

Topic	<b>2 – Purchasing Terms</b>			
Specification	<b>2.7 Specification for surface treatment</b>			
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<b>No.</b>	<b>Topic</b>
1	Paint Products
2	Daily Report
3	Pre-treatment of Steel Constructions Before Delivery/Painting
4	Colors
5	Assembly instructions for Fireproofing and cable penetrations and cable trays

**Purchaser in this document is Sør-Norge Aluminium AS**

## Description of Surface Treatment of Steel and Aluminum Structures

### 1.1. Introduction

#### 1.1.1. Objective

The norm has been created to get an optimally uniform treatment of the surfaces of steel constructions, with proper quality. The created systems will cover various environments and applications, and discrepancies from the norm should therefore only occur for particular objects.

#### 1.1.2. General

Purchaser will always specify paint system in their inquiries. The products of the specified manufacturers shall be used unless otherwise described or agreed in writing beforehand.

#### 1.1.3. Standards

Pre-treatment:	ISO 8501-1 <i>which is equivalent to DIN 55928</i>
Chemical purity:	ISO 8502- 1 to 4
Surface texture:	ISO 8503-1 Ry 2 - 3
Adhesion test:	ISO 4624

#### 1.1.4. Deviations

Any deviations from the norm must be approved in writing from the Purchaser.

### 1.2. Source

This description is essentially built up similarly to Norsk Hydro's norm EH-015 and Purchaser's earlier Building Technical Specification section 1.5 Paint Work and Specification, with certain changes and updates.

#### Abbreviations:

Purchaser	- Sør-Norge Aluminium AS
Seller	- Paint Supplier
PUR	- Polyurethane
ISO	- International Standardizing Organization
TFT	- Dry Film Thickness indicated in µm. (Micron)
YL	- Industrial Hygiene Air requirement
RAL	- International Color Code

### 1.3. Public Regulations and Requirements

Current Norwegian regulations for health protection in connection with blast cleaning and paint work shall be followed at all times, see order no. 566, 377, 551, **431** and 470 from the Labor Inspection. Work hygiene product data sheets shall be present at the work place when buying and using paint products.

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## 1.4. Pre-treatment

### 1.4.1. Steel Treatment

New steel, welds and edges from torch cutting shall have the same texture grade as specified for the project as a whole. Edges resulting from cutting and sawing shall be ground down, minimum = 2 mm. Welding spatter and knobs shall be ground away. Rough hand welds shall be smoothed out. Holes in the welds shall be re-welded.

### 1.4.2. Degreasing

Before blast cleaning or mechanical cleaning and whenever it is required, the surface shall be degreased with a suitable degreasing agent and cleaned with an emulsification agent and water.

### 1.4.3. Cleaning:

### 1.4.4. Blast Cleaning

Blast cleaning shall be performed by pressured air at 7 bar min. with a free blast or as vacuum blasting. Water jet shall be used whenever possible. The blasting air shall be clean, dry and free of oil and grease.

Blasting agent: Steel grit, aluminum-silicate (slag from heat power plants), metallurgic slag or olivine sand. Recommended particle size for all: 0.2 – 1.5 mm, with an average of 0.6 mm. After blast cleaning, dust and blasting agent shall be carefully removed with a broom, vacuum cleaning or oil and water free pressured air.

### 1.4.5. Mechanical Cleaning

Mechanical cleaning by scraping, steel brushing, grinding is not a good cleaning method for advanced paint systems. This shall only be used following a specific description from the Purchaser and in that case only where blast cleaning is not possible for some particular reason. To achieve acceptable cleaning results, a 3M disk should preferably be used for the final cleaning, ISO 8501-1, St 2 -St 3.

### 1.4.6. Cleaning Quality after Pre-treatment

The cleaning quality grade is specified for each paint system. Regarding characteristics for the cleaning quality grades, see the standard ISO 8501-1.

### 1.4.7. Roughness after Blast Cleaning

For roughness checks, use ISO 8503-1, segment 2/3.

