Inspection- and Installation Guide

Martin® CLEANSCRAPE Belt Cleaning System Type S

martin® CLEANSCRAPE

MARTIN ENGINEERING
a global company

Contents

1. Safety

1.1 Important information

This guide helps you to operate the Martin® CLEANSCRAPE Type S product in a safe and effective way.
Familiarise yourself with the content of this guide before you install the product and start to use it.
Pay particular attention to the warning instructions given in this guide. Failure to comply with these instructions entails risk of serious personal injury and property damage.
Do not attempt to commission the device if you do not understand the safety instructions provided.
Inform your superior or your safety inspector.
The scraper may be used for its intended purpose only to avoid damage and injuries.
All necessary measures must be implemented by trained staff only. The operating company is responsible for compliance with applicable regulations and instructions at the location of use.

The following pre-requirements are to be accomplished:

1. Professional configuration of the device in line with its use.
2. Installation of the device according to the assembly and operation manual.
3. Operation of the device in the scope of the approved conditions of use.
4. Regular visual checks in line with the manufacturer's instructions.

1.2 Intended use

General use

The **Martin® CLEANSCRAPE Type S** front-end drum scraper cleans conveyor belts by removing bulk material adhering to them immediately at the discharge drum. It must be installed on the front edge of the discharge drum as a helical curve (helix). The ideal installation angle is 17°; angles from approx. 10 degrees to 22,5 degrees are permissible. As a matter of principal, the scraper should be assembled so deeply that it avoids any contact to the material stream!

General operational conditions

Drum diameter from 270 mm to 550 mm
Belt widths up to a ratio of max. 3 : 1 to the drum diameter
Belt speed up to 6 m/s
Conveyor belt type: rubber or PVC with smooth cover plate.
Recommended hardness > 80 Shore A
Belt connection: vulcanised with a hardness difference of less than 5 Shore A (measured according to DIN 53505)
Connect using any commercially available belt connectors (hook seams)
(For belt speeds > 4 m/ s please consult **Martin Engineering)**
Ambient temperature from -20° C up to +80° C
Direction of belt travel: suitable for normal and reversing operation
You can use the factory standard product in areas with a risk of explosion (ATEX).

Optional operational conditions

In case of deviating operating conditions, please consult **Martin Engineering**. Commissioning the product outside of the permissible operating conditions can cause serious personal injury and property damage.
For special designs, please contact **Martin Engineering.**

1.3 Changes to components

Modifications to components and deviating configurations, installations, operation and maintenance are subject to written approval by **Martin Engineering.** Failure to observe these instructions entails risk of serious personal injury and property damage.

