Twist Synthetic Infectious Disease Controls

Positive controls provide quality control measures for a wide range of applications from assay development to routine testing which requires robust and consistent nucleic acid controls used in next-generation sequencing (NGS), or nucleic acid amplification tests (NAATs) such as reverse transcription quantitative polymerase chain reaction (RT-qPCR), digital PCR, or isothermal amplification assays. Synthetic viral controls are a powerful alternative to “live virus” controls which are viral nucleic acids extracted from either an infected patient or from live virus propagated in culture. Synthetic controls created through gene synthesis broaden access across diverse strains while mitigating safety and security concerns.

SECTIONS:

Twist Synthetic SARS-CoV-2 RNA Controls

The Twist Synthetic SARS-CoV-2 RNA controls consist of six non-overlapping 5 kb fragments generated from Twist Gene Fragments then transcribed into ssRNA. These provide coverage of greater than 99.9% of the bases of the viral genome.

All Standard Twist Synthetic SARS-CoV-2 RNA Controls are Biosafety Level 1. They are supplied frozen as 100 µL with a specification range of approximately $1x10^6$ copies/µL and should be stored at -70°C to -90°C.

PART NUMBER	CONTROL	VOI/VOC	GENBANK/GISAID ID	GISAID NAME
102019	Control 1		MT007544.1	Australia/VIC01/2020
102024	Control 2*		MN908947.3	Wuhan-Hu-1
102860	Control 3		LC528232.1	Japan/Hu_DP_Kng_19-020/2020
102862	Control 4		MT106054.1	USA/TX1/2020
102917	Control 5		MT188340	USA/MN2-MDH2/2020
102918	Control 6		MT118835	USA/CA9/2020
102916	Controls 1 – 6		N/A	N/A
103087	Control 7		EPI_ISL_418227	France/HF2393/2020
103086	Controls 1 – 7		N/A	N/A
103511	Control 8		MT066176	Taiwan/NTU02/2020
103512	Control 9		MT152824	USA/WA2/2020
103513	Control 10		EPI_ISL_414648	USA/CA-PC101P/2020
103514	Control 11		EPI_ISL_417739	Iceland/5/2020
103515	Control 12		EPI_ISL_420244	England/SHEF-C05B2/2020
103533	Control 13		EPI_ISL_421184	Belgium/ULG-10004/2020
103907	Control 14* (B.1.1.7)	**Alpha**	EPI_ISL_710528	England/205041766/2020
103909	Control 15* (B.1.1.7)	**Alpha**	EPI_ISL_601443	England/MILK-9E05B3/2020
104043	Control 16 (B.1.351)	**Beta**	EPI_ISL_678597	South Africa/KRISP-EC-K005299/2020
104044	Control 17 (P.1)	**Gamma**	EPI_ISL_792683	Japan (Brazil)/IC-0564/2021
104338	Control 18 (B.1.617.1)	**Kappa**	EPI_ISL_1662307	India/CT-ILSGS00361/2021
104529	Control 19 (B.1.526)	**Iota**	EPI_ISL_1300881	USA/NY-MSHSPSP-PV24650/2020
104530	Control 20 (B.1.427)		EPI_ISL_730092	USA/CA-ALSR-4704/2020

