		Fr	equei	псу							
Procedure Description	Weekly	Bi-Monthly	Quarterly Semi-Annually	Annually	Bi-Annually	Biennially	Comments				
Closed Circuit TV	-	-		+	-	++					
Clean, align, and focus all cameras after tunnel washing	\vdash	+	→ x	+		+					
Emergency Lighting - Buildings	\vdash	+	+^	+		+	Manufacturers O&M Manual for luminaires - Not Provided				
Operate test buttons on emergency light fixtures		7	\dashv	+	-	++	Managetares beam menas to tamments. Her formed				
Operate battery pack for emergency lighting for 90 minutes		\vdash	-	x		+ +					
Electrical Switchboard and Switchgear	+	$\dashv \dashv$	+	+^	-	+	O&M Manual recommendations				
Inspect switchgear bus and connections by infrared scanning				X			On the circuit breaker molded case there should not be:				
Perform ultrasonic inspection of medium voltage switchgear bus supports,	Ħ	11	T		===	11	1) no traces of grime (grease), excessive dust or condensation which all reduce insulation.				
insulators, and barriers				X			2) no signs of burns or cracks which could weaken the case and thus its capacity to withstand short-circuits.				
Visually inspect all equipment for unusual conditions				Х			Preventative maintenance recommendation for molded case :				
Check tightness of all connections				Х			1) A visual inspection of its condition and cleaning with a dry cloth or a Q14vacuum cleaner. All cleaning products with solvents Q14are strictly forbidden.				
Remove and replace defective lighting contacts				Х			2) Measuring the insulation every five years and following trips due to a short-circuit.				
Review results of last visual, infrared, and ultrasonic inspection					×		Replace the circuit breaker if there are signs of burns or cracks.				
After power shutdown, clean entire switchgear interior					>		The arc chutes must be regularly checked. The fins of the arc chutes may be blackened (due to the gases produced at In) but must not be significantly damaged. What is more, the filters must				
Clean all bus insulators and check for cracks and chips					×		not be blocked to avoid internal overpressures. Use a vacuum cleaner rather than a cloth to remove dust from the outside of the arc chutes.				
Clean, lubricate (if applicable), and verify operation of all control switches,					_{>}	,	Regular operation is required to maintain the normal performance level of each part involved in the opening and closing cycles.				
auxiliary relays, and devices						,	In installations where power circuit breakers are used in source changeover systems, it is advised to periodically operate the circuit breaker for the alternate source.				
Clean, lubricate, adjust, and add anti-oxidant grease to contacts of all					١ ١,		Preventative maintenance for MX and XF shunt releases and MN undervoltage release consists of periodically cheaking operation at minimum values.				
disconnect switches	Ш			\perp			Auxiliary wiring must be regularly checked and replaced as needed, particularly if there are vibrations, high ambient temperatures or corrosive atmospheres.				
Clean and perform insulation resistance testing on all lighting arrestors					×		Periodic checks on the spring charging motor operation and the charging time are required to ensure the device function,				
Perform insulation resistance testing on any bus bars)		To ensure correct operation of electronic trip unit, it is necessary to periodically check:				
Perform calibration test and verify proper operation of all meters	\perp			<u> </u>	×		• the chain of action resulting in a trip				
Low Voltage Air Circuit Breakers	\vdash			\perp		\perp	• the response time as a function of the level of the fault current.				
Remove covers and thoroughly clean each breaker and contact surfaces	\vdash			1	<u> </u>		Periodic checks on the orders (read, write, commands) transmitted by the communication bus are required to maintain a high degree of reliability and confidence in the communication system.				
Apply anti-oxidant grease to breaker's main contacts	\perp			_)		If fixed circuit breaker connections are not made with Schneider Electric recommendations (tightening torque, hardware, and contact washer), then regularly check the temperature-rise points.				
Lubricate and verify opeation of all mechanisms	\vdash			-	×		If there is a change in color of copper or tinning:				
Apply current equal to 90 to 110 percent of the breaker trip coil setting to) x		• dismantle the connections				
verify proper pick-up of tripping mechanism	\vdash	-		+		+	• clean and scrape the contact surfaces				
Record trip times for long-time, short-time instaneous, and ground fault						.	• then reassemble the connections using new hardware.				
breakers when passing loads equal to multiples of their listed ratings through					'	`	Check the terminals.				
each phase of the breaker	\vdash	7 10	_	+-	-+	, -	Drawout circuit breakers connections require periodic cleaning.				
Measure contact resistance and adjust where possible	\vdash	-	-	+	×	+	Always inspect the switchboard after a fault.				
Perform and record results of insulation resistance test from each pole to					x		General switchboard inpsection and cleaning: 1. Very way the application is to remove any distant density. Wine all hus here insulators, cables, etc., with a clean, dry, list free cleth				
other two poles and to ground	\vdash	-		+		+	1. Vacuum the switchboard interior to remove any dirt or dust deposits. Wipe all bus bars, insulators, cables, etc., with a clean, dry, lint-free cloth. 2. Check the switchboard interior carefully for moisture, condensation build-up, or signs of any previous wetness. Inspect all conduit entrances and cracks between the enclosure panels for				
Clean and lubricate breaker carriage and racking mechanism on any draw out					×		dripping leaks. Take the necessary steps to eliminate the moisture and seal off all leaks.				
breakers Molded Case Circuit Breakers	+	-	-	+		++	3. Inspect the switchboard for any signs of overheating. Discoloration and flaking of insulation or metal parts are indications of overheating.				
Inspect breaker for proper installation	++	-	-	+	— >	. +	4. Check for signs of rodent nesting in the switchboard.				
Remove cover (if possible) and fully clean interior and exterior			+	+	7		5. Carefully inspect all devices for any visibly worn-out, cracked, or missing parts.				
Inspect for burning, overheating, wear, and proper alighment	++	+	+	+	7		6. Manually open and close switches and circuit breakers several times to verify they are working properly.				
Perform contact resistance and insulation resistance measurements and test	\vdash	+	-1-		\ \frac{7}{2}		7. Verify that all key interlocks and door interlocking provisions are working properly.				
Apply current equal to 300 percent of breaker rating to test the long-time	\vdash	+	-	1			Bus Bar Joints, Lug Terminations, and Insulating Materials				
element					>		1. Bus bar joints are maintenance-free. Do not retighten them after the pre-energizing checkout procedure is complete.				
Test and compare any breakers with instantaneous trip units to	1 1		-	T		.	2. Check all bus bar joints and terminal lugs for any pitting, corrosion, or discoloration resulting from high temperatures or subjection to high fault conditions. If any damage has occurred, replace				
manufacturer's characteristic curve					×		the bus bars or lugs. If cleaning is required, use Lectra-Clean®, made by CRC.				
Automatic Transfer Switch (600 Volt Class)			Ħ	1		\top	3. Inspect all insulating materials. Before re-energizing the switchboard, replace insulators with any visible damage (such as cracks).				
After total outage is obtained, clean all contact surfaces, apply anti-oxidant				\top			Bolt-Loc switch maintenance:				
contact grease, measure and record contact resistance, and make any					>		1. Exercise the operating mechanism at least once a year to ensure proper operation.				
adjustments if necessary							2. The Bolt-Loc switch is shipped from the factory properly lubricated. Periodic cleaning and lubrication of the switch is required. The maintenance interval between lubrications depends on				
Lubricate bearings, links, pins, and cams					Х		factors such as usage and ambient conditions. The maximum recommended maintenance interval is one year for current-carrying parts and five years for operating mechanisms.				
Perform insulation resistance test					Х		Exercise circuit breakers at least once a year to ensure proper operation. For general maintenance:				
Test all settings of voltage, frequency sensing, and timing relays					×		1. Trip the circuit breaker by pushing the Push-To-Trip or "Open" button located on the face of the circuit breaker. Refer to the appropriate circuit breaker manual for the specific location of this				
Low Voltage Insulated Cable (Less Than 600 Volts)							button.				
Check all cable terminations for tightness	\Box				×		2. Manually open and close the circuit breaker two to three times.				
				777	-						