### 1.4.8. Priming

Priming coats shall be applied to the blasted surfaces as soon as possible after the blasting to ensure that the surface satisfies the requirements for cleaning quality grade when the paint is applied. Environment conditions like temperature, humidity, air quality, etc. determine what procedures may be allowed. The time interval, which may vary according to the conditions, will be decided together with the Purchaser in each specific case. In case the surface gets dirty or new rust develops before priming, a new pre-treatment shall be performed in accordance with item 3. Strip coating shall be performed with a round brush as the first coat on sharp edges, hand welds, and places that are difficult to reach with the pressurized spray.

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## 1.4.9. Cleaning Between Paint Coats

In case the steel surfaces get soiled from dirt or salt/acid between priming coats and the last paint coat, they shall be carefully rinsed/washed with fresh water and blasted dry with clean and dry pressurized air before more coats are applied. Alternatively, the constructions can be covered. This shall be agreed with the Purchaser before starting the work.

## Paint Systems and Corrosion Classes

### 1.5. General

Paint systems are specified according to environment classes and corrosion classes. Each system is given a number. Details for paint systems are included in attachment 1.

Paint systems in attachment 1 are only mandatory when it is explicitly specified that they shall be used. When paint systems are not specified, Contractor shall, for all items to be painted, submit corrosion categories (in accordance with ISO 12944 etc.) and paint systems for Purchaser's approval.

The paint work shall be performed under quality climatic conditions. The steel surfaces shall not have been exposed to precipitation or fallout from ash plants before painting, and they shall have a temperature that is at least 3°C over the dew point of the steel. The relative air humidity shall not exceed 85% and the air temperature shall normally not be under 5°C. For other climatic conditions, the painting shall only be performed according to agreement with the Purchaser's supervisor and if necessary the paint Supplier. All instructions on the product data sheet from the paint Supplier must be carefully observed and followed. The Supplier has the full responsibility to ensure the corrosion protection is performed according to the specified requirements.

All reparation areas where blast cleaning can be performed shall be treated in accordance with the main system. When applying a paint program, the paint for each coat shall be from the same manufacturer.

Paint systems that include other environment and corrosion classes than the ones mentioned above, shall be agreed with the Purchaser's representative for each case.

#### 1.5.1. Painting of Screw Connections, Edges, etc.

Before each paint coat, screw connections and sharp edges, in addition to areas that are difficult to reach, shall be given an extra coat with a brush to ensure the dry film thickness is sufficient in these areas. A roller shall not be used for spot painting in the first coat or painting the first coat.

### 1.6. Information in the Paint Systems

#### 1.6.1. Environment/Object

The environment where the system is suitable.

#### 1.6.2. Cleaning

Degree of blast cleaning or specification for other cleaning.

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## 1.6.3. Dry Film Thickness (DFT)

Total DFT is a minimum requirement. For single coats, a moderate deficiency in DFT is allowed. For some systems it is important that the single coats are not too thick. All recommendations from the manufacturer shall be followed.

## 1.6.4. Coats

Normally, priming, middle, and cover coats are used.

## 1.6.5. Paint Type

The paint type for each coat is listed. All paint shall be approved by the Purchaser before use. All paint for the same project shall be from the same manufacturer and shall be of first class quality. The Supplier should be certified according to ISO 9001.

## 1.6.6. YL-group

YL indicates Industrial Hygiene Air Requirement. There are 7 groups, 00, 0, 1, 2, 3, 4, and 5. *See also order number 431 from the Labor Inspection Authority.*

## 1.6.7. Tools

Indicates which paint tools may be used.

HTS = High Pressure Spray

LFS = Air Atomization Spray

## 1.6.8. Covering Ability

Specified as m<sup>2</sup>/l for each coat and is an approximate value. Some manufacturers use the term "coverage".

## 1.6.9. Time Intervals between Paint Coats

Time intervals between each coat shall be in accordance with recommendations from the manufacturer. The items in this description are only guidelines.