104531	Control 21 (B1.1.429)	**Epsilon**	EPI_ISL_672365	USA/CA-CZB-12943/2020
104532	Control 22 (B1.1.519)		EPI_ISL_933685	Mexico/CMX-InDRE_208/2021
104533	Control 23 (B.1.617.2)	**Delta**	EPI_ISL_1544014	India/MH-NCCS-P1162000182735/2021
104534	Control 24 (B.1.617.3)		EPI_ISL_1939891	India/MH-SEQ-221_S66_R1_001/2021
104538	Control 28 (AY.1)	**Delta**	EPI_ISL_2695467	Portugal/PT9543/2021
104539	Control 29 (AY.2)	**Delta**	EPI_ISL_2693246	USA/WA-CDC-UW21061750277/2021
105204	Control 48 (B.1.1.529/BA.1)	**Omicron**	EPI_ISL_6841980	Hong Kong/HKU-211129-001/2021
105345	Control 50 (B.1.1.529/BA.2)	**Omicron**	EPI_ISL_7190366	Australia/QLD2568/2021
105346	Control 51 (B.1.1.529/BA.2)	**Omicron**	EPI_ISL_7718520	England/MILK-2DF642C/2021
105865	Control 62 (BA.2.12.1)	**Omicron**	EPI_ISL_12248637.1	hCoV-19/Denmark/DCGC-493190/2022
105857	Control 63 (BA.2.12.1)	**Omicron**	EPI_ISL_12303256.1	hCoV-19/USA/NY-CDC-LC0579415/2022
106196	Control 64 (BA.5)	**Omicron**	EPI_ISL_12516495	hCoV-19/England/LSPA-3DC1269/2022
106197	Control 65 (BA.5)	**Omicron**	EPI_ISL_12620611	hCoV-19/USA/TN-ASC-210769476/2022
106198	Control 66 (BA.4)	**Omicron**	EPI_ISL_12454576	hCoV-19/USA/TX-HMH-M-96682/2022
106199	Control 67 (BA.4)	**Omicron**	EPI_ISL_12605687	hCoV-19/USA/CA-CDC-QDX36065390/202

**Indicates controls that are also available in the Assay Ready format*

Assay Ready Synthetic RNA Controls

Twist Bioscience Assay Ready Control products are provided in desiccated pellet format that includes a nucleic acid stabilizer which enables greater stability and ease of use during the shipping and protocol processes. Due to the enhanced stability, they can be shipped at room temperature, reducing cost and improving accessibility. The Assay Ready Controls are supplied at approximately two million copies per tube.

All Assay Ready Controls are Biosafety Level 1. They are supplied as a dried down pellet with a specification range of approximately $2x10^6$ copies/tube and should be stored at -20°C.

PART NUMBER	CONTROL	VOI/VOC	GENBANK ID	GISAID NAME
103925	Assay Ready Control 2		MN908947.3	Wuhan-Hu-1
103926	Assay Ready Control 14 (B.1.1.7)	**Alpha**	EPI_ISL_710528	England/205041766/2020
103927	Assay Ready Control 15 (B.1.1.7)	**Alpha**	EPI_ISL_601443	England/MILK-9E05B3/2020

Encapsulated Synthetic RNA Controls

Twist Bioscience Encapsulated Control products offer a unique storage and delivery method for Twist's established Synthetic SARS-CoV-2 RNA controls. Just as protein encapsulation of viruses offers more stable molecular storage, Twist's Encapsulated Control products leverage a novel method to seal a metal capsule around a desiccated pellet to enhance stability of the RNA controls. Due to the enhanced stability, they can be shipped and stored at room temperature, reducing cost, and improving accessibility globally. The Encapsulated Controls are supplied at approximately 50,000 copies per tube in a rack of 16 or 96 tubes, they are single use, and have a 5-year shelf life from the date of manufacture.

All Encapsulated Controls are Biosafety Level 1 and should be stored at 4°C to 40°C.

RACK OF 16 TUBES WITH TUBE OPENER

PART NUMBER	CONTROL	VOI/VOC	GENBANK ID	GISAID NAME
104422	Encapsulated Control 2		MN908947.3	Wuhan-Hu-1
104423	Encapsulated Control 28 (AY.1)	**Delta**	EPI_ISL_2695467	Portugal/PT9543/2021
104424	Encapsulated Control 48 (B.1.1.529/BA.1)	**Omicron**	EPI_ISL_6841980	Hong Kong/HKU-211129-001/2021

RACK OF 96 TUBES WITH 4 TUBE OPENERS

PART NUMBER	CONTROL	VOI/VOC	GENBANK ID	GISAID NAME
104426	Encapsulated Control 2		MN908947.3	Wuhan-Hu-1
104427	Encapsulated Control 28 (AY.1)	**Delta**	EPI_ISL_2695467	Portugal/PT9543/2021
104428	Encapsulated Control 48 (B.1.1.529/BA.1)	**Omicron**	EPI_ISL_6841980	Hong Kong/HKU-211129-001/2021

