PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Applications.

1. General duty valves common to most mechanical piping systems.
2. Special purpose valves are specified in individual piping system specifications.

B. General requirements.

C. Globe valves.

D. Ball valves.

E. Butterfly valves.

F. Check valves.

G. Gate valves.

H. Chainwheels.

1.02 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene diene monomer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. PTFE: Polytetrafluoroethylene.

G. RS: Rising stem.

H. SWP: Steam working pressure.

I. TFE: Tetrafluoroethylene.

1.03 SUBMITTALS

A. Submit in accordance with conditions of Contract and Division 01 submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, pressure and temperature classifications, valve design, body material, seating materials, trim material, dimensions, clearances, rough-in details, weights, support requirements, and piping connections.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1.04 QUALITY ASSURANCE

A. Manufacturer:

1. Obtain valves for each valve type from a single manufacturer.
2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
3. Subject to compliance requirements, provide products from one of the manufacturers listed in Valve Schedule in Part 3.

B. Valves shall be certified to meet the specified ASTM, ASME, ANSI, and MSS standards in Part 2 Products, and as follows:

1. ASME B31.9 for building services piping.
2. ASME B31.1 for power piping.

C. Welding Materials and Procedures: Conform to ASME BPVC-IX.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
5. Secure check valves in either the closed position or open position.
6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:

1. Maintain valve end protection and protect flanges and specialties from dirt.

a) Provide temporary inlet and outlet caps.
b) Maintain caps in place until installation.

2. Store valves in shipping containers and maintain in place until installation.

a) Store valves indoors in dry environment.
b) Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:

1. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 - PRODUCTS AND MATERIALS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products from one of the manufacturers listed in the Valve Schedule in Part 3.

2.02 APPLICATIONS

A. Provide the following valves for the applications if not indicated on Drawings:

1. Throttling (Hydronic): Butterfly, Ball, and Globe.
2. Throttling (Steam): Globe.
3. Isolation (Hydronic): Butterfly, Gate, Ball, and Globe.
4. Isolation (Steam): Gate and Ball.
5. Dead-End: Butterfly and Ball.

B. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

C. Required Valve End Connections for Non-Wafer Types:

1. Steel Pipe:

a) 2 NPS and Smaller: Threaded ends.
b) 2-1/2 NPS and Larger: Grooved or flanged ends.

2. Copper Tube:

a) 2 NPS and Smaller: Threaded or solder-joint valve ends.

1) Exception: Solder ends not acceptable for hot water or steam pipe.

b) 2-1/2 NPS and Larger: Grooved or flanged ends.

3. Steam and Steam Condensate Pipe: Solder and grooved ends not acceptable.

D. Chilled Water Valves:

1. 2 NPS and Smaller:

   a) Minimum Class: 150.
   b) Body: Bronze.
   c) Allowable Valve Types:

      1) Ball: Two piece. Forged brass body is acceptable to bronze body.

         a) Brass components.
         b) Stainless steel components.

      2) Lift check.
      3) Swing check.
      4) Wafer plate-type check.
      5) Gate.
      6) Globe.

2. 2-1/2 NPS and Larger:

   a) Minimum Class: 150.
   b) Body: Cast iron, except as noted below.
   c) Allowable Valve Types:

      1) Ball: 2-1/2 inch to 3 inch: Three piece, bronze, forged brass, carbon steel, or stainless steel body.

         a) Brass components.
         b) Stainless steel components.

      2) Butterfly: Ductile iron body.
      3) Lift check.
      4) Swing check.
      5) Wafer plate-type check.
      6) Gate.
      7) Globe.

E. Heating Hot Water Valves:

1. 2 NPS and Smaller:

   a) Minimum Class: 150.
   b) Body: Bronze.
   c) Allowable Valve Types:

      1) Ball: Two piece. Forged brass body is acceptable to bronze body.

         a) Brass components.
         b) Stainless steel components.

      2) Lift check.
      3) Swing check.
      4) Wafer plate-type check.

5) Gate.
6) Globe.