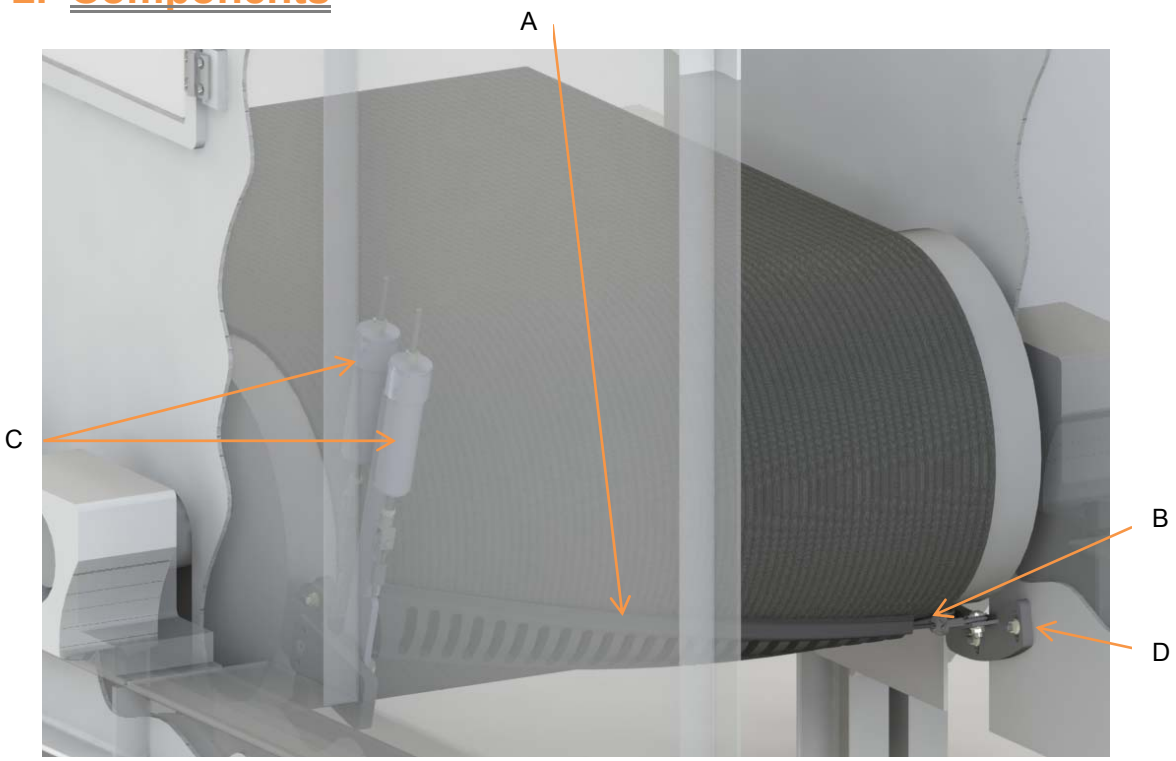
1.4 Hazard warnings

- During operation, unpredictable evasive movements may occur. There is danger of crushing. The operating company must take appropriate safety measures (safety fencing, warning signs).
- Wear on the scraper can cause sharp burrs and edges. There is risk of injury during disassembly or maintenance work.
- In operation, the scraper can heat up considerably due to friction while running. Touching it immediately after stopping the conveyor system can cause burns.
- Mineral or metal parts can adhere to the surface of the belt. When they run over the scraper edge sparks can occur in exceptional cases.
- If the structure of parts exposed to wear weakens, there is danger of fractures. To ensure safety of persons and equipment, these parts must be replaced with new parts.

1.5 Safety measures during installation and maintenance work

- Installation and maintenance work on the scraper must only be performed when the conveyor belt system is stopped and locked. Cordon off the work area. The work must be approved by the responsible works manager.
- Always use appropriate work and protective clothes, in particular, safety shoes, gloves, hard hat and safety goggles.
- In case of any welding or cutting work, the permission of the operating company is to be obtained.
- If there is risk of falling, appropriate safety devices must be installed; for example, scaffolding, railings, safety nets and safety belts. This equipment must be inspected and approved for the relevant work.
- Before commissioning a scraper, always ensure that the construction site is completely clear. All parts, such as scaffolding, hoisting devices and tools must be removed from the area in which the conveyor system is started up. Any safety systems previously removed (hoods, coverings, etc.) must be refitted.
- Check if all screw connections are securely tightened following any maintenance work or commissioning. Do not reuse fasteners (chain locks, lock nuts, shackles), but replace them with new parts. In case of mechanical damage, including corrosion, always use new parts.
- **Use original spare parts only!**

2. Components



A Scraper body
B Tensioning ropes
C System tensioner with pressure springs
D System fixed point

2.1 Design

The **Martin® CLEANSCRAPE Type S** front-end drum scraper is a robust, stand-alone, flexibly adjustable device for cleaning the header drum of conveyor belts. The single-row, overlapping scraper module is fitted with carbide metal scraper edges. The carbide metal runners for applying the force are integrated into the scraper module.

2.2 Function

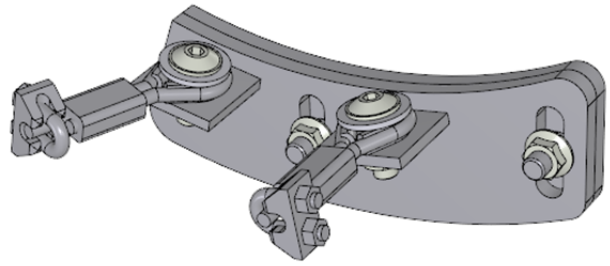
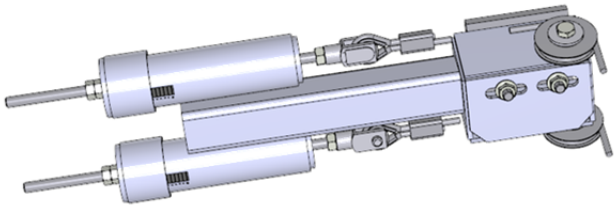
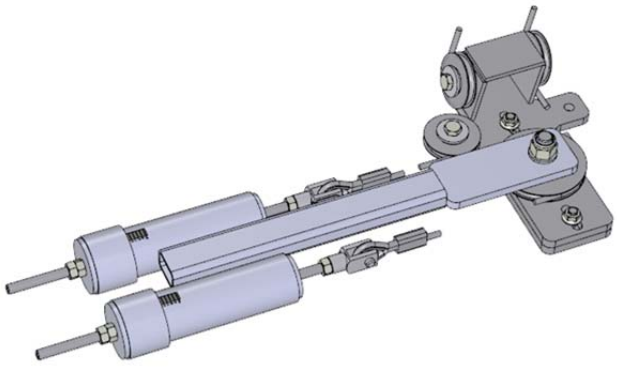
The **Martin® CLEANSCRAPE Type S** front-end drum scraper is comprised of 3 main assemblies, the fixed point bearing system, system tensioners with 2 pressure springs and scraper module.

The scraper module has several overlapping scraper edges made of carbide metal; they are pressed against the belt by the steel rope and system tensioner and tensioned helically to remove the bulk material adhering to the belt. The cleaning side with the carbide metal edges is exposed to single-sided wear in operation and thus implemented as an easily replaceable wear part. The module has a cleaning side and a running side, which are connected via springs to allow controlled evasion in case of continuous uneven surface of the belt running through it.

The system tensioner for retaining the scraper module comprises multiple parts. The scraper module is fastened to the system tensioner and system fixed points by means of ropes. This fixture type allows tailored adjustment of the module with respect to the belt. The system fixed point connects the tensioning ropes and system tensioner. The installation position of the system tensioner can be on the upper or lower rope deflector. The system fixed point is welded onto the opposite of the system tensioner on the inside of the chute.