## 1.7. Painting under Insulation

Normal steel surfaces shall be painted when the conditions make it necessary. Stainless steel surfaces which can be exposed to high humidity and chlorides shall be painted before insulating. Pre-treatment before painting stainless steel surfaces shall be performed as light blast cleaning (sweep blasting) with a non-metallic and chlorine free blasting agent. Valves and other equipment shall be treated the same way as the piping or container to which they belong.

## 1.8. Trash

Blasting agents and left-over paint are considered special waste and shall be treated and disposed by the Supplier in accordance with all regulations.

## 1.9. Control Routines

### 1.9.1. Work Control

Contractor shall perform control checks of their own work. Contractor is also obligated to help the Purchaser's control supervisor with the checks they deem necessary, also when arriving, securing, etc.

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## 1.9.2. Documentation

Contractor shall keep daily reports for the work, including all control checks. See attachment 2. The report shall include: Objects, weather conditions, air temperature, % RH, steel temperature, pre-treatment/cleaning method, performed "strip coating", number of coats, paint type, product number, color, DFT of each coat + total, and adhesion test. The adhesion test shall be in accordance with the guidelines in ISO 4624 (Pull off Test). The minimum adhesion shall be 3 MPA. The Purchaser's control supervisor shall be given the opportunity to review the control check results as the work progresses. A copy of the documentation shall be delivered to the Purchaser's control supervisor as agreed, minimum once per week.

## 1.9.3. Clearance Approval before Painting

The paint work must not commence until the Purchaser's control supervisor has given the approval to start. Clearance is required for both the first and the following coats. This also applies for delivery/constructions ordered by the Purchaser to be performed externally.

## 1.9.4. Approval

The Purchaser's control supervisor shall be given the opportunity to approve the work before each paint coat. This is especially important for the primer coat, the last middle coat and the top coat. If the dry film thickness is too thin, more paint shall be applied before approval.

## 1.9.5. Flaws and Deficiencies

The paint specifications can only be deviated from if agreed in writing. If the wrong product has been used or if the procedure is faulty, repainting, in accordance with the specifications, shall be performed at no extra cost for the Purchaser. This can alternatively be accomplished after delivery/mounting of the construction if the progress so requires. Price Estimate, according to *NS 8405* item 32.5 is omitted as a whole for paint work.

In case the Purchaser reaches the conclusion that access or other conditions hinder repainting, the warranty period shall be extended by 5 years. Proof for the cause of possible damages and flaws in the total warranty period are irrelevant to the Purchaser. Furthermore, price reduction resulting from flaws or damages will be demanded, calculated from the reduced value of the construction.

As a minimum, the price reduction shall be equal to the difference resulting from the work not being in accordance with the contract, plus whatever extra costs the Purchaser may endure.

## 1.9.6. Colors

The colors that are described in attachment 4 shall be used for constructions and equipment.

## 1.10. Fire Proofing of Penetrations and Sectioning

### 1.10.1. General

For fire proofing, FLAMMASTIK (manufactured by Jak. J. Alveberg AS) or an equivalent product shall be used. Sealing of penetrations and paint application shall be performed in accordance with the Supplier's description. Furthermore, when nothing else is prescribed, the sealing shall be of the same fire class as the part of the building where the sealing is being applied. The Purchaser shall approve the product and application method before the work is performed.

### 1.10.2. Laying Cable

Cable trays/bridges shall end 50 cm from the penetration to insure good sealing and access. Drawing No. 24479, attachment 1, show respectively penetrations in fire class A60 and A120, and also fire sectioning with painting of cables horizontally, vertically, and diagonally.

### 1.10.3. Penetrations for Piping and Ventilation

Shall be sealed with rock wool and fire-retardant paint, FLAMMASTIK or an equivalent product or approved fire retardant caulking if practical. Sealant foam or building foam must not be used.

### 1.10.4. Marking

The places where the proofing is done shall be clearly marked according to the case worker's instructions. ***The marking will contain the type of material, the performing company, date and person.***

### 1.10.5. Documentation

Product sheets and MSDS sheets shall be supplied to the Purchaser by Contractor prior to the material being delivered.