				Fr	equ	uen	су					
	Procedure Description	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Bi-Annually	Tri-Annually	Biennially	Quinquennial	
Masterpa <i>Case</i> <i>Device</i>	Perform and record results of insulation resistance test from each phase to the other two and to ground for one minute using a test voltage of 1,000 volts Direct Current (DC). Compare results with previous test. ICT NT and NW Circuit Breakers Measure insulation resistance Check the general condition of the device (accessory cover, trip unit, case,						v		x		X	QMB/QMJ/QMQB1 Fusible Switches 1. Periodically exercise the switch to ensur 2. Check the cover interlock with the switch 3. Inspect the switch interior for any dama 4. For fusible switch units, check the fuser 5. For additional maintenance instructions After the equipment in switchgear has bee 1) Inspect all components for cracks, loose 2) If cracks or strain damage are suspected 3) Periodically check for distortion of the time verify that the rails and sections are aligned verify that the carriage and winch mechon verify that the cable has been fastened verify that the gears are well lubricated NOTE: For normal operation, use a heavy grundry. 4) If applicable, remove handling means are services.
	cradle, connections)						Х					4) If applicable, remove handling means ar5) Thoroughly inspect the traveling lifter w
Mechanis		_		_		_	, v	<u> </u>	_			or maintenance procedures.Contact Schne
-	Open/close device manually and electrically Charge device electrically	-	-			_	X	H	_		-	 Kinking, crushing, cutting, or unstrandir
	Check complete closing of device's poles	-			\vdash		x		_		-	— Corroded, cracked, bent, or broken wire
	Check number of device operating cycles	_	H				X					— Worn end connections
	Check spring charging motor charging time at 0.85 of rated voltage	_					Ĥ			Х		6) Always keep the exterior finish in good
	Check general condition of mechanism								-	Х		finish coat.
	Check tripping forces (crescent shaped part)	_		Н	-	Н	-					7) Be certain that all the warning labels are
Breakina	Unit (Arc Chutes + Contacts)	_		\vdash			Н				Ť	8) Do not repair any parts that are worn, c
	Check the filters cleanliness and the attachment of the arc-chute						Х					manufacturers' parts.
	Check condition of breaking unit						Ť			Х		9) Record all inspections and maintenance
	Measure resistance of input/output contact										х	Inspect the SPD periodically to maintain re
Control A	ccessories										Ť	indicators. Routinely use the built-in diagn
	Check auxiliary wiring and insulation						Х					<u> </u>
	Check operation of indication contacts (OF / PF / MCH)			\Box				П		Х	\Box	
	Check closing operation of control auxiliary XF									Х		
	Check opening operation of control auxiliary MX at 0.70 of rated voltage									Х		
	Check operation of control auxiliary MN/MNR between 0.35 and 0.7 of rated		П							х		
	voltage									^		
	Check delay of MNR devices at 0.35 and 0.7 of rated voltage									Х		
	Check MX tripping time									Х		
	Check the service life of the accessories XF, MX, MN										Х	
	Preventative replacement of control accessories										Х	
Trip Unit												
	Trip trip unit using test tool and check operation of contacts SDE and SDE2						Χ					
	Check ground fault protection function (Micrologic 6.0)						Х				_	
	Check tripping curves using test tool, signaling LED (tripped, overload). Save results on PC									х		
	Check continuity of the tripping chain by primary injection for each phase										Х	
Device Lo												
	Open and close keylocks installed on device						Х					
	Open and close padlock system installed on device						Х					
Cradle (Fo	or Drawout Circuit Breakers)											
	Remove device from cradle and put it back						Х					
				_	_	_	_	_	$\overline{}$	_	_	
	Check operation of position contacts (CE, CT, CD, EF)						Х					
							X					
	Check operation of position contacts (CE, CT, CD, EF)						_			Х		