The scraper is mounted using ropes with fixed point and system tensioner onto the chute wall. The displacement system has 2 adjustment screws that allow the scraper to be moved into or away from the belt. In addition, the pressure spring spindles allow the assembly fitter to define the pre-tensioning of the system tensioners.
If needed, adaptor for outside assembling can be mounted on the system tensioner. This allows variable fixing of the scraper on the chute walls.

2.3 Component overview

Component	Description	Drawing number	AMS number
	Fixed point, small scraper	100.01.03.00	039235
	Small system tensioner, steep	100.01.11.00	104619
	Small system tensioner, rotary	100.01.12.00	104543

2.4 Carbide metal choice

CLEANSCRAPE is available in 4 degrees of hardness and one of chemically resistant carbide metal variants:

- TU01 – standard version, suitable for all less abrasive materials and low belt speed and/or allowed for all mechanical belt connectors.
- TU02 – version for moderately abrasive materials and medium belt speeds. Limited application with mechanical belt connectors (assembling instructions for belt connectors must be complied with!)
- TU03 – version for highly abrasive materials and high belt speeds. Not to be used with mechanical belt connectors.
- TU05 – version in degree of hardness between TU01 and TU02 with chemical resistance.

Classification of different materials

Less abrasive materials:	limestone, salt, sugar, brown coal (lignite), anthracite coal
Moderately abrasive materials:	gravel, clinker, sandstone, recycling waste
Highly abrasive materials:	sand, glass, ore
Extremely abrasive materials:	quartz sand, glass ash, kaolin, ore

Correlation of the degree of hardness to the material

Belt speed	low abrasive material	moderately abrasive material	highly abrasive material	extremely abrasive material	chemical resistance
0,5 m/s	TU01	TU01	TU02	TU03	TU05
1,0 m/s	TU01	TU01	TU02	TU03	TU05
1,5 m/s	TU01	TU02	TU02	TU03	TU05
2,0 m/s	TU01	TU02	TU02	TU03	TU05
2,5 m/s	TU01	TU02	TU02	TU03	TU05
3,0 m/s	TU01	TU02	TU02	TU03	TU05
3,5 m/s	TU02	TU02	TU02	TU03	TU05
4,0 m/s	TU02	TU02	TU02	TU03	TU05
4,5 m/s	TU02	TU02	TU03	TU03	
5,0 m/s	TU02	TU02	TU03	TU03	
5,5 m/s	TU02	TU03	TU03	TU03	
6,0 m/s	TU02	TU03	TU03	TU03	