Paint System A1	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Dry Industry Atmosphere Indoors Max. Temp., Approx. 100° C Cleaning: Blast Cleaned Sa 2½ Total DFT: min. 170 $\mu\text{m}$	Primer Coats	2-comp. Zinc Rich Epoxy	Brush-HTS	1	50
	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	1	60
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	70
Paint System A2	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Alternating temperature and condensation indoors. Max. Temp., Approx. 100° C Cleaning: Blast Cleaning Sa 2½ Total DFT: min. 220 $\mu\text{m}$ .	Primer Coats	2-comp. Zinc Rich Epoxy	Brush-HTS	1	60
	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	1	100
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	70
Paint System A3	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Areas with highly corrosive environment. Max. Temp., Approx. 100° C Cleaning: Blast Cleaning Sa 2½ Total DFT: min. 320 $\mu\text{m}$ .	Primer Coats	2-comp. Zinc Rich Epoxy	Brush-HTS	1	60
	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	2*	200
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	70
Paint System B1	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Dry Industry Atmosphere Indoors Max. Temp., Approx. 100° C Cleaning: Steel brushing, St 2 - 3. Total DFT: 170 $\mu\text{m}$ .	Primer Coats	2-comp. Al.pig. epoxy mastic	Brush-HTS	1	60
	Middle Coats	2-comp. Al. pig. epoxy mastic	Brush-HTS-Roller	1	60
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	60
Paint System B2	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Altern. temperature and condensation indoors Max. Temp., Approx. 100° C Cleaning: Steel brushing, St 2 - 3 Total DFT: 220 $\mu\text{m}$ .	Primer Coats	2-comp. Al. pig. epoxy mastic	Brush-HTS	1	60
	Middle Coats	2-comp. Al. pig. epoxy mastic	Brush-HTS-Roller	2*	120
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	60
Paint System B3	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Areas with highly corrosive environment. Max. Temp., Approx. 100° C Cleaning: Steel brushing, St 2 - 3. Total DFT: 320 $\mu\text{m}$ .	Primer Coats	2-comp. Al. pig. epoxy mastic	Brush-HTS	1	60
	Middle Coats	2-comp. Al. pig. epoxy mastic	Brush-HTS-Roller	3 or more*	200
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	60
Paint System C1	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Dry Industry Atmosphere Indoors Max. Temp., Approx. 100° C. Base: Hot Galvanized Units and Aluminum. Cleaning: Degreasing with solvents, clean with synth. agent or light blast cleaning. Total DFT: min 170 $\mu\text{m}$ .	Primer Coats	Hot Galvanized/Aluminum			80
	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	1	60
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	50
Paint System C2	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Alternating temperature and condensation indoors. Max. Temp., Approx. 100° C Base: Hot Galvanized Units and Aluminum. Cleaning: Degreasing with solvents, clean with synth. agent or light blast cleaning. Total DFT: min. 220 $\mu\text{m}$ .	Primer Coats	Hot Galvanized/Aluminum			80
	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	1	100
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	50
Paint System C3	Coats	Paint Type	Tools	Number of Coats	DFT $\mu\text{m}$
Areas with highly corrosive environment.	Primer Coats	Hot Galvanized/Aluminum			80



Max. Temp., Approx. 100° C. Base: Hot Galvanized Units and Aluminum. Cleaning: Degreasing with solvents, clean with synth. agent or light blast cleaning. Total DFT: min. 320 µm.	Middle Coats	2-comp. epoxy mastic	Brush-HTS-Roller	2*	200
	Cover Coats	2-comp. PUR	Brush-HTS-Roller	1	50
* Large color difference between each coat					

## Paint Products

Paint products that can be used at the Purchaser's:

- Jotun
- Carboline
- International

## Paint Systems:

Environment Class 1	Dry industry atmosphere
Environment Class 2	Alternating temperature and condensation indoors
Environment Class 3	Areas with highly corrosive environment
Corrosion Class A	Painting of new steel and reparation with blast cleaning
Corrosion Class B	Reparation without blast cleaning
Corrosion Class C	Painting over hot galvanized units and aluminum