Comments

- e proper operation. This period should not exceed one year.
- th in the ON position. The cover should not open using normal hand force.
- ged or cracked parts, and replace as necessary.
- mounting clips or bolted contact area for corrosion or discoloration (indicating overheating). Replace them if necessary.
- , see the label on the inside of the door.

en lubricated, perform the following steps.

- parts, and weather or chemical damage.
- l, remove the unit from service. If cracked components are detected, replace them before returning unit to use.
- raveling lifter. If distortion is found:
- gned.
- nanism have been installed correctly.
- securely to the winch drum.

gear lubricant. In very dirty or gritty conditions, it is advisable to use a dry lubricant such as dry graphite to lubricate the gears. Never allow the gears to

- nd any obstructions from the top of the unit that could inhibit operation of the traveling lifter.
- rire cable. Pay close attention to cable sections, such as parts passing over sheaves or wound on the drum, which are normally hidden during inspection eider Electric Services at 1-888-778-2733 if the cable shows any of the following signs of deterioration:

condition to protect against corrosive damage. When damage is noticed, remove the finish to bare metal and refinish using a high-quality primer and

- e still in place and readable. If the warning labels become unreadable or are destroyed, contact your local Schneider Electric sales office.
- racked, deformed, misaligned, or severely corroded. Repairing parts does not ensure satisfactory or safe performance. Do not substitute other
- performed on the traveling lifter in a maintenance log.

liable system performance and continued transient voltage surge suppression. Periodically check the state of the diagnostic display panel LED status ostics to inspect for inoperative modules.