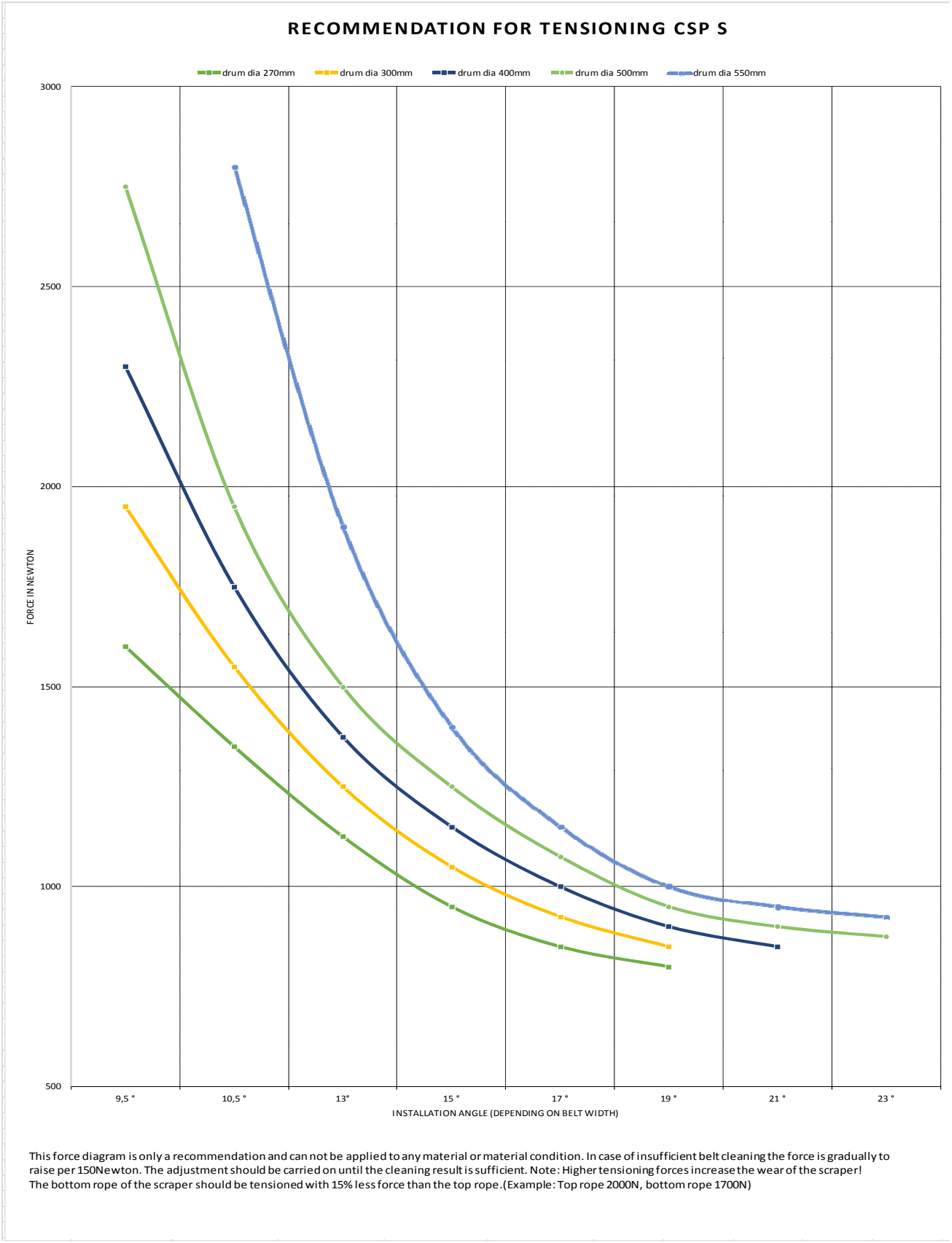
3. Assembly instructions

3.1 Drilling table for the ducts (in case of outside assembling of the system tensioner)

chute width approximately 1,2*belt width

drum dia	belt width	400mm	500mm	600mm	700mm	800mm	900mm	1000mm	1100mm	1200mm	1300mm	1400mm
270mm	X1.1	154,5	155,4	156,2								
	Y1.1	0	0	0								
	X2.1	126,7	127,8	128,8								
	y2.1	-88,4	-88,4	-88,4								
	X1.2	92	96,1	91,1								
	Y1.2	-124,1	-122,1	-127								
	X2.2	4,4	9,6	3,3								
	Y2.2	-154,4	-155,1	-156,2								
	angle	-14,5	-11,5	-10								
300mm	X1.1	169,5	170,4	171,2	172,1							
	Y1.1	0	0	0	0							
	X2.1	144,6	145,6	146,7	147,7							
	y2.1	-88,4	-88,4	-88,4	-88,4							
	X1.2	92,3	91	98,7	99,3							
	Y1.2	-142,2	-144	-140	-140,6							
	X2.2	4,6	3	12,3	13							
	Y2.2	-169,4	-170,3	-170,8	171,6							
	angle	-16,5	-13,5	-11	-9,5							
350mm	X1.1	191,5	195,4	196,2	197,1	198						
	Y1.1	-33,8	0	0	0	0						
	X2.1	155,3	174,2	175,2	176,2	177,2						
	y2.1	-117,1	-88,4	-88,4	-88,4	-88,4						
	X1.2	94	92,6	92,9	98,2	102,7						
	Y1.2	-170,3	-172	-172,9	-170,9	-169,3						
	X2.2	6,4	4,7	5,1	11,2	16,3						
	Y2.2	-194,4	-195,3	196,2	-196,8	-197,3						
	angle	-17,5	-16	-13,5	-11,5	-10						
400mm	X1.1	216,2	220,4	221,2	222,1	223	223,9					
	Y1.1	-38,1	0	0	0	0	0					
	X2.1	182,5	201,9	202,8	203,8	204,7	205,7					
	y2.1	-121,9	-88,4	-88,4	-88,4	-88,4	-88,4					
	X1.2	125	102,8	95,3	93,1	107,6	100,3					
	Y1.2	-180,4	-195	-199,7	-201,7	-195,3	-200,2					
	X2.2	41,8	15,9	7,6	5,2	21,4	13,1					
	Y2.2	-215,5	-219,8	-221,1	-222,1	-222	-223,5					