Twist Respiratory Virus Controls

The Twist Synthetic Respiratory Virus Controls cover a broad range of RNA and DNA viruses relevant to respiratory disease research. These controls are aligned with the content of the Twist Respiratory Virus Research Panel (PN 103067) and are suitable for use with Twist Fixed Panel NGS workflows or for use with Nucleic Acid Amplification Tests (NAATs).

All Twist Respiratory Virus Controls are Biosafety Level 1. They are supplied frozen as 100 µL with a specification range of either approximately 1x10^5 or 1x10^6 copies/µL and should be stored at -70°C to -90°C.

Part Number	Name	Accession Number	Virus Type	Length (bases)
109012	Twist Synthetic Influenza A (H5N1) RNA Control	OR051630.1, OR051629.1	ssRNA (- sense)	HA Segment: 1,695, NA Segment: 1,410
103001	Twist Synthetic Influenza H1N1 (2009) RNA Control	NC_026438, NC_026435, NC_026437, NC_026433, NC_026436, NC_026434, NC_026431, NC_026432	ssRNA (- sense)	13158
103002	Twist Synthetic Influenza H3N2 RNA Control	NC_007373, NC_007372, NC_007371, NC_007366, NC_007369, NC_007368, NC_007367, NC_007370	ssRNA (- sense)	13627
103003	Twist Synthetic Influenza B RNA Control	NC_002204, NC_002205, NC_002206, NC_002207, NC_002208, NC_002209, NC_002210, NC_002211	ssRNA (- sense)	14452
103004	Twist Synthetic Human bocavirus 1 DNA Control	MG953830.1	ssDNA	5164
103005	Twist Synthetic Human enterovirus 68 RNA Control	NC_038308.1	ssRNA (+ sense)	7367
103006	Twist Synthetic Human rhinovirus 89 RNA Control	NC_001617.1	ssRNA (+ sense)	7152
103007	Twist Synthetic Mumps virus RNA Control	NC_002200.1	ssRNA (- sense)	15384
103008	Twist Synthetic Human parainfluenza virus 1 RNA Control	NC_003461.1	ssRNA (- sense)	15600
103009	Twist Synthetic measles virus RNA Control	NC_001498.1	ssRNA (- sense)	15894
103010	Twist Synthetic Human parainfluenza virus 4 RNA Control	NC_021928.1	ssRNA (- sense)	17052
103011	Twist Synthetic Human coronavirus 229E RNA Control	NC_002645.1	ssRNA (+ sense)	27317
103012	Twist Synthetic Human coronavirus NL63 RNA Control	NC_005831.2	ssRNA (+ sense)	27553
103013	Twist Synthetic Human coronavirus OC43 RNA Control	NC_006213.1	ssRNA (+ sense)	30741
103730	Twist Respiratory Virus Controls (13 Count)	N/A	N/A	N/A

Twist Synthetic Human Monkeypox Virus Controls

The Twist Synthetic human Monkeypox Virus (hMPXV) Controls are built based on sequences from either the Congo Basin (CB) or West African (WA) clades of hMPXV and provide coverage of ≥80% of the viral genome. These controls are compatible with CDC real-time PCR procedures and also are suitable for use with Twist Fixed Panel NGS workflows.

The hMPXV controls are Biosafety Level 1. They are supplied frozen as 100 µL with a specification range of approximately $1x10^5$ copies/µL and should be stored at -70°C to -90°C.

Part Number	Name	Accession Number	Virus Type	Length (bases)
106056	Twist Synthetic hMPXV Control 1 (CB)	GISAID / EPI_ISL_13056236	dsDNA	164678 bp
106059	Twist Synthetic hMPXV Control 2 (WA)	NCBI / ON585037	dsDNA	166798 bp