	Frequency											
Procedure Description	Weekly	Monthly Bi-Monthly	Quarterly	Semi-Annually Annually	Bi-Annually	Tri-Annually	Biennially Quinquennial	Comments				
Check connection/disconnection torque							Х					
Clean and regrease racking screw							Х					
Cradle Locking												
Open and close keylocks installed on cradle												
Operate padlocking system				Х								
Power connections				Х								
Check and tighten loose connections							<					
Electrical Transformer												
Inspect transformer connections by infrared scanning				Х								
Perform ultrasonic inspection of medium voltage bus supports, insulators, and barriers				х								
Visually inspect all equipment for unusual conditions				X								
Test transformer and circuit breaker insulating oil				Х								
Dry-Type Dry-Type												
Remove cover and visually inspect all cable/bus connections for evidence of overheating or burning, check for tightness and clean windings				x		х		O&M Manual recommendation for dry location 1. Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer. 2. Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.				
Fire Alarm System												
Perform all tests and inspections in accordance with NFPA 72												
Make and file a permanent record of all inspections and tests conducted												
Open primary power supply to fire alarm panel and note sounding of trouble alarm and light		х										
Perform fire drill by user of drill switch on fire alarm panels, and check that all visual and audible signal emit a sound and tunnel SCADA system (if any) receives alarm		x										
Visually inspect all supervisory and water flow alarm on any standpipe systems	Ш	х										
Test all heat detectors with calibrated heat source and replace all failed units	Ш			X				O&M Manual recommendation				
Test all smoke detectors by measuring and recording sensitivity; replace all failed units				×				O&M Manual recommendation				
Clean all smoke and heat detector housings and check battery voltage under load				х								
Verify that proper alarm devices operate for the appropriate initiating device circuit				х								
Verify that all remote annunciators operate				×				O&M Manual recommendation				
Check all lamps, alarm devices, and printers for proper operation Make a discharge test of batteries to determine capacity for operating system	\forall		Х	×								
for 24 hours	+	_	1			_	+	O&M Manual recommendation				
	+	_	1	-		_	-					
Visually inspect control panels	+	-	++	X	H	-	-					
Visually inspect batteries	++	+	1	X	H	-	-					
Visually inspect fiber optic connections	+	-	1-	V X			+					
Visually inspect emergency voice/alarm equipment	++	+		X			+					
Visually inspect remote annunciators	+	+		X		-	+					
Visually inspect dust detectors	+	+-		X		-	+					
Visually inspect duct detectors	+	+		* -	H	-	+					
Visually inspect HVAC control dampers	+	+		<u>x</u>		-	+					
Visually inspect suppression release systems	++	+		<u> </u>	\vdash	-	+					
Visually inspect heat detectors	+	+		<u> </u>	H	+	+					
Visually inspect smoke detectors	+	+	 x	^ -	H	-	+					
Visually inspect waterflow and tampers Visually inspect post indicator valves	+	-	1 <u>*</u> 1	_	\vdash		+					
	++	-		x	\vdash	-	+					
Visually inspect alarm notification appliances			\perp	^ _	ш							

			From		. 0				
		_	rieq	uenc	У	150,00			
Procedure Description	Weekly	Monthly	BI-Montniy Quarterly	Semi-Annually	Annually	BI-Annually Tri-Annually	Biennially	Quinquennial	Comments
Visually inspect dialers and interface equipment		\neg	\neg	l x l	_	1	\vdash	\neg	
		\neg			\neg	1	+	\neg	
Test control panels			T	\vdash	x	-	+		
Test batteries				x					
Test fiber optic connections					х	1	\top		
Test emergency voice/alarm equipment				1 x 1			\Box		
Test remote annunciators		\Box		\Box	х		\top		
Test air sampling				\Box	х	1	\Box		
Test duct detectors					x	7			
Test HVAC control dampers					х	1		\exists	
Test suppression release systems					Х				
Test heat detectors				\Box	Х				
Test smoke detectors					Х				
Test waterflow and tampers				Х					
Test post indicator valves			X						
Test alarm notification appliances					х		\Box		
Test dialers and interface equipment					Х				
Tunnel Lights									Vlanufacturers O&M Manual for luminaires - Not Provided
Verify proper operation of the lighting fixtures in the tunnel areas	X								
Count and record number of lights out on night lighting and day lighting	X		_				\sqcup		
Replace any inoperable components	x								
Clean exterior of lenses on all lighting fixtures in the tunnel			Х						
If required clean interior of lenses			Х						
Perform group replacement for any lunminaires that have failed					x				

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