	angle	-18	-18	-15,5	-13,5	-11,5	-10,5					
450mm	X1.1	240,8	241,6	246,2	247,1	248	248,9	249,7	250,6			
	Y1.1	-42,5	-42,6	0	0	0	0	0	0			
	X2.1	209,1	210,1	229,8	230,8	231,7	232,6	233,6	234,5			
	y2.1	-126,6	-126,8	-88,4	-88,4	-88,4	-88,4	-88,4	88,4			
	X1.2	158,4	112,9	95,4	102	111,3	96,1	113,6	92,9			
	Y1.2	-186,3	-217,9	-227	-225,1	-221,6	-229,6	-222,4	-232,8			
	X2.2	80,3	26,8	7,6	14,8	25	8,3	27,5	4,9			
	Y2.2	-230,9	-243,9	-246,1	-246,7	-246,7	-248,7	-248,2	-250,6			
	angle	-18	-18	-17,5	-15	-13	-12	-10,5	-10			
500mm	X1.1	265,4	266,3	267,1	272,1	273	273,9	274,7	275,6	276,5		
	Y1.1	-46,8	-47	-47,1	0	0	0	0	0	0		
	X2.1	235,4	236,3	237,2	257,4	258,3	259,2	260,1	261,1	262		
	y2.1	-131,3	-131,4	-131,6	-88,4	-88,4	-88,4	-88,4	-88,4	-88,4		
	X1.2	189,4	150,6	106,8	110,2	113,5	113,3	102,1	100,7	109,5		
	Y1.2	-191,8	-224,5	-249,3	-248,8	-248,3	-249,3	-255,1	-256,6	-253,9		
	X2.2	116	69	19,7	23,4	27	26,8	14,6	13,1	22,5		
	Y2.2	-243,3	-261,4	-270,5	-271,1	-271,7	-272,6	-274,4	-275,3	-275,6		
	angle	-18	-18	-17,5	-16,5	-14,5	-13	-12	-11	-10		
520mm	X1.1	275,3	276,1	277	282,1	283	283,9	284,7	285,6	286,5		
	Y1.1	-48,5	-48,7	-48,8	0	0	0	0	0	0		
	X2.1	245,8	246,7	247,6	267,9	268,8	269,8	270,7	271,6	272,5		
	y2.1	-133,1	-133,3	-133,4	-88,4	-88,4	-88,4	-88,4	-88,4	-88,4		
	X1.2	201,3	164,6	113,1	97,2	96	115,6	101,5	97,3	104,2		
	Y1.2	193,9	-227	-257,5	-264,9	-266,2	-259,3	-266	-268,6	-266,9		
	X2.2	129,7	84,6	26,5	9,3	8	29,1	13,9	9,4	16,7		
	Y2.2	-247,6	-267,3	-280	-282	-282,9	-282,4	-284,4	-285,5	-286		
	angle	-18	-18	-18	-17,5	-15,5	-13,5	-12,5	-11,5	-10,5		

3.2 Force diagram



This force diagram is only a recommendation and can not be applied to any material or material condition. In case of insufficient belt cleaning the force is gradually to raise per 150Newton. The adjustment should be carried on until the cleaning result is sufficient. Note: Higher tensioning forces increase the wear of the scraper!
The bottom rope of the scraper should be tensioned with 15% less force than the top rope.(Example: Top rope 2000N, bottom rope 1700N)

Before assembling the system, make sure that the delivery is complete. For more information on the dimensions and individual parts refer to the dimensional sheets and spare parts lists.

3.3 Defining the installation position

(Figure 1)

- Defining the drilling position using the dimensions from the table 3.1
- Mark the position on the side wall inside.
- The ideal installation angle is at an inclination below 17 degree. It may be adjusted from approx. 10 to 22 degrees. For that purpose the drilling tables in Section 3.1 should be referred to.

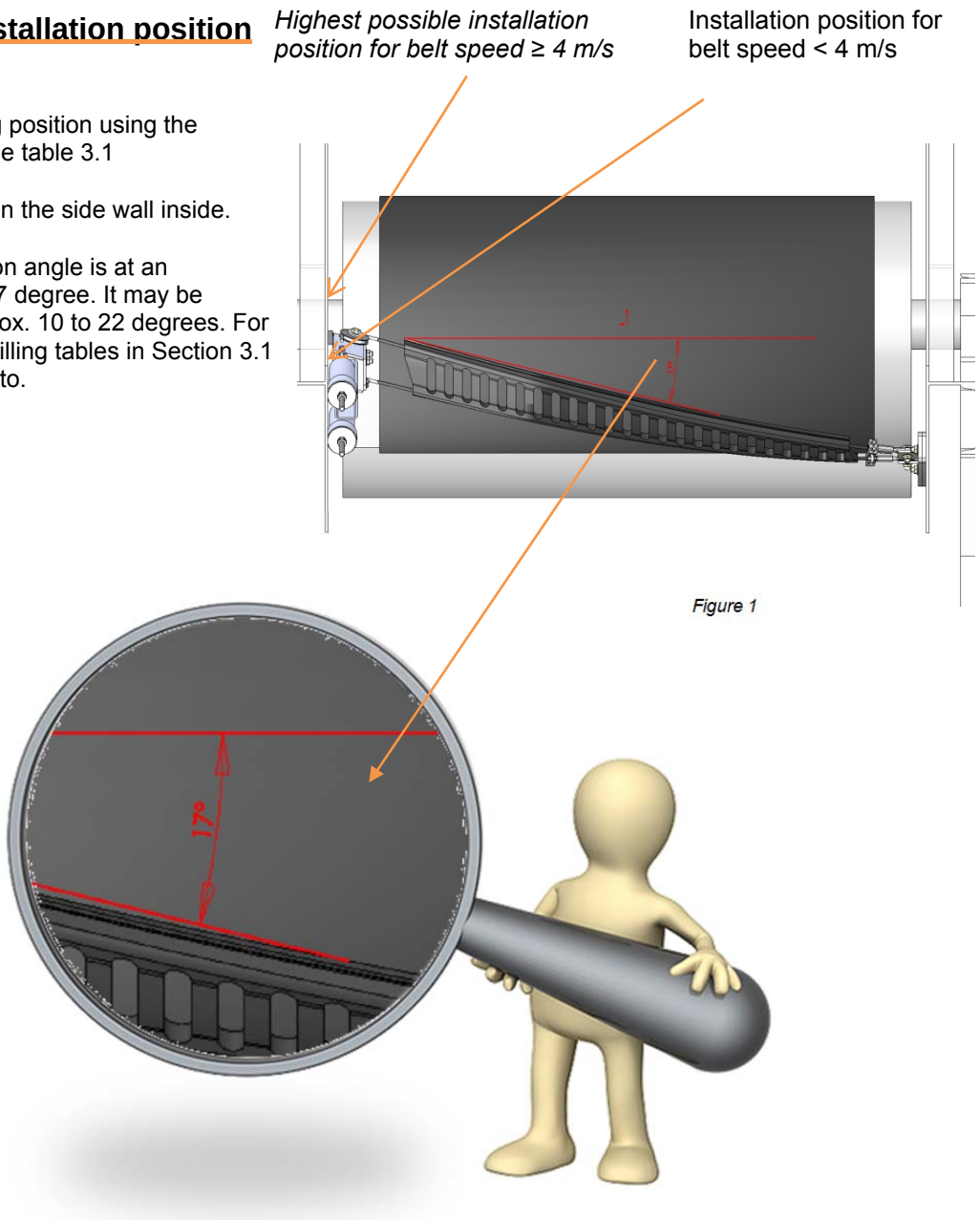


Figure 1

3.4 Drilling holes for the system tensioners

It is required only in case the inside assembly of the tensioning elements is not possible or the clients request an outside assembling. In this case, mark the dimensions X1.1 / Y1.1 and X2.1 / Y2.1 (Figure 3) from the drilling table (Section 3.1) on the side wall outside. Drill the holes on these positions, minimum diameter 50 mm (Figure 2).

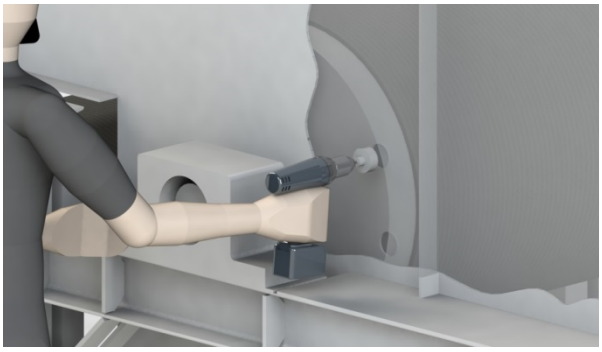


Figure 2

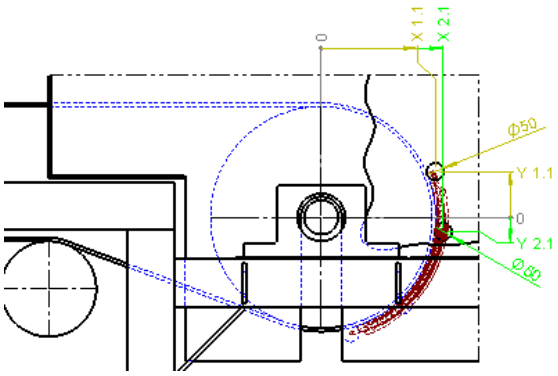


Figure 3

3.5 Choosing the tension set

- steep system tensioner (Figure 4),or
- rotary system tensioner (Figure 5)

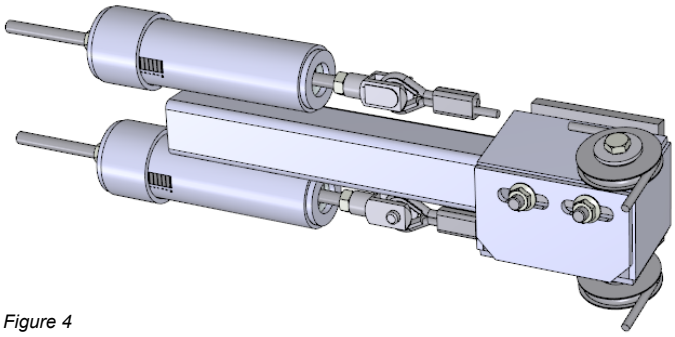


Figure 4

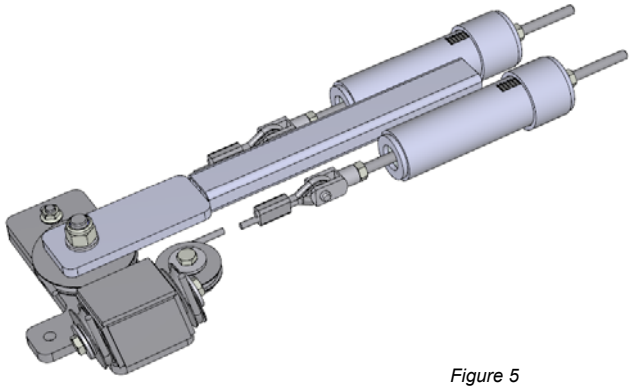


Figure 5

3.6 Fixing the welding plates of the system tensioner

Weld or bolt the welding plates on the inside of a chute, using dimensions X1.1 / Y1.1 and X2.1 / Y2.1 from the drilling table, tangentially to the belt surface (Figure 6).
On the welding plates there are holes for the carriage bolts.

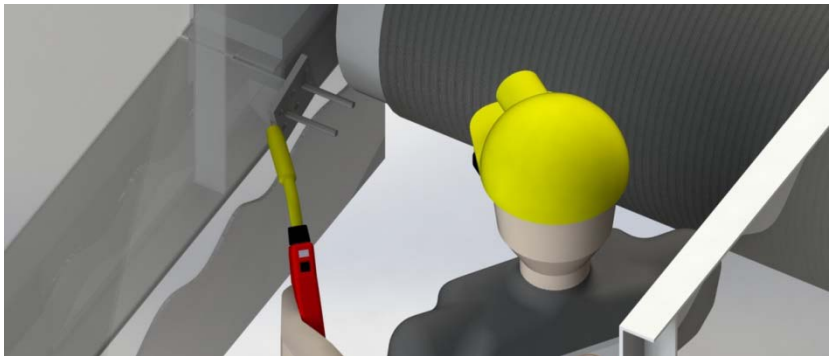


Figure 6

3.7 Mounting the fixed point holder

For fixing the lower rope deflector of the Martin® CLEANSCRAPE Type S, align the welding plate of the fixed point holder (Figure 7) to the dimensions X1.2 / Y1.2 and X2.2 / Y2.2 of the drilling table and weld it on (Figure 8).

Attach the fixed point holder to the welding plate and fix it tightening the nuts (Figure 9).

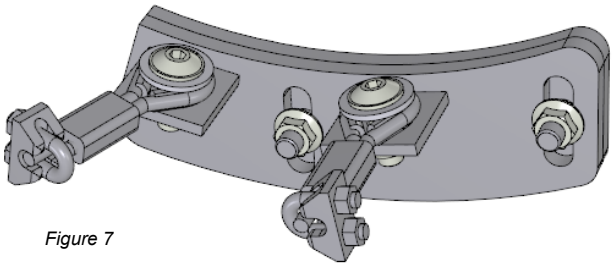


Figure 7

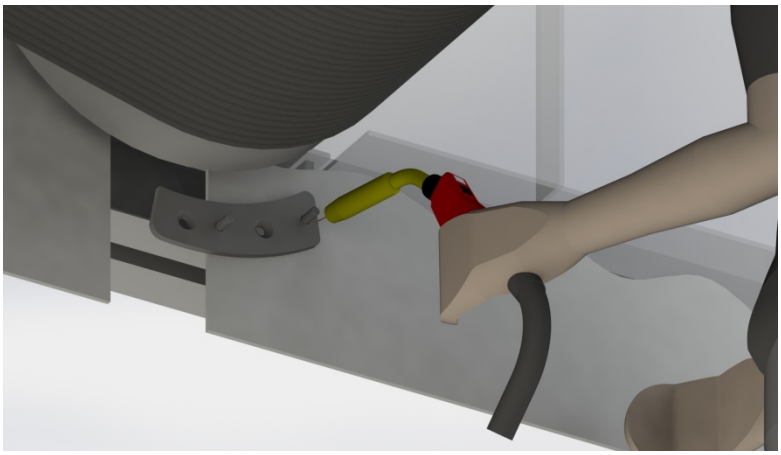


Figure 8

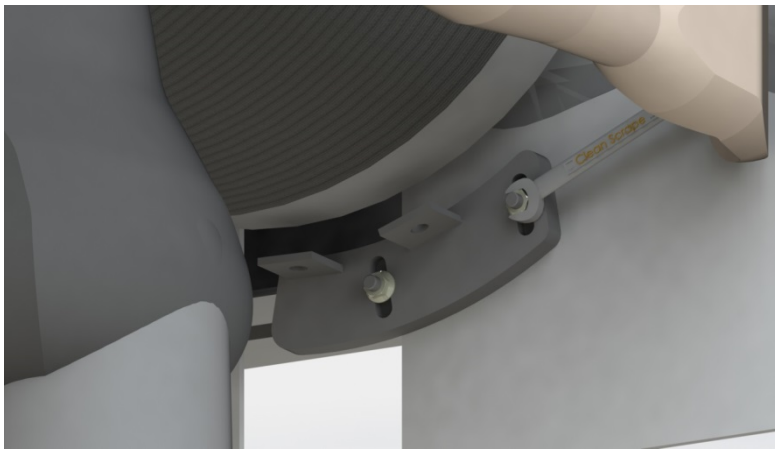


Figure 9

3.8 Tension the scraper and bring into the operating position

- Attach the system tensioner onto the welding plate; fasten the clamping nuts (1) of the system tensioner hand-tight.
- Tension the pressure springs in the system tensioner by tightening the nut (2) until the scraper lies fully flush against the belt and the bushing scale shows the tension value from the drilling table. Then lock it up fixing an additional nut (3).
- Tighten the clamping nuts of the system tensioner (1) (Figure 10).
- Tighten the two clamping nuts (4) of the system fixed point.
  (Figure 11)
- Check the position of the tensioning ropes. They must line up tangenially to the drum surface passing to the deflector.

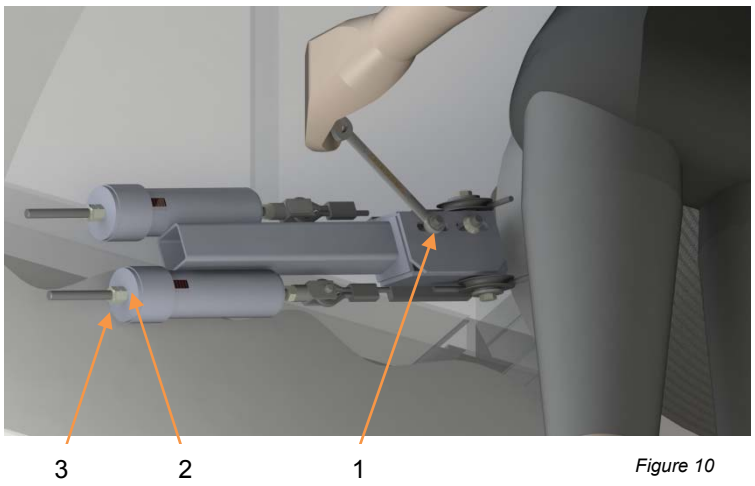


Figure 10

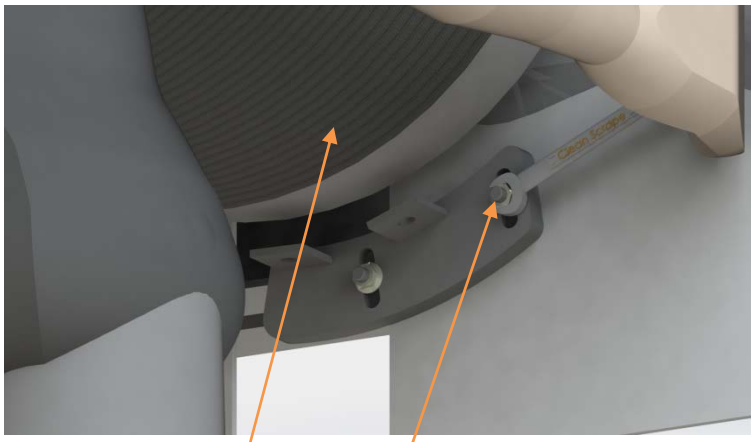


Figure 11

3.9 Checking the installation

- Tighten and lock all screw connections.
- Tighten the nuts on the system tensioner (1+3).
- Check if all components operate correctly.
- Check the clearance of the module by pulling off the belt (5).
  CAUTION: The scraper is now in operating position. The tensioning units of the scraper module are tensioned. When threaded joints are loosened, they can release energy abruptly. There is danger of injury.
- Remove the installation material and tools from the location of use.

3.10 Test run

The following test runs are required to check the proper functioning of the scraper:

- Perform a test run with the conveyor belt unloaded (at least 15 minutes)
  Check the scraper, especially at the transition points of belt connectors and mends.
  This test run should last at least 15 minutes to ensure all components are checked properly.

- Perform a test run with the conveyor belt loaded (at least 30 minutes)
  Check the achieved cleaning performance. If needed, adjust individual tensioners or fixed points while the conveyor belt is stationary. Due to the changing load of the bulk material being conveyed or changes in the properties of the bulk material, this check should last at least 30 minutes. In case of inefficient belt cleaning or flooding of the system, the system tensioners must be tensioned additionally, 100 Newton more each. The adjusting of the system tensioners should be carried on until the cleaning effect is sufficient.
  Make sure that there are no persons dangerously close to the conveyor system and follow the rules for safe commissioning of the system

4. Inspection and service

The system tensioners must be visually checked at regular intervals to ensure the proper function of the entire scraper system. The tension degree on the scale must correspond to the data in the drilling table or they should be re-tensioned, if necessary. The necessary safety precautions for all service work on scrapers and conveyor belt systems are always to comply with.

4.1 Initial inspection

Immediately after the first full day of operation of the scraper, a visual check must be performed.
In this process, the device function, cleaning performance, material flow and smooth running of the scraper are to be checked. Check the belt surface as well as the belt connectors and mends along the entire length of the belt.

Inspection work

1. Functional check of the system tensioners (the tension degree on the scale must correspond to the data in the drilling table).
2. Check the belt surface and belt connectors.
3. Check screw connections.
4. Perform a test run.

4.2 Follow-up inspection

You must perform regular follow-up inspections; the intervals are variable and mainly depend on the load to which the scraper is exposed. The follow-up inspection includes a visual check of all components. The system tensioner must be checked visually inspecting the pressure springs (the tension degree on the scale must correspond to the data in the drilling table). Additionally, check the state of the carbide metal and clean the scraper, if needed, removing any bulk material adhering to it. The scraper module must be replaced if the carbide metal wear is ≥ 5 mm as the belt damage will otherwise be inevitable. When cleaning the scraper, be sure to avoid damaging the scraper edges of the module. **CAUTION -** damaged scraper edges can lead to the belt damage and impair the cleaning performance. For further reference, regard the general hazard warnings**.**

Inspection work

1. Functional check of the tension unit.
2. Inspect and possibly repair the corrosion protection of all components.
3. Inspect the wear state of all components.
4. Replace worn or damaged components with original parts.
5. Before reinstalling a used module, remove all sharp carbide metal edges.
6. In case of a belt change, install and readjust the scraper in line with the assembly and operation manual.
7. Check screw connections.
8. Perform a test run.

4.3 Maintenance

Under normal operating conditions, you should check the scraper every 16 weeks.
Martin Engineering will be happy to advise you if you have any questions relating to defining the exact inspection intervals or required actions within the scope of maintenance.

Martin Engineering Service

On request, the service department at **Martin Engineering** will be happy to handle all required inspection work. Service employees from **Martin Engineering** or partner companies are available worldwide to perform the work. In addition to this, **Martin Engineering** offers training seminars on topics of selecting, installing and maintaining its cleaning systems.

Notes

Layout

Technical alterations

The scraper is subject to ongoing development and may contain modified components.

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