Paint System No.	Environment/Object
A1	Dry Industry Atmosphere Indoors Painting of new steel/reparation with blast cleaning Sa 2½
A2	Alternating temperature and condensation indoors. Painting of new/reparation with blast cleaning Sa 2½ <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>
A3	Areas with highly corrosive environment. Painting of new steel/reparation with blast cleaning Sa 2½ <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>
B1	Dry Industry Atmosphere Indoors Steel brushing, St 2 - 3
B2	Alternating temperature and condensation indoors. Steel brushing, St 2 - 3 <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>
B3	Areas with highly corrosive environment. Steel brushing, St 2 - 3 <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>
C1	Dry Industry Atmosphere Indoors Hot galvanized units/aluminum, light blast sweeping
C2	Alternating temperature and condensation indoors. Hot galvanized units/aluminum, light blast sweeping <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>
C3	Areas with highly corrosive environment. Hot galvanized units/aluminum, light blast sweeping <b><i>The form for daily reports shall be used here (Attachment 2)</i></b>

<b>DAILY REPORT</b> Attachment 2			Area/Object being treated:										Issued by:									
													Date:		Report no.:							
Project:			Area: m <sup>2</sup>		Contractor:			Person in charge.														
Date:			Cleaning:			Air temp.:			Approval of surface treatment				Signature:									
Method:			Cleaning agent:			Surface temp.:							Date:									
Abrasive:			Particle size:			Dew point:			SØRAL				Contr-actor		Sub-Contr.		Paint Supplier					
Standard:						Relative air humidity:																
Coat s No.	Strip coat ----- Spot coating	Batch no. Prod. no.	Date:	Time	Observations at start of work				Minimum dry film thickness my	Maximum dry film thickness my												
					Air temp.	Steel temp.	Dew point	Relati ve humi dity														
																Approval of paint application		Signature: Date:				
																Approval of surface treatment		Signature: Date:				
																SØRAL	Contr- actor	Sub- contractor	Paint Supplier			
																Approval of paint film		Signature: Date:				
																SØRAL	Contr- actor	Sub- contractor	Paint Supplier			
Specification No.:			NOTES:										Approval of final control				Signature: Date:					
System No.:													SØRAL				Contr- actor		Sub- contractor		Paint Supplier	
Drawing No.:																						
Responsible:			DISCREPANCIES:      Yes      No      If yes, specify in separate form.																			

## Pre-treatment of Steel Constructions before Delivery/Painting

## Attachment 3

Unless specified otherwise, the following shall be complied with before delivery/painting:

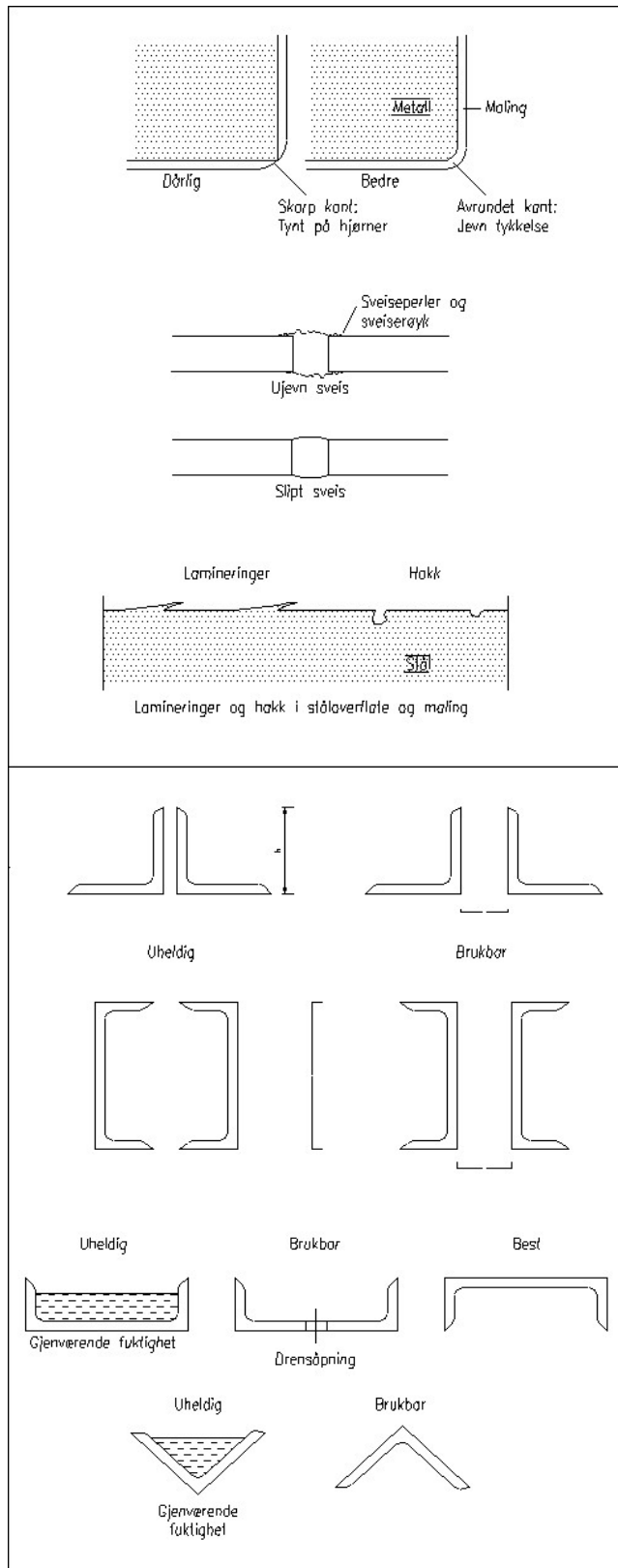
All sharp edges shall be rounded to a diameter of 2 mm minimum.

All welds shall be cleaned from slag and grinded.  
Weld spatter shall be removed.

Laminations and nicks in the steel surface shall be grinded out.

The construction shall be designed in such a manner that difficult access for painting and or maintenance can be avoided.

The construction shall be designed to avoid gathering of water, dirt and pollution.



## Colors

### Pipe System:

*Heat System	Green	RAL 6000
*Cooling System	Blue	RAL 5012
*Sanitary System	Yellow Green	RAL 6018
*Oils	Brown	RAL 8004
*Gases, Flammable	Ochre Yellow	RAL 1007
*Gases, Non-Flammable	Gray	RAL 7004
*Acids and Alkalis	Light Violet	RAL 4005
*Pressurized Air	Light Blue	RAL 5024
*Vacuum Cleaner Pipes	Ruby Red	RAL 3003

### Machine Constructions:

*Indoor Steel Structures	Blue	RAL 5012
*Outdoor Steel Structures	Gray	RAL 7038

*Moveable parts that may cause injury	Yellow	RAL 1023
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*Lifting Equipment	Yellow	RAL 1023
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### Electrical Cabinets:

