22	1.27	1.26	1.30
7	1.02	1.12	1.06	1.15	1.11	1.19	1.15	1.22	1.19	1.25	1.23	1.28	1.26	1.31
8	1.04	1.14	1.08	1.17	1.12	1.20	1.16	1.23	1.19	1.26	1.23	1.29	1.27	1.32
9	1.05	1.16	1.09	1.19	1.13	1.22	1.17	1.25	1.20	1.27	1.24	1.30	1.28	1.33
10	1.06	1.17	1.10	1.20	1.14	1.23	1.17	1.26	1.21	1.28	1.25	1.31	1.28	1.33
11	1.07	1.19	1.11	1.21	1.14	1.24	1.18	1.27	1.22	1.29	1.25	1.32	1.29	1.34
12	1.08	1.20	1.12	1.23	1.15	1.25	1.19	1.28	1.22	1.30	1.26	1.32	1.29	1.34
13	1.09	1.21	1.13	1.24	1.16	1.26	1.20	1.28	1.23	1.31	1.26	1.33	1.29	1.35
14	1.10	1.22	1.13	1.25	1.17	1.27	1.20	1.29	1.23	1.31	1.27	1.33	1.30	1.35
15	1.11	1.23	1.14	1.25	1.17	1.28	1.21	1.30	1.24	1.32	1.27	1.34	1.30	1.36
16	1.11	1.24	1.15	1.26	1.18	1.28	1.21	1.30	1.24	1.32	1.28	1.34	1.31	1.36
17	1.12	1.25	1.15	1.27	1.19	1.29	1.22	1.31	1.25	1.33	1.28	1.35	1.31	1.36
18	1.13	1.26	1.16	1.28	1.19	1.30	1.22	1.31	1.25	1.33	1.28	1.35	1.31	1.37
19	1.14	1.26	1.17	1.28	1.20	1.30	1.23	1.32	1.26	1.34	1.29	1.35	1.31	1.37
20	1.14	1.27	1.17	1.29	1.20	1.31	1.23	1.32	1.26	1.34	1.29	1.36	1.32	1.37
22	1.15	1.28	1.18	1.30	1.21	1.32	1.24	1.33	1.27	1.35	1.29	1.36	1.32	1.38
24	1.15	1.29	1.18	1.31	1.21	1.32	1.24	1.34	1.27	1.35	1.30	1.37	1.32	1.38
26	1.16	1.30	1.19	1.32	1.22	1.33	1.25	1.35	1.27	1.36	1.30	1.37	1.32	1.38
28	1.17	1.31	1.20	1.32	1.22	1.34	1.25	1.35	1.28	1.36	1.30	1.38	1.33	1.39
30	1.17	1.32	1.20	1.33	1.23	1.34	1.25	1.36	1.28	1.37	1.31	1.38	1.33	1.39
32	1.18	1.32	1.21	1.34	1.23	1.35	1.26	1.36	1.28	1.37	1.31	1.39	1.33	1.39
34	1.18	1.33	1.21	1.34	1.24	1.35	1.26	1.36	1.29	1.37	1.31	1.39		
36	1.19	1.34	1.22	1.35	1.24	1.36	1.27	1.37	1.29	1.38	1.31	1.39		
38	1.19	1.34	1.22	1.35	1.24	1.36	1.27	1.37	1.29	1.38	1.32	1.39		
40	1.20	1.35	1.22	1.36	1.25	1.36	1.27	1.37	1.30	1.38	1.32	1.39		
45	1.20	1.35	1.23	1.36	1.25	1.37	1.28	1.38	1.30	1.38	1.32	1.39		
50	1.21	1.35	1.23	1.36	1.26	1.37	1.28	1.38	1.30	1.39	1.32	1.39		
55	1.21	1.35	1.24	1.36	1.26	1.37	1.28	1.38	1.30	1.39	1.33	1.39		
60	1.22	1.35	1.24	1.36	1.26	1.37	1.28	1.38	1.31	1.39	1.33	1.39		

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TITAN® Matrix Blend Gassing Table
TITAN 3070G

Technical Information

BULK SYSTEMS®

USE OF TABLE

1. The left hand column in this table (Depth) indicates the height of the product column under **dry hole conditions.** In **wet hole** conditions, the value selected from the left hand column must be the sum of the product column plus the height of the water column in the hole. If the length of the product and water column exceeds the depth of the hole then the value selected from the left hand column must be the hole depth.

2. This table applies for TITAN 3000 Matrix blends with an emulsion content of **70% w/w ONLY, i.e. T3070G.**

3. Emulsion explosives behave as liquids when subjected to the gravitational stress in a vertical blasthole, and a pressure gradient in the explosive will be established. The higher the explosive column in the blasthole, the higher the internal pressure at the bottom of the column, and the larger the quantity of gassing chemicals that need to be added to provide sensitisation.

4. The open cup density is a measure of the level of sensitisation of the product. It is necessary to choose an open cup density to ensure that the density of the explosive at the bottom of the blasthole is less than the critical density. Inappropriate sensitisation may lead to poor detonation, fragmentation and generation of excessive post blast fume.

    Blacked out areas indicate where critical density is reached or exceeded.

5. For example, **to determine the required open cup density for an explosive** column of 40m, find 40m in the Depth column. Moving to the right, read off the density in the unshaded column under the required open cup density (a **TOE** density of 1.37g/cm³ in the 1.10 g/cm³ open cup density column). This indicates that sufficient gassing chemicals should be added to the gassed explosive blend during delivery so that an open cup density of 1.10g/cm³ is achieved.

    This level of gassing chemicals will ensure that the density at the bottom of the column will be below the critical density, and the column will detonate at full order upon initiation.