2. 2-1/2 NPS and Larger:

a) Minimum Class: 150.
b) Body: Cast iron, except as noted below.
c) Allowable Valve Types:

1) Ball: 2-1/2 inch to 3 inch: Three piece, bronze, forged brass, carbon steel, or stainless steel body.

a) Brass components.
b) Stainless steel components.

2) Butterfly: Ductile iron body.
3) Lift check.
4) Swing check.
5) Wafer plate-type check.
6) Gate.
7) Globe.

2.03 GENERAL REQUIREMENTS

A. Mechanically Joined General Duty Valves:

1. Contractor may provide mechanically joined general duty valves as an option in lieu of, in whole of, or in part of, the general duty valve fitting and joining methods for the specific systems indicated in Article "Applications." Reference Division 23 Section "Mechanically Joined Hydronic Piping Systems."
2. Contractor shall not use mechanically joined general duty valves for hydronic piping in lieu of welded, threaded or flanged valves.

B. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

C. Valve Sizes: Match upstream piping unless otherwise indicated.

D. Valve Stem Design:

1. Rising stem or rising outside screw and yoke stems.
2. Non-rising stem valves may be used on water systems where headroom prevents full extension of rising stems.

E. Valve Actuator Types:

1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
2. Handwheels: Valves other than quarter-turn types.
3. Hand Lever: Quarter-turn valves 6 NPS and smaller, vinyl-covered.

4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

F. Valves in Insulated Piping: Provide stem extensions so valve operator extends a minimum of 1/2 inches outside of the insulation and the following features:

1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

G. Valve-End Connections:

1. Threaded End Valves: ASME B1.20.1.
2. Flanges: ASME B16.1 for cast iron.
3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5 for steel, ASME B16.24 for bronze.
4. Solder Joint Connections: ANSI B16.18.
5. Grooved End Connections: AWWA C606.

H. General ASME Compliance:

1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Power Piping Valves: ASME B31.1.
3. Building Services Piping Valves: ASME B31.9.

I. Bronze Valves:

1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

J. Valve Bypass and Drain Connections: MSS SP-45.

K. Source Limitations: Obtain each valve type from a single manufacturer.

2.04 BRONZE GLOBE VALVES

A. Class 150, 300 psig CWP:

1. Comply with MSS SP-80, Type 2, nonmetallic disc to metal seat.
2. Body: Bronze; ASTM B62, with integral seat and union bonnet.
3. Ends: Threaded or solder joint.
4. Stem and Disc: Bronze stem, PTFE disc.
5. Packing: Asbestos free, brass gland.
6. Operator: Malleable iron handwheel.

2.05 BRONZE BALL VALVES

A. Two Piece, Class 150, bronze trim, for valves 2 inch and smaller:

1. Comply with MSS SP-110.
2. CWP Rating: 600 psi.
3. Body: Bronze, ASTM B584.
4. Trim: Bronze.
5. Ends: Threaded or solder joint.
6. Seats and Seals: PTFE.
7. Stem: Blowout-proof.
8. Ball: Full port, chrome plated brass.
9. Operator: Vinyl-covered steel handle.

B. Two Piece, Class 150, stainless steel trim, for valves 2 inch and smaller:

1. Comply with MSS SP-110.
2. CWP Rating: 600 psi.
3. Body: Bronze, ASTM B584.
4. Trim: Stainless steel.
5. Ends: Threaded or solder joint.
6. Seats and Seals: PTFE.
7. Stem: Blowout-proof, stainless steel..
8. Ball: Full port, ASTM A276 Type 316 stainless steel.
9. Operator: Vinyl-covered steel handle.

C. Three Piece, Class 150, bronze trim, for valves 2-1/2 inch to 3 inch:

1. Comply with MSS SP-110.
2. CWP Rating: 600 psig.
3. Body: Bronze, ASTM B584.
4. Trim: Bronze.
5. Ends: Threaded or solder joint.
6. Seats and Seals: PTFE.
7. Stem: Blowout-proof.
8. Ball: Full port, chrome plated brass.
9. Operator: Vinyl-covered steel handle.

D. Three Piece, Class 150, stainless steel trim, for valves 2-1/2 inch to 3 inch:

1. Comply with MSS SP-110.
2. CWP Rating: 600 psi.
3. Body: Bronze, ASTM B584.
4. Trim: Stainless steel.
5. Ends: Threaded or solder joint.
6. Seats and Seals: PTFE.
7. Stem: Blowout-proof, stainless steel..
8. Ball: Full port, ASTM A276 Type 316 stainless steel.
9. Operator: Vinyl-covered steel handle.

2.06 BRASS BALL VALVES

A. Two Piece, Class 150, brass trim, for valves 2 inch and smaller:

1. Standard: MSS SP-110.
2. CWP Rating: 600 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass, ASTM A283.
5. Trim: Brass.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Blowout-proof ,brass.
9. Ball: Chrome plated brass.
10. Port: Full.

B. Two Piece, Class 150, stainless trim, for valves 2 inch and smaller:

1. Standard: MSS SP-110.
2. CWP Rating: 600 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass, ASTM A283.
5. Trim: Stainless steel.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Blowout-proof, stainless steel.
9. Ball: ASTM A276 Type 316 stainless steel.
10. Port: Full.

C. Two Piece, Class 150, Brass Trim, for valves 2-1/2 inch to 3 inch:

1. Standard: MSS SP-110.
2. CWP Rating: 600 psig.
3. Body Design: Three piece.
4. Body Material: Forged brass, ASTM A283.
5. Trim: Brass.
6. Ends: Threaded or soldered ends.
7. Seats: PTFE.
8. Stem: Blowout-proof, brass.
9. Ball: Chrome plated brass.
10. Port: Full

D. Two Piece, Class 150, Stainless Steel Trim, for valves 2-1/2 inch to 3 inch:

1. Standard: MSS SP-110.
2. CWP Rating: 600 psig.
3. Body Design: Three piece.
4. Body Material: Forged brass, ASTM A283.
5. Trim: Stainless steel.
6. Ends: Threaded or soldered ends.

7. Seats: PTFE.
8. Stem: Blowout-proof, stainless steel.
9. Ball: ASTM A276 Type 316 stainless steel.
10. Port: Full

2.07 STAINLESS STEEL BALL VALVES

A. Three Piece, Class 150:

1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: Minimum 1,000 psig.
4. Body: Stainless steel, ASTM A351.
5. Trim: Stainless steel.
6. Ends: Threaded.
7. Seats and Seals: PTFE.
8. Stem: Stainless steel, blowout-proof.
9. Ball: Full port, stainless steel, vented.
10. Operator: Vinyl-covered steel handle.

2.08 CARBON STEEL BALL VALVES

A. Three Piece, Class 150:

1. Comply with MSS SP-72.
2. CWP Rating: Minimum 1,000 psig.
3. Construction: Two-piece or three-piece.
4. Body: Carbon steel, ASTM A216/A216M, Type WCB.
5. Trim: Stainless steel.
6. Ends: Threaded.
7. Seats and Seals: PTFE.
8. Stem: Stainless steel, blowout-proof.
9. Ball: Full port, stainless steel, vented.
10. Operator: Vinyl-covered steel handle.

2.09 IRON BUTTERFLY VALVES

A. Lug type: Bi-directional dead-end service without downstream flange.

1. Comply with MSS SP-67, Type I.
2. CWP Rating: 200 psig and 250 psig.
3. Body Material: ASTM A536 ductile iron.
4. Stem: One or two-piece stainless steel.
5. Seat and Seal: EPDM.
6. Disc: Aluminum-bronze, stainless steel, or one-piece Nylon-coated ductile iron.
7. Operator:

a) Size 2-1/2 through 6 inches: Lever operator, 10 position minimum, with locks and stops.
b) Size 8 inch and larger: Gear type with position indicator.

2.010 BRONZE SWING CHECK VALVES

A. Class 150:

1. Comply with MSS SP-80, Type 3.
2. CWP Rating: 300 psig.
3. Design: Horizontal swing, Y-pattern, capable of being refitted and ground while valve remains in the line.
4. Body: Bronze, ASTM B62.
5. Ends: Threaded.
6. Disc: PTFE.

2.011 IRON, WAFER PLATE-TYPE CHECK VALVES

A. Class 250 Dual-Plate (Twin Disc):

1. Comply with API STD 594.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 400 psig.
3. 14 NPS to 24 NPS, CWP Rating: 300 psig.
4. Design: Wafer, non-slam, spring-loaded plates, designed to open and close at approximately 0.5 psi differential.
5. Body: ASTM A126, cast iron.
6. Ends: Flanged.
7. Trim: Stainless steel.
8. Disc: Bronze.
9. Seat: EPDM, or NBR.

2.012 BRONZE GATE VALVES

A. Class 150:

1. Comply with MSS SP-80, Type I.
2. CWP Rating: 300 psig.
3. Body: Bronze, ASTM B61 with integral seat and union-ring bonnet.
4. Trim: Bronze.
5. Ends: Threaded.
6. Stem: Bronze, RS type. NRS type where exceptions apply.
7. Disc: Solid wedge; bronze.
8. Packing: Asbestos free, brass.
9. Operator: Malleable iron handwheel.

2.013 IRON GATE VALVES

A. Class 250:

1. Comply with MSS SP-70, Type I.

2. 2-1/2 NPS to 12 NPS, CWP Rating: 500 psig.
3. 14 NPS to 24 NPS, CWP Rating: 300 psig.
4. Body: Cast iron, ASTM A126 Class B with bolted bonnet.
5. Ends: Flanged.
6. Trim: Bronze.
7. Stem: OS&Y, RS type. NRS type where exceptions apply.
8. Disc: Solid wedge.
9. Packing and Gasket: Asbestos free, 2-piece packing gland assembly.
10. Operator: Malleable iron handwheel.

2.014 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.

1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
3. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. If valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Locate valves for easy access. Provide access doors and fire rated access doors as required.

C. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

D. Install shut-off duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.

E. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.

F. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

G. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

H. Install valves in a position to allow full stem movement.

I. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

J. Valves with soldered end connections:

1. Use solder with a melting point as follows:

a) Below 840 degrees F for gate, globe, and check valves.
b) Below 421 degrees F for ball valves.

K. Install check valves where necessary to maintain direction of flow as follows:

1. Lift Check: Install horizontal style with stem plumb and vertical.
2. Swing Check: Install horizontal maintaining hinge pin level.
3. Orient plate-type into horizontal or vertical position, between flanges.

L. Provide chainwheels on operators for valves 2-1/2 NPS and larger where located 72 inches or more above finished floor in mechanical rooms, terminating 60 NPS above finished floor.

3.03 FIELD QUALITY CONTROL

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leak; replace valves if leak persists.

3.04 ADJUSTING AND CLEANING

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

B. Inspect valves for leaks after piping systems have been tested and put into service, but before final adjusting and balancing. Adjust or replace packing, as required, on valves with leaks. Replace valve if leak persists.

3.05 VALVE SCHEDULE

A. Bronze Globe Valves, Class 150:

MANUFACTURER	THREADED	THREADED	SOLDER

	NRS	RS	RS
Apollo	--	122T	--
Crane	--	7TF	1310
Hammond	--	IB413T	IB423
Jenkins	--	106BJ	--
Milwaukee	--	590T	1590T
Nibco	--	T-235-Y	S-235-Y
Powell	150	--	--
Stockham	--	B-22T	--

B. Bronze Ball Valves – 2 inch and smaller, Class 150:

1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Apollo	77C-140	77C-240
Hammond	8301A	8311A
Milwaukee	BA-400	BA-450
Nibco	T-585-70	S-585-70
Watts	LFB6080G2	LFB6081G2

C. Bronze Ball Valves - 2-1/2 inch to 3 inch, Class 150:

1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Apollo	82-100	82-200
Hammond	8604	8614
Milwaukee	BA-300	BA-350
Nibco	T-595-Y	S-595-Y
Watts	LFB6080G2	LFB6081G2

D. Brass Ball Valves – 2 inch and smaller, Class 150:

1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Apollo	77F-100	77F-200
Bray	S51	
Hammond	8901	8911
Kitz Corporation	AKTFLL	CTFLL
Milwaukee	BA-475B	BA-485B
Nexus Valve Inc.	UX-#F-#F	UX-#S-#S
Nibco	T-FP-600A	S-FP-600A
Watts	FBV-3C	FBVS-3C

E. Brass Ball Valves - 2-1/2 inch to 3 inch, Class 150:

1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Hammond	8901	8911
Kitz Corporation	AKTAFP	--
Milwaukee	BA-475B	BA-485B
Nexus Valve Inc.	UX-#F-#F	UX-#S-#S
Nibco	T-595-Y	S-595-Y

F. Bronze Lift Check Valves, Class 150:

MANUFACTURER	HORIZONTAL	VERTICAL
Crane	27TF	29
Elite Valve		CKVB
Spirax Sarco	LCV1	

G. Bronze Swing Check Valves:

MANUFACTURER	CLASS 125 THREADED	CLASS 125 SOLDER	CLASS 150 THREADED	CLASS 200 THREADED
Apollo	163T	163S	164T	169T
Crane	41TF	--	141TF	36
Hammond	IB940	--	IB946	IB944
Jenkins	4037J	--	4475TJ	4449J
Milwaukee	509-T	1509-T	510-T	508
Nibco	T-413-Y	S-413-Y	T-433-Y	T-453-B
Powell	578	--	--	560Y
Stockham	B-320-T	B-310-T	B322	B-345

H. Iron Flanged End Swing Check Valves:

MANUFACTURER	CLASS 125	CLASS 250
Apollo	910F	920F
Crane	373	39E
Hammond	IR1124	IR322
Jenkins	587J	339RJ
Milwaukee	F2974	F2970
Nibco	F-918-B	F-968-B
Powell	559	--
Stockham	G-931	F-947

I. Iron Wafer Plate-Type Check Valves:

MANUFACTURER	CLASS 125	CLASS 250
Apollo	910WB	--
Center Line	800	--
Crane	DuoChek StyleG	DuoChek Style G
Metraflex	CVOSSXXX	CVOSSXXX
Nibco	W-920-W	W-960-W
Stockham	WG970	--

J. Silent Check Valves (Wafer Style)

MANUFACTURER	CLASS 125	CLASS 150	CLASS 250	CLASS 300
Flomatic	--	888VFD	--	888VFD
Keckley	CW1CI	CW2CS/36	CW1CI	CW2CS36
Metraflex	CVO700-SS	--	CVO700-SS	--
Mueller	101MAP	101MBP	103MAP	103MBP
Titan	--	CV90/91	--	CV90/91
Valmatic	1400A	--	1400A	--

K. Silent Check Valves (Globe Style)

MANUFACTURER	CLASS 125	CLASS 150	CLASS 250	CLASS 300
Flomatic	402	402	402	402
Keckley	CG1CI	CG2CS/36	CG3CI	CG4CS/36
Metraflex	CVO900-SS	--	CVO900-SS	--
Mueller	105MAP	105MBP	107MAP	109MBP
Titan	--	CV50/51	--	CV52
Valmatic	1800	--	1800	--

L. Bronze Gate Valves, Class 150:

MANUFACTURER	THREADED NRS	THREADED RS	SOLDER NRS	SOLDER RS
Apollo	106T	107T	--	--
Crane	437	431	1324	1334
Hammond	IB638	IB629	--	IB648
Jenkins	2310J	47CUJ	--	--
Milwaukee	1141	1151	--	1169
Nibco	T-136	T-134	S-136	S-134
Powell	2712	2714	--	--
Stockham	B-128	B-120	--	B-124

M. Iron Gate Valves, Class 250:

MANUFACTURER	OS&Y RS	NRS
Apollo	621F	620F
Crane	7-1/2E	3E
Hammond	IR-330	--
Jenkins	204J	203J
Milwaukee	F2894A	--
Nibco	F-667-0	F-669
Powell	1797	--
Stockham	F-667	--

END OF SECTION

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