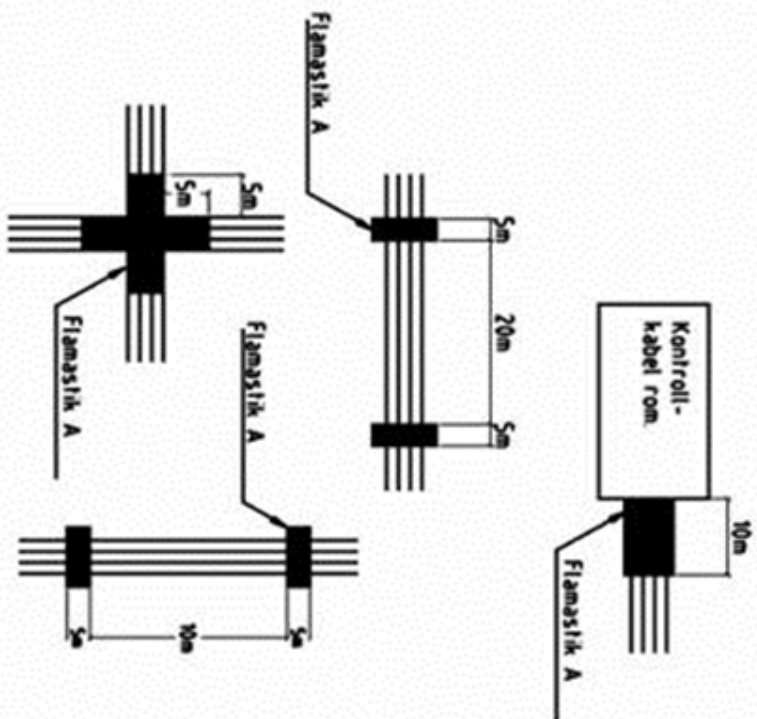
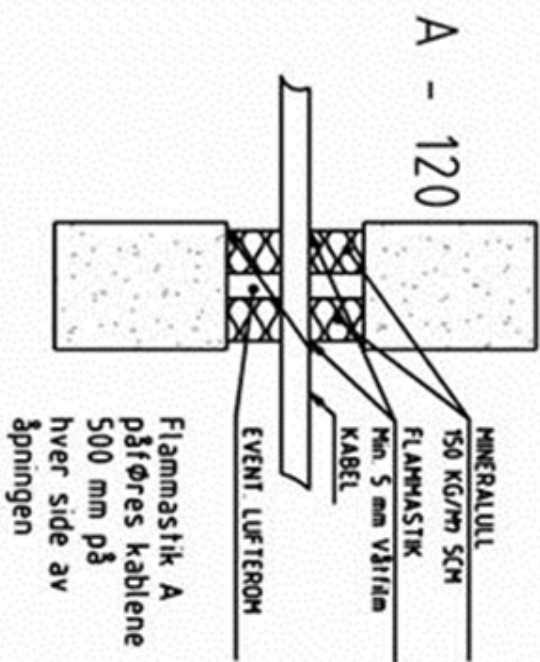
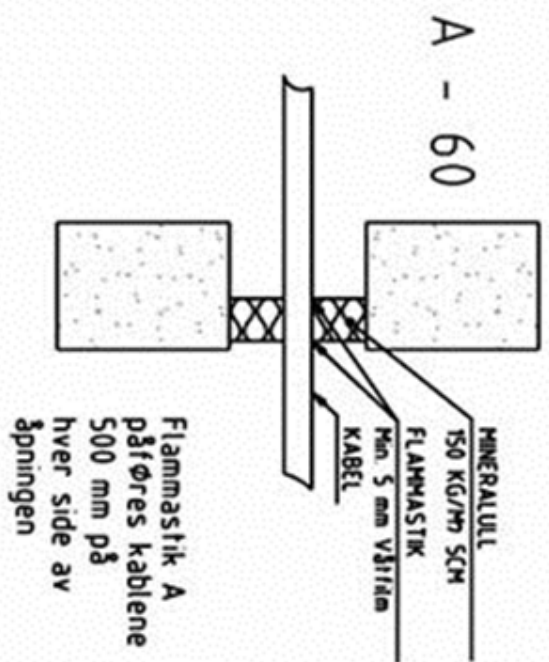
*Steel Structures	Gray	RAL 7030
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### Steel Building Structures:

*Indoors and outdoors	Gray	RAL 7038
*Railings - indoors	Yellow	RAL 1023

### Containers:

*Anode remnants	Yellow	RAL 1004
*Used tires	Yellow	RAL 1004
*Cable Stubs	Yellow	RAL 1004
*Aluminum	Aluminum	RAL 9006
*Discarded glass	Yellow	RAL 1004
*Paper	Blue	RAL 5007
*Other waste	Green	RAL 6002
*Iron scraps	Red Brown	RAL 3009
*Fiber waste	Yellow	RAL 1004
*Wood waste	Beige	RAL 1001



## VISER TIL MONTERINGSANVISNING

A Laga dreg Tegning		hsh/24.10.2018	
Sym	Forandring	Sign./Date	
103			
BRAUNNSIKRING AV KABEL- GJENNOMFØRINGER OG KABELGATER		24479-1	
15		SORAL	
24479-1		24479-1	