6. For example, **to determine the approximate average in-hole density** in a column of 40m find 40m in the Depth column. Moving to the right, read off the density in the shaded column (an **AVG. IN-HOLE** density of 1.28g/cm³ in the 1.10 g/cm³ open cup density column).

    For depths that are not listed, Dyno Nobel recommends rounding up to the next highest depth e.g. a 25m deep hole should be rounded to 26m and corresponding densities applied.

7. Blast design should be based on average in-hole density whilst blasthole loading requires the MPU operator to achieve the associated open cup density.

8. The gassing reaction takes 30-40 minutes to achieve the desired open cup density at 20°C. It is necessary to allow at least this time to elapse following completion of loading and before stemming the charged blasthole. A longer period should be allowed at lower temperatures.

9. The density values shown were calculated using a laboratory mathematical model that was validated using a specially designed fit-for-purpose pressure-volume apparatus.

Depth (m)	TITAN 3070G Density g/cm³													
	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe	Avg. In-Hole	Toe
Open Cup	0.90	0.90	0.95	0.95	1.00	1.00	1.05	1.05	1.10	1.10	1.15	1.15	1.20	1.20
1	0.92	0.94	0.97	0.99	1.02	1.04	1.07	1.08	1.12	1.13	1.16	1.18	1.21	1.22
2	0.94	0.98	0.99	1.02	1.04	1.07	1.08	1.11	1.13	1.16	1.18	1.20	1.22	1.24
3	0.96	1.01	1.00	1.05	1.05	1.10	1.10	1.14	1.14	1.18	1.19	1.22	1.23	1.26
4	0.97	1.04	1.02	1.08	1.07	1.12	1.11	1.16	1.15	1.20	1.20	1.23	1.24	1.27
5	0.99	1.07	1.03	1.11	1.08	1.14	1.12	1.18	1.16	1.21	1.20	1.25	1.25	1.28
6	1.00	1.09	1.05	1.13	1.09	1.16	1.13	1.20	1.17	1.23	1.21	1.26	1.25	1.29
7	1.02	1.11	1.06	1.15	1.10	1.18	1.14	1.21	1.18	1.24	1.22	1.27	1.26	1.30
8	1.03	1.13	1.07	1.16	1.11	1.19	1.15	1.22	1.19	1.25	1.23	1.28	1.26	1.31
9	1.04	1.15	1.08	1.18	1.12	1.21	1.16	1.24	1.20	1.26	1.23	1.29	1.27	1.32
10	1.05	1.16	1.09	1.19	1.13	1.22	1.17	1.25	1.20	1.27	1.24	1.30	1.27	1.32
11	1.06	1.17	1.10	1.20	1.14	1.23	1.17	1.25	1.21	1.28	1.24	1.30	1.28	1.33
12	1.07	1.19	1.11	1.21	1.15	1.24	1.18	1.26	1.22	1.29	1.25	1.31	1.28	1.33
13	1.08	1.20	1.12	1.22	1.15	1.25	1.19	1.27	1.22	1.29	1.25	1.31	1.29	1.34
14	1.09	1.21	1.13	1.23	1.16	1.26	1.19	1.28	1.23	1.30	1.26	1.32	1.29	1.34
15	1.10	1.22	1.13	1.24	1.17	1.26	1.20	1.28	1.23	1.30	1.26	1.32	1.29	1.34
16	1.11	1.23	1.14	1.25	1.17	1.27	1.20	1.29	1.24	1.31	1.27	1.33	1.30	1.35
17	1.11	1.24	1.15	1.26	1.18	1.28	1.21	1.30	1.24	1.31	1.27	1.33	1.30	1.35
18	1.12	1.24	1.15	1.26	1.18	1.28	1.21	1.30	1.24	1.32	1.27	1.34	1.30	1.35
19	1.13	1.25	1.16	1.27	1.19	1.29	1.22	1.31	1.25	1.32	1.28	1.34	1.30	1.35
20	1.13	1.26	1.16	1.27	1.19	1.29	1.22	1.31	1.25	1.33	1.28	1.34	1.31	1.36
22	1.14	1.27	1.17	1.29	1.20	1.30	1.23	1.32	1.26	1.33	1.28	1.35	1.31	1.36
24	1.14	1.28	1.17	1.29	1.20	1.31	1.23	1.32	1.26	1.34	1.29	1.35	1.31	1.37
26	1.15	1.29	1.18	1.30	1.21	1.32	1.24	1.33	1.26	1.34	1.29	1.36	1.31	1.37
28	1.16	1.29	1.18	1.31	1.21	1.32	1.24	1.34	1.27	1.35	1.29	1.36	1.32	1.37
30	1.16	1.30	1.19	1.32	1.22	1.33	1.24	1.34	1.27	1.35	1.29	1.36	1.32	1.37
32	1.17	1.31	1.19	1.32	1.22	1.33	1.25	1.34	1.27	1.36	1.30	1.37		
34	1.17	1.31	1.20	1.33	1.23	1.34	1.25	1.35	1.28	1.36	1.30	1.37		
36	1.18	1.32	1.20	1.33	1.23	1.34	1.25	1.35	1.28	1.36	1.30	1.37		
38	1.18	1.32	1.21	1.33	1.23	1.34	1.26	1.35	1.28	1.36	1.30	1.37		
40	1.19	1.33	1.21	1.34	1.24	1.35	1.26	1.36	1.28	1.37				
45	1.19	1.33	1.22	1.34	1.24	1.35	1.26	1.36	1.29	1.37				
50	1.20	1.33	1.22	1.34	1.24	1.35	1.27	1.36	1.29	1.37				
55	1.20	1.34	1.22	1.34	1.25	1.35	1.27	1.36	1.29	1.37				
60	1.20	1.34	1.23	1.35	1.25	1.35	1.27	1.36	1.29	1